



2025 Evolut Clinical Guidelines for Medical Necessity Review

ADVANCED IMAGING GUIDELINES

Effective January 1, 2025 – December 31, 2025

Guidelines for Clinical Review Determination

Preamble

Evolent is committed to the philosophy of supporting safe and effective treatment for patients. The medical necessity criteria that follow are guidelines for the provision of diagnostic imaging. These criteria are designed to guide both providers and reviewers to the most appropriate diagnostic tests based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice will be used when applying the guidelines. Determinations are made based on both the guideline and clinical information provided at the time of the request. It is expected that medical necessity decisions may change as new evidence-based information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient.

Guideline Development Process

These medical necessity criteria were developed by Evolent for the purpose of making clinical review determinations for requests for therapies and diagnostic procedures. The developers of the criteria sets included representatives from the disciplines of radiology, internal medicine, nursing, cardiology, and other specialty groups. Evolent's guidelines are reviewed yearly and modified when necessary following a literature search of pertinent and established clinical guidelines and accepted diagnostic imaging practices.

All inquiries should be directed to:

Evolent Specialty Services, Inc.

c/o Privacy

1812 N. Moore St, Suite 1705, Arlington, VA 22209

Fax 800-830-1762 / Privacy@Evolent.com

TABLE OF CONTENTS

ADVANCED IMAGING GUIDELINES

70336 – MRI TEMPOROMANDIBULAR JOINT
70450 – CT HEAD/BRAIN
70480 – CT TEMPORAL, BONE, MASTOID, ORBIT
70486 – CT MAXILLOFACIAL/SINUS
70490 – CT SOFT TISSUE NECK
70496 – CT ANGIOGRAPHY, HEAD
70498 – CT ANGIOGRAPHY, NECK
70540 – MRI ORBIT, FACE, AND/OR NECK
70544 – MR ANGIOGRAPHY HEAD/BRAIN
70547 – MR ANGIOGRAPHY NECK
70551 – MRI BRAIN (INCLUDES INTERNAL AUDITORY CANAL)
70554 – FUNCTIONAL MRI BRAIN
71250 – CT CHEST (THORAX)
71271 – LOW DOSE CT FOR LUNG CANCER SCREENING
71275 – CT ANGIOGRAPHY, CHEST (NON CORONARY)
71550 – MRI CHEST (THORAX)
71555 – MR ANGIOGRAPHY CHEST
72125 – CT CERVICAL SPINE
72128 – CT THORACIC SPINE
72131 – CT LUMBAR SPINE
72141 – MRI CERVICAL SPINE
72146 – MRI THORACIC SPINE
72148 – MRI LUMBAR SPINE
72159 – MR ANGIOGRAPHY SPINAL CANAL
72191 – CT ANGIOGRAPHY, PELVIS
72192 – CT PELVIS
72196 – MRI PELVIS
72198 – MR ANGIOGRAPHY, PELVIS
73200 – CT UPPER EXTREMITY
73206 – CT ANGIOGRAPHY, UPPER EXTREMITY
73220 – MRI UPPER EXTREMITY
73225 – MR ANGIOGRAPHY UPPER EXTREMITY
73700 – CT LOWER EXTREMITY
73706 – CT ANGIOGRAPHY, LOWER EXTREMITY
73720 – MRI LOWER EXTREMITY
73725 – MR ANGIOGRAPHY, LOWER EXTREMITY
74150 – CT ABDOMEN
74174 – CT ANGIOGRAPHY, ABDOMEN AND PELVIS
74175 – CT ANGIOGRAPHY, ABDOMEN
74176 – CT ABDOMEN AND PELVIS COMBINATION

74181 – MRI MRCP ABDOMEN
74185 – MR ANGIOGRAPHY, ABDOMEN
74261 – CT COLONOSCOPY DIAGNOSTIC (VIRTUAL)
74263 – CT COLONOSCOPY SCREENING (VIRTUAL)
74712 – FETAL MRI
75557 – MRI HEART
75571 – ELECTRON BEAM TOMOGRAPHY (EBCT)
75572 – CT HEART
75573 – CT HEART CONGENITAL STUDIES
75574 – CTA CORONARY ARTERIES (CCTA)
75635 – CT ANGIOGRAPHY, ABDOMINAL ARTERIES
76376 – 3D RENDERING (CT MULTIPLANAR RECONSTRUCTION)
76380 – FOLLOW-UP, LIMITED OR LOCALIZED (SEE CT MAXILLOFACIAL/SINUS)
76390 – MR SPECTROSCOPY
76391 – MAGNETIC RESONANCE ELASTOGRAPHY (MRE)
76497 – UNLISTED CT PROCEDURE (SEE UNLISTED STUDIES)
76498 – UNLISTED MRI PROCEDURE (SEE UNLISTED STUDIES)
77012 – CT NEEDLE GUIDANCE
77021 – MRI NEEDLE GUIDANCE
77046 – MRI BREAST
77078 – CT BONE DENSITY STUDY
77084 – MRI BONE MARROW
78429 – HEART PET WITH CT FOR ATTENUATION
78451 – MYOCARDIAL PERFUSION IMAGING
78459 – PET SCAN, HEART (CARDIAC)
78472 – MUGA SCAN
78608 – PET SCAN, BRAIN
78803 – RADIOPHARMACEUTICAL TUMOR LOCALIZATION (SPECT), SINGLE AREA
78813 – PET SCANS
78816 – PET SCANS WITH CT ATTENUATION
0042T – CEREBRAL PERFUSION CT
G0219 – PET IMAGING WHOLE BODY, MELANOMA - NONCOVERED
G0235 – PET IMAGING, ANY SITE, NOT OTHERWISE SPECIFIED
G0252 – PET IMAGING, INITIAL DIAGNOSIS OF BREAST CANCER
S8042 – LOW FIELD MRI

EVOLENT CLINICAL GUIDELINE 007 FOR TEMPOROMANDIBULAR JOINT (TMJ) MRI

Guideline or Policy Number: Evolent_CG_007	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2003 - 2025 Evolent. All rights Reserved.		
Original Date: May 2003	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS FOR TEMPOROMANDIBULAR JOINT (TMJ) MRI.....	2
EVALUATION OF TEMPOROMANDIBULAR JOINT DYSFUNCTION (TMD)	2
<i>Suspected Internal Joint Derangement</i>	2
EVALUATION OF JUVENILE IDIOPATHIC ARTHRITIS (JIA)	2
ABNORMAL INITIAL X-RAY OR ULTRASOUND.....	2
PRE-OPERATIVE EVALUATION	3
POST-OPERATIVE EVALUATION	3
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	3
CODING AND STANDARDS	3
CODING	3
<i>CPT Codes</i>	3
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	4
<i>Temporomandibular Joint Dysfunction (TMD)</i>	4
<i>TMD Etiologies</i>	4
<i>TMD Imaging</i>	4
<i>TMD Conservative Care</i>	4
CONTRAINDICATIONS AND PREFERRED STUDIES	5
POLICY SUMMARY.....	5
<i>Summary</i>	5
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL.....	5
<i>Committee</i>	5
DISCLAIMER.....	5
REFERENCES.....	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Imaging can assist in the diagnosis of TMJ dysfunction (TMD) when history and physical examination findings are equivocal.

INDICATIONS FOR TEMPOROMANDIBULAR JOINT (TMJ) MRI

Evaluation of Temporomandibular Joint Dysfunction (TMD)

Suspected Internal Joint Derangement ^(1,2,3)

- Persistent symptoms of facial or jaw pain, restricted range of motion, pain and/or noise with TMJ function (i.e., chewing) **AND**
- Conservative therapy with a trial of anti-inflammatory **AND** behavioral modification* has been unsuccessful for at least four (4) weeks
- *Behavioral modification may include patient education, self-care, cognitive behavior therapy, physical therapy, and occlusal devices.

Note: X-ray should be the initial study if there is recent trauma, dislocation, malocclusion, or dental infection

Evaluation of Juvenile Idiopathic Arthritis (JIA) ^(2,4,5)

Abnormal Initial X-ray or Ultrasound ⁽²⁾

Additional imaging is needed.

Pre-Operative Evaluation ⁽⁶⁾

Candidates for orthognathic surgery

Post-Operative Evaluation ⁽⁷⁾

Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

70336

Applicable Lines of business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Temporomandibular Joint Dysfunction (TMD)

Temporomandibular joint (TMJ) dysfunction causes pain and dysfunction in the jaw joint and muscles controlling jaw movement. Symptoms may include jaw pain, masticator muscle stiffness, limited movement or locking of the jaw, clicking or popping in jaw joint when opening or closing the mouth, and a change in how the upper and lower teeth fit together. The cause of the condition is not always clear but may include acute or chronic trauma to the jaw or temporomandibular joint, e.g., grinding of teeth, clenching of jaw, or impact in an accident. Osteoarthritis or rheumatoid arthritis may also contribute to the condition.

TMD Etiologies

Etiologies of TMJ dysfunction (TMD) include intra-articular (intracapsular) and extra-articular (extracapsular pathology). Intra-articular (intracapsular pathology), such as disc displacement and coexisting osteoarthritis or degenerative joint disease, is considered the most common cause of serious TMJ pain and dysfunction and the most likely to be treated surgically. Extra-articular (extracapsular pathology) includes musculoskeletal (bone, masticatory muscles and tendons) and central nervous system/peripheral nervous system.⁽⁸⁾

TMD Imaging

Imaging can assist in the diagnosis of TMD when history and physical examination findings are equivocal. The initial study should be plain radiography (transcranial and transmaxillary views) or panoramic radiography when there is recent trauma, dislocation, malocclusion, or dental infection.⁽³⁾ Ultrasound is an inexpensive and easily performed imaging modality that can also be used to evaluate the TMJ.⁽²⁾ CT is useful to evaluate the bony structures of the TMJ when there is suspicion of bony involvement (i.e., fractures, erosions, infection, invasion by tumor, as well as congenital anomalies).⁽²⁾ Magnetic resonance imaging (MRI) has the highest sensitivity, specificity, and accuracy in the evaluation of temporomandibular joint dysfunction and provides tissue contrast for visualizing the soft tissue and periarticular structures of the TMJ.

TMD Conservative Care

Conservative care for TMD includes patient education, self-care, behavioral modification, cognitive behavioral therapy/biofeedback, medication, physical therapy, and occlusive devices. Medications includes NSAIDs and muscle relaxants (for spasms) and in chronic cases benzodiazepines or antidepressants.

There is lack of high-quality evidence and uncertainty about the effectiveness of manual therapy and therapeutic physical therapy in treating TMJ dysfunction.⁽⁹⁾

The use of occlusive splints is thought to alleviate some of the degenerative forces on the TMJ which may be helpful in patients with bruxism or nocturnal teeth clenching. Preferred

devices are unclear from the literature and dental consultation is required.⁽³⁾ In systematic reviews, there has been short-term benefit observed from splinting but no clear role in the overall long-term treatment of TMD patients.^(10,11)

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY SUMMARY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Added Contraindications and Preferred Studies section
April 2023	<ul style="list-style-type: none"> • Updated references • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of



their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Jeon K, Lee C, Choi Y, Han S. Analysis of three-dimensional imaging findings and clinical symptoms in patients with temporomandibular joint disorders. *Quantitative imaging in medicine and surgery*. 2021; 11: 1921-1931. 10.21037/qims-20-857.
2. Gharavi S, Qiao Y, Faghihimehr A, Vossen I. Imaging of the Temporomandibular Joint. *Diagnostics* (Basel, Switzerland). 2022; 12: 10.3390/diagnostics12041006.
3. Gauer R, Semidey M. Diagnosis and treatment of temporomandibular disorders. *Am Fam Physician*. 2015; 91: 378-86.
4. Schmidt C, Ertel T, Arbogast M, Hügler B, Kalle T. The Diagnosis and Treatment of Rheumatoid and Juvenile Idiopathic Arthritis of the Temporomandibular Joint. *Deutsches Arzteblatt international*. 2022; 119: 47-54. 10.3238/arztebl.m2021.0388.
5. Bollhalder A, Patcas R, Eichenberger M, Müller L, Schroeder-Kohler S et al. Magnetic Resonance Imaging Followup of Temporomandibular Joint Inflammation, Deformation, and Mandibular Growth in Juvenile Idiopathic Arthritis Patients Receiving Systemic Treatment. *The Journal of rheumatology*. 2020; 47: 909-916. 10.3899/jrheum.190168.
6. Krishnan B, Parida S. Preoperative Evaluation and Investigations for Maxillofacial Surgery. Bonanthaya, K., Panneerselvam, E., Manuel, S., Kumar, V.V., Rai, A. (eds) *Oral and Maxillofacial Surgery for the Clinician*. Springer, Singapore. 2021; 11 - 24. 10.1007/978-981-15-1346-6_2.
7. Hoffman D, Puig L. Complications of TMJ surgery. *Oral Maxillofac Surg Clin North Am*. 2015; 27: 109-24. 10.1016/j.coms.2014.09.008.
8. American Society of Temporomandibular Joint Surgeons. Guidelines for diagnosis and management of disorders involving the temporomandibular joint and related musculoskeletal structures. *Cranio*. 2003; 21: 68-76.
9. Armijo-Olivo S, Pitance L, Singh V, Neto F, Thie N. Effectiveness of Manual Therapy and Therapeutic Exercise for Temporomandibular Disorders: Systematic Review and Meta-Analysis. *Phys Ther*. 2016; 96: 9-25. 10.2522/ptj.20140548.
10. Kuzmanovic P, Pficer J, Dodic S, Lazic V, Trajkovic G, Milic N. Occlusal stabilization splint for patients with temporomandibular disorders: Meta-analysis of short and long term effects. *PLoS One*. 2017; 12: e0171296. 10.1371/journal.pone.0171296.
11. Zhang C, Wu J Y, Deng D, He B, Tao Y et al. Efficacy of splint therapy for the management of temporomandibular disorders: a. *Oncotarget*. 2016; 7: 84043-84053. 10.18632/oncotarget.13059.



EVOLENT CLINICAL GUIDELINE 002 FOR BRAIN CT

Guideline or Policy Number: Evolent_CG_002	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
SPECIAL NOTE	3
PURPOSE	3
<i>Brain CT</i>	3
INDICATIONS	4
HEADACHE	4
<i>Evaluation of Headache</i>	4
<i>Special Considerations in the Pediatric Population with Persistent Headache</i>	5
NEUROLOGICAL SYMPTOMS OR DEFICITS	5
STROKE AND VASCULAR DISEASE	5
<i>Evaluation of Known or Suspected Stroke</i>	5
<i>Evaluation of Known or Suspected Vascular Disease</i>	5
HEAD TRAUMA	6
<i>Evaluation of Known or Suspected Trauma</i>	6
BRAIN TUMOR, MASS, OR METASTASIS	6
<i>Evaluation of Suspected Tumor/Mass/Cyst</i>	6
<i>Evaluation of Known Brain Lesion/Cyst</i>	7
CT FOR KNOWN CANCER	7
<i>Combination Studies for Initial Staging, Active Monitoring, or Evaluation of Suspected Metastases #</i>	7
SEIZURE DISORDERS	8
<i>For Evaluation of Known or Suspected Seizure Disorder</i>	8
INFECTIOUS OR INFLAMMATORY DISEASE	8
<i>Evaluation of Known or Suspected Infection or Inflammatory Disease #</i>	8
COGNITIVE IMPAIRMENT	8
<i>Evaluation of Cognitive Impairment</i>	8
MOVEMENT DISORDERS	9
<i>Evaluation of Movement Disorders #</i>	9
CRANIAL NERVE AND VISION ABNORMALITIES	9
<i>Vision Abnormalities #</i>	9
<i>Other Cranial Neuropathies</i>	9
CONGENITAL ABNORMALITIES	10
<i>Evaluation of Known or Suspected Congenital Abnormalities</i>	10

CEREBROSPINAL FLUID ABNORMALITIES	10
<i>Evaluation of Known or Suspected CSF Abnormalities</i>	10
PROCEDURAL EVALUATIONS	11
<i>Preoperative/Procedural Evaluation</i>	11
<i>Postoperative/Procedural Evaluation</i>	11
PRIOR IMAGING	11
<i>Further Evaluation of Indeterminate Findings on Prior Imaging</i>	11
OTHER INDICATIONS	11
COMBINATION STUDIES	12
<i>Note:</i>	12
<i>Brain CT and Brain CTA</i>	13
<i>Brain CT and/or Brain CTA and/or Neck CTA</i>	13
<i>Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any combination) #</i>	13
<i>Brain CT and Orbit CT</i>	14
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	14
CODING AND STANDARDS	15
CODING	15
<i>CPT Codes</i>	15
APPLICABLE LINES OF BUSINESS	15
BACKGROUND	15
CONTRAINDICATIONS AND PREFERRED STUDIES	15
HEADACHE AND MIGRAINE	15
DEFINITIONS	16
LEPTOMENINGEAL CARCINOMATOSIS	17
DROP METASTASES	17
MENINGITIS	17
NORMAL PRESSURE HYDROCEPHALUS	17
MACROCEPHALY	17
CONGENITAL ABNORMALITIES	18
ANOSMIA	18
CRANIAL NERVES	18
TUMORS	18
HEAD TRAUMA	19
CENTRAL VENOUS THROMBOSIS	19
STROKE/TIA	19
NEUROLOGICAL DEFICITS	20
POLICY HISTORY	20
<i>Summary</i>	20
LEGAL AND COMPLIANCE	21
GUIDELINE APPROVAL	21
<i>Committee</i>	21
DISCLAIMER	21
REFERENCES	22

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

Brain CT/CTA are not approvable simultaneously unless they meet the criteria described below in the Indications for Brain CT/Brain CTA combination studies section. If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation OR
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.
- (*Unless approvable in the **combination section** as noted in the guidelines)

Purpose

Brain CT

Computed tomography (CT) is an imaging technique used to view the structures of the brain and is useful in evaluating pathologies in the brain. It provides more detailed information on head trauma, brain tumors, stroke, and other pathologies in the brain than regular radiographs.

Important Note: Brain MRI is preferred to Brain CT in most circumstances where the patient can tolerate MRI and sufficient time is available to schedule the MRI examination.

Assessment of subarachnoid hemorrhage, acute trauma, or bone abnormalities of the calvarium (fracture, etc.) may be better imaged with CT. CT is also appropriate in an urgent situation where MRI is not readily available (stroke, increased ICP, CNS infection).

— Designates CT is indicated only when MRI is contraindicated or cannot be performed

INDICATIONS

Headache

Evaluation of Headache

- Chronic headache with a change in character/pattern (e.g., more frequent, increased severity, or duration) ⁽¹⁾ #
- Cluster headaches or other trigeminal-autonomic cephalgias, i.e., paroxysmal hemicrania, hemicrania continua, short-lasting unilateral neuralgiform headache attacks (SUNCT/SUNA) imaging is indicated once to eliminate secondary causes ^(1,2) #
- Acute headache, sudden onset:
 - With a personal or family history (brother, sister, parent, or child) of brain aneurysm or AVM (arteriovenous malformation) **OR**
 - < 48 hours of “worst headache in my life” or “thunderclap” headache (Sudden onset new headache reaching maximum intensity within 2-3 minutes, lasting more than 5 minutes).
 - Prior history of stroke or intracranial bleed
 - Known coagulopathy or on anticoagulation
- New onset of headache with any of the following ^(1,3,4):
 - Acute, new, or fluctuating neurologic deficits, such as sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes or with signs of increased intracranial pressure (papilledema). (See background) #
 - History of cancer or significantly immunocompromised #
 - Fever
 - Subacute head trauma
 - Age ≥ 50 ^(1,3) #
 - Severe unilateral headache with radiation to or from the neck, associated with suspicion of carotid or vertebral artery dissection #
 - Related to activity or event (sexual activity, exertion, Valsalva, position), new or progressively worsening ^(1,5,6,7) #
 - Persistent or progressively worsening during a course of physician-directed treatment ⁽¹⁾ #

Note: Neuroimaging warranted for atypical/complex migraine aura, but not for a typical migraine aura ⁽¹⁾ (see background)

Special Considerations in the Pediatric Population with Persistent Headache ^(8,9)

- Occipital location #
- Age < 6 years #
- Symptoms indicative of increased intracranial pressure, such as recurring headaches after waking with or without associated nausea/vomiting #
- Documented absence of family history of headache #
- Severe headache in a child with an underlying disease that predisposes to intracranial pathology (e.g., immune deficiency, sickle cell disease, neurofibromatosis, history of neoplasm, coagulopathy, hypertension, congenital heart disease)

Neurological Symptoms or Deficits

Acute, new, or fluctuating neurologic symptoms or deficits such as, sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes (see background).

Stroke and Vascular Disease

Evaluation of Known or Suspected Stroke ^(15,16)

- Known or suspected stroke with any acute, new, or fluctuating symptoms or deficits such as sensory deficits, limb weakness, speech difficulties, visual loss, lack of coordination, or mental status changes (see background)
- Suspected stroke with a personal or first-degree family history (brother, sister, parent, or child) of aneurysm or known coagulopathy or on anticoagulation
- Symptoms of transient ischemic attack (TIA) (episodic neurologic symptoms such as sensory deficits, limb weakness, speech difficulties, visual loss, lack of coordination, or mental status changes) #
- Evaluation of neurological signs or symptoms in sickle cell disease ^(17,18) #
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity >200 ⁽¹⁹⁾ #

Evaluation of Known or Suspected Vascular Disease

- Evaluation of suspected acute subarachnoid hemorrhage (SAH)
- Suspected central venous thrombosis - see background ^(20,21) #

- Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms #
- Follow-up for known hemorrhage, hematoma, or vascular abnormalities

Head Trauma

Evaluation of Known or Suspected Trauma ^(22,23,24)

- Known or suspected trauma or injury to the head with documentation of one or more of the following acute, new, or fluctuating:
 - Focal neurologic findings
 - Motor changes
 - Mental status changes
 - Amnesia
 - Vomiting
 - Seizures
 - Headache
 - Signs of increased intracranial pressure
- Known coagulopathy or on anticoagulation
- Known or suspected skull fracture by physical exam and/or prior imaging
- Repeat scan 24 hours post head trauma for anticoagulated patients with suspected diagnosis of delayed subdural hematoma
- Post concussive syndrome if persistent or disabling symptoms and imaging has not been performed
- Subacute or chronic traumatic brain injury with new cognitive and/or neurologic deficit #

Brain Tumor, Mass, or Metastasis

Evaluation of Suspected Tumor/Mass/Cyst ^(1,25)

- Suspected brain tumor with any acute, new, or fluctuating neurologic symptoms or deficits such as sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes (see **background**) #
- Lesion with atypical features for further evaluation or follow up
- Histiocytic Neoplasms for screening and/or with neurological signs or symptoms

- Erdheim-Chester Disease
- Langerhans Cell Histiocytosis
- Rosai-Dorfman Disease

Note: Suspected Pituitary Tumors (Brain MRI is the study of choice if indicated) or Sella CT if MRI is contraindicated or cannot be performed

Note: Screening for hereditary cancers syndromes (Brain MRI is the study of choice if indicated)

Evaluation of Known Brain Lesion/Cyst

- Bone tumor or abnormality of the skull ⁽²⁶⁾
- Histiocytic Neoplasms to assess treatment response and surveillance of known brain/skull lesions ^(27,28)
 - Erdheim-Chester Disease
 - Langerhans Cell Histiocytosis
 - Rosai-Dorfman Disease

Note: Known pituitary tumors (Brain MRI is the study of choice if indicated) or Sella CT if MRI is contraindicated or cannot be performed

CT for Known Cancer

MRI is the ideal modality to follow-up meningioma, pituitary tumors, low grade tumors, neurocutaneous syndromes, and screening/restaging/surveillance for non-CNS cancers. CT should only be used when MRI is contraindicated or is unable to be obtained.

MRI is appropriate for **any malignancy when there are signs or symptoms of brain metastases** (e.g., headache, sensory deficits, memory problems). There does not need to be a neuro deficit on exam or other workup done first for a patient with cancer.

Combination Studies for Initial Staging, Active Monitoring, or Evaluation of Suspected Metastases # ⁽²⁵⁾

≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine

Seizure Disorders

For Evaluation of Known or Suspected Seizure Disorder ^(29,30,31)

- New onset of seizures or newly identified change in seizure activity/pattern # (Brain MRI is the study of choice if indicated)

Infectious or Inflammatory Disease

Evaluation of Known or Suspected Infection or Inflammatory Disease #

- Suspected intracranial abscess or brain infection with acute altered mental status or with positive lab findings (such as elevated WBCs) OR follow-up assessment during or after treatment completed.
- Meningitis with positive signs and symptoms (such as fever, headache, mental status changes, stiff neck) **OR** with positive lab findings (such as elevated white blood cells or abnormal lumbar puncture fluid exam) ⁽³²⁾
- Suspected encephalitis with headache and altered mental status or follow-up as clinically warranted
- Endocarditis with suspected septic emboli
- Central Nervous System (CNS) involvement in patients with known or suspected vasculitis or autoimmune disease with abnormal inflammatory markers or autoimmune antibodies
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ⁽³³⁾
- Immunocompromised patient (e.g., transplant recipients, HIV with CD4<200, primary immunodeficiency syndromes, hematologic malignancies) with focal neurologic symptoms, headaches, behavioral, cognitive or personality changes

Cognitive Impairment

Evaluation of Cognitive Impairment ^(34,35)

- Mental status score of either MMSE or MoCA of less than 26 or other similar mental status instruments*/formal neuropsychological testing showing at least mild cognitive impairment **AND** a completed basic metabolic workup (such as thyroid function testing, liver function testing, complete blood count, electrolytes, and B12) #
- *Other examples include Mini-Cog, Memory Impairment Screen, Saint Louis University Mental Status Examination (SLUMS), Brief Alzheimer's Screen (BAS), Blessed Dementia Scale (BDS), Clinical Dementia Rating (CDR) ^(36,37)

Movement Disorders

Evaluation of Movement Disorders # ^(11,38)

- For evaluation of acute onset of a movement disorder with concern for stroke or hemorrhage
- For evaluation of suspected Parkinson's with atypical feature or unresponsive to levodopa
- **Note:** Atypical parkinsonian syndromes include progressive supranuclear palsy (PSP), multiple system atrophy (MSA), corticobasal degeneration (CBD), and dementia with Lewy bodies.
- For the evaluation of other movement disorder to exclude a structural lesion (i.e., suspected Huntington disease, chorea, hemiballismus, atypical dystonia)

Note: CT has limited utility in the chronic phases of disease. Brain MRI is the study of choice if indicated. Imaging is not indicated in essential tremor, Tourette' syndrome or isolated focal dystonia (e.g., blepharospasm, cervical dystonia, laryngeal dystonia, oromandibular dystonia, writer's dystonia) ^(38,39).

Cranial Nerve and Vision Abnormalities

Vision Abnormalities #

- Abnormal eye findings on physical or neurologic examination (papilledema, pathologic nystagmus, optic atrophy, ocular nerve palsies, new onset anisocoria, visual field deficit, etc.) **Note:** See background
- Binocular diplopia with concern for intracranial pathology after comprehensive eye evaluation ⁽⁴⁰⁾
- Childhood strabismus with development delay or abnormal fundoscopic exam to rule out intracranial abnormalities ⁽⁴¹⁾
- Horner's syndrome with symptoms localizing the lesion to the central nervous system ⁽⁴²⁾

Other Cranial Neuropathies

- Evaluation of cranial nerve palsy/neuropathy/neuralgia when thought to be due to tumor, stroke, or bony abnormalities of the skull base or when MRI is contraindicated or cannot be performed
- Bulbar symptoms, i.e., difficulty in chewing, weakness of the facial muscles, dysarthria, palatal weakness, dysphagia, and dysphonia and/or signs, i.e., atrophy and fasciculations of the tongue and absent gag reflex ⁽⁴³⁾ **#**

- Pseudobulbar symptoms, i.e., dysphagia, dysarthria, facial weakness, sudden, stereotyped emotional outbursts that are not reflective of mood and/or signs, i.e., spastic tongue and exaggerated gag/jaw jerk ⁽⁴⁴⁾ #

Congenital Abnormalities

Evaluation of Known or Suspected Congenital Abnormalities

- Known or suspected congenital abnormality with any acute, new, or fluctuating neurologic, motor, or mental status changes
- Evaluation of macrocephaly in an infant/child <18 with previously abnormal US, abnormal neurodevelopmental examination, signs of increased ICP or closed anterior fontanelle ⁽⁴⁵⁾ #
- Evaluation of microcephaly in an infant/child < 18 ⁽⁴⁶⁾ #
- Evaluation of craniosynostosis and other skull deformities. ^(47,48)
- Evaluation of the corticomedullary junction in Achondroplasia ⁽⁴⁹⁾ #
- Cerebral palsy if etiology has not been established in the neonatal period, there is change in the expected clinical or developmental profile or concern for progressive neurological disorder ⁽⁵⁰⁾
- Prior treatment **OR** treatment planned for congenital abnormality

Note: For evaluation of known or suspected hydrocephalus please see section on CSF abnormalities.

Cerebrospinal Fluid Abnormalities

Evaluation of Known or Suspected CSF Abnormalities

- Evaluation of suspected hydrocephalus with any acute, new, or fluctuating neurologic, motor, or mental status changes
- Known hydrocephalus*
- For initial evaluation of a suspected Arnold Chiari malformation ⁽⁵¹⁾ *#
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms ⁽⁵²⁾ #
- Initial evaluation for a known syrinx or syringomyelia*#
- Known or suspected normal pressure hydrocephalus (NPH) ⁽⁵³⁾
 - With symptoms of gait difficulty, cognitive disturbance, and urinary incontinence
- Follow-up shunt evaluation ^(54,55,56)

- Post operativity if indicated based on underlying disease or pre-operative radiographic findings and/or
- 6-12 months after placement and/or
- With neurologic symptoms that suggest shunt malfunction
- Evaluation of known or suspected cerebrospinal fluid (CSF) leakage ⁽⁵⁷⁾
- Cisternography for intermittent and complex CSF rhinorrhea/otorrhea. CSF fluid should always be confirmed with laboratory testing (Beta-2 transferrin assay) ^(57,58)
- Suspected spontaneous intra-cranial hypotension with distinct postural headache (other symptoms include nausea, vomiting, dizziness, tinnitus, diplopia neck pain or imbalance) ^(1,59) #

*Often congenital, but can present later in life; or less commonly acquired secondary to tumor, stroke, trauma, infection, etc.

Procedural Evaluations

Preoperative/Procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure

Postoperative/Procedural Evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Prior Imaging

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Other Indications

- Vertigo associated with any of the following ⁽¹⁰⁾ #

- Signs or symptoms suggestive of a CNS lesion (ataxia, visual loss, double vision, weakness, or a change in sensation)
- Progressive unilateral hearing loss
- Risk factors for cerebrovascular disease with concern for stroke
- After full neurologic examination and vestibular testing with concern for central vertigo (i.e., skew deviation, vertical nystagmus, head thrust test, videonystagmography (VNG)/ electronystagmography (ENG))
- Diagnosis of central sleep apnea on polysomnogram #
 - Children > 1 year ⁽⁶⁰⁾
 - Adults in the absence of heart failure, chronic opioid use, high altitude, or treatment emergent central sleep apnea **AND** concern for a central neurological cause (Chiari malformation, tumor, infectious/inflammatory disease) **OR** with an abnormal neurological exam
- Syncope with clinical concern for seizure or associated neurological signs or symptoms ^(61,62) #
- Cyclical vomiting syndrome or abdominal migraine with any localizing neurological symptoms ^(63,64) #
- Soft tissue mass of the head with nondiagnostic initial evaluation (ultrasound and/or radiograph) ^(65,66,67) #
- Psychological changes with neurological deficits on exam or after completion of a full neurological assessment that suggests a possible neurologic cause ⁽⁶⁸⁾ #
- Global developmental delay or developmental delay with abnormal neurological examination in a child < 18 years ^(69,70) #
- Unexplained event (BRUE) formerly apparent life-threatening event (ALTE) in infants < 1 year with concern for neurological cause based on history and exam ⁽⁷¹⁾ #
 - Imaging is not indicated in low risk patients
- Prior to lumbar puncture in patients with suspected increased intracranial pressure or at risk for herniation

Combination Studies

Note:

These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the neuroaxis), patient history, and other available information, including prior imaging.

Exception: Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology

Brain CT and Brain CTA

- Recent ischemic stroke or transient ischemic attack (TIA) when MRI is contraindicated or cannot be performed ^(72,73)
- Acute, sudden onset of headache with personal history of a vascular abnormality or first-degree family history of aneurysm ^(74,75)
- Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH ⁽⁷⁵⁾
- Headache associated with exercise, exertion, Valsalva or sexual activity when MRI is contraindicated or cannot be performed ⁽⁷⁶⁾
- Suspected venous thrombosis (dural sinus thrombosis) and MRI is contraindicated or cannot be performed ⁽⁷³⁾ – CT/CTV**
- Neurological signs or symptoms in sickle cell patients when MRI is contraindicated or cannot be performed ⁽¹⁷⁾
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200 when MRI is contraindicated or cannot be performed ⁽¹⁷⁾
- Known Moyamoya disease ^(77,78) or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms ^(75,79)
- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies when MRI is contraindicated or cannot be performed ⁽⁷⁴⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up when MRI is contraindicated or cannot be performed ^(74,80,81)

Brain CT and/or Brain CTA and/or Neck CTA

- Recent stroke or transient ischemic attack (TIA)
- Suspected or known carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- ***Note:** MRA and CTA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can alternatively be combined with Brain CTA/Neck CTA.

Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any combination) #

- For initial evaluation of a suspected Arnold Chiari malformation

- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms (82,83,84,85)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (CT spine imaging in this scenario is usually CT myelogram) see background
 - Suspected leptomeningeal carcinomatosis (see background) (86)
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula - CT spine imaging in this scenario is usually CT myelogram)

Brain CT and Orbit CT

- If MRI is contraindicated or cannot be performed;
 - Optic neuropathy or unilateral optic disk swelling of unclear etiology to distinguish between a compressive lesion of the optic nerve, optic neuritis, ischemic optic neuropathy (arteritic or non-arteritic), central retinal vein occlusion, or optic nerve infiltrative disorders⁽⁸⁷⁾
 - Bilateral optic disk swelling (papilledema) with vision loss⁽⁸⁸⁾
 - Approved indications as noted above and being performed in high-risk populations and will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology⁽⁸⁸⁾

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine

CODING AND STANDARDS

Coding

CPT Codes

70450, 70460, 70470, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why and MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Headache and Migraine

Headache timeframes and other characteristics – Headaches can be classified as acute, subacute or chronic. Acute headaches are present from hours to days, subacute from days to weeks and chronic headaches for more than 3 months. Acute severe headaches are more likely to be pathological (e.g., SAH, cerebral venous thrombosis) than non-acute (e.g., migraine, tension-type). Headaches can also be categorized as new onset or chronic/recurrent. Non-acute new onset headaches do not require imaging unless there is a red flag as delineated above. Incidental findings lead to additional medical procedures and expense that do not improve patient well-being. Primary headache syndromes, such as migraine and tension headaches, are often episodic with persistent or progressive headache not responding to treatment requiring further investigation (e.g., new daily persistent headache). Imaging is indicated in chronic headaches if there is a change in the headache frequency (number of headache episodes/month), duration of each episode, severity of the

headaches or new characteristics, such as changing aura or associated symptoms.
(1,2,89,90,91,92,93,94,95)

Migraine with aura ^(2,3,96) – The headache phase of a migraine is preceded and/or accompanied by transient neurological symptoms referred to as aura in at least a third of migraine attacks. Migraine with typical aura consists of visual and/or sensory and/or speech/language symptoms, but no motor, brainstem or retinal symptoms and is characterized by gradual development, duration of each symptom no longer than one hour, a mix of positive and negative features and complete reversibility. Atypical or complex aura includes motor, brainstem, monocular visual disturbances, or ocular cranial nerve involvement (hemiplegic migraine, basilar migraine/brainstem aura, retinal migraine, ophthalmoplegic migraine) and secondary causes need to be excluded. Additional features of an aura that raise concern for an underlying vascular etiology include late age of onset, short duration, evolution of the focal symptoms, negative rather than positive visual phenomenon, and history of vascular risk factors.

Individuals presenting with a new migraine with aura (especially an atypical or complex aura) can mimic a transient ischemic attack or an acute stroke. If there is a new neurologic deficit, imaging should be guided by concern for cerebrovascular disease, not that the individual has a headache. ^(97,98)

Definitions

MoCA – The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. MoCA differs from the MMSE mainly by including tests of executive function and abstraction, and by putting less weight on orientation to time and place. Ten of the MMSE's 30 points are scored solely on the time-place orientation test, whereas the MoCA assigns it a maximum of six points. The MoCA also puts more weight on recall and attention-calculation performance, while de-emphasizing language skill. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

CT and developmental delay – Significant developmental delay is defined as significant delay (more than two standard deviations below the mean) in one or more developmental domains: gross/fine motor, speech/language, cognition, social/personal, and activities of daily living. Isolated delay in social/language development is characteristic of autism spectrum disorders or hearing loss. Isolated delay in motor development is characteristic of cerebral palsy (a static encephalopathy) or myopathy. Global developmental delay (GDD) is a subset of developmental delay defined as significant delay (by at least 2 SD's) in two or more developmental categories. Note that the term "GDD" is usually reserved for children < 5 years old, whereas in older children > 5 years, disability is quantifiable with IQ testing.

Leptomeningeal Carcinomatosis

Leptomeningeal Carcinomatosis ^(86,99,100,101) – Leptomeningeal metastasis is an uncommon and typically late complication of cancer with poor prognosis and limited treatment options. Diagnosis is often challenging with nonspecific presenting symptoms ranging from headache and confusion to focal neurologic deficits such as cranial nerve palsies. Standard diagnostic evaluation involves a neurologic examination, MRI of the brain and spine with gadolinium, and cytologic evaluation of the cerebral spinal fluid (CSF). Hematologic malignancies (leukemia and lymphoma), primary brain tumors as well as solid malignancies can spread to the leptomeninges. The most common solid tumors giving rise to LM are breast cancer (12 - 35%), small and non-small cell lung cancer (10-26%), melanoma (5 -25%), gastrointestinal malignancies (4-14 %), and cancers of unknown primary (1-7%).

Drop Metastases

Drop Metastases – Drop metastases are intradural extramedullary spinal metastases that arise from intracranial lesions. Common examples of intracranial neoplasms that result in drop metastases include pineal tumors, ependymomas, medulloblastomas, germinomas, primitive neuroectodermal tumors (PNET), glioblastomas multiform, anaplastic astrocytomas, oligodendrogliomas and less commonly choroid plexus neoplasms and teratomas. ⁽¹⁰²⁾

Meningitis

CT scan and Meningitis – In suspected bacterial meningitis, CT with contrast may be performed before lumbar puncture (LP) to show preliminary meningeal enhancement. It is important to evaluate for a mass lesion or cause of elevated ICP that would contraindicate an LP. CT may be used to define the pathology of the base of the skull and that may require therapeutic intervention and surgical consultation. Some causes of an intracranial infection include fractures of the paranasal sinus and inner ear infection.

Normal Pressure Hydrocephalus

CT and Normal Pressure Hydrocephalus (NPH) – Although diagnosis can be made based on CT findings alone, MRI is more accurate for disclosing associated pathologies (such as cerebrovascular disease), excluding other potential etiologies, and for detecting NPH typical signs of prognostic value. A CT scan can exclude NPH and is appropriate for screening purposes and in individuals who cannot undergo MRI.

Macrocephaly

CT for Macrocephaly – Consider ultrasound in infants with macrocephaly and a normal neurological examination, no evidence of increased ICP and an open anterior fontanelle. If

head US is normal, the infant should be monitored closely. ⁽¹⁰³⁾ The anterior fontanelle generally closes between 10 and 24 months of age, with 3% closing between 5-9 months and 11% after 24 months. ⁽¹⁰⁴⁾

Congenital Abnormalities

CT scan for congenital abnormalities – While MRI is preferred to CT for evaluation of most congenital CNS abnormalities, in some clinical situations CT is preferred (craniosynostosis) or equivalent to MRI. CT is appropriate in the follow-up of hydrocephalus or VP shunt function where the etiology of hydrocephalus has been previously determined or in individuals for which MRI evaluation would require general anesthesia.

Anosmia

Anosmia – There is no relevant literature to support the use of CT head in the evaluation of the olfactory nerve.

Cranial Nerves

CT for evaluation of the cranial nerves – Magnetic resonance imaging (MRI) is considered the gold standard in the study and evaluation of the cranial nerves. Computed tomography (CT) allows, usually, an indirect view of the nerve and is useful to demonstrate the intraosseous segments of cranial nerves, the foramina through which they exit skull base, and their pathologic changes. In optic neuritis, CT has limited utility. Contrast-enhanced CT scanning of the orbits may help exclude other orbital pathology. CT scanning of the brain, regardless of whether intravenous contrast material is administered or not, does not yield prognostic and treatment-altering information. In Bell's Palsy temporal bone CT is useful in the evaluation of the caliber and the course of the IAC and bony facial nerve canal in the temporal bone. When using CT to evaluate the facial nerve, pathology often can only be inferred by visualization of erosion or destruction of the adjacent bony facial nerve canal. In contrast, MRI visualizes soft tissues well and so is better suited for evaluating soft tissue facial nerve abnormalities.

Tumors

CT and tumors – MRI is the ideal modality to follow-up meningioma, pituitary tumors, low grade tumors, neurocutaneous syndromes, and staging/surveillance for non-CNS cancers. CT should only be used when MRI is contraindicated or is unable to be obtained.

Surveillance timelines should follow NCCN guidelines. Imaging is also warranted if the individual is symptomatic or there are new/changing signs or symptoms or complicating factors.

Head Trauma

CT scan for Head Trauma – Most types of head injury are minor injuries; clinical signs and symptoms help predict the need for brain CT following injury. CT has advantages in evaluating head injury due to its sensitivity for demonstrating mass effect, ventricular size and configuration, bone injuries, and acute hemorrhage. An individual who presents with certain clinical risk factors may be more likely to benefit from CT imaging. Some of the clinical risk factors that may be used as a guide to predict the probability of abnormal CT following minor head injury are vomiting, skull fracture, and age greater than 60 years. Individuals with a Glasgow Coma Scale of 15 or less who also have been vomiting or have a suspected skull fracture are likely to show abnormal results on CT scan. CT is also useful in detecting delayed hematoma, hypoxic-ischemic lesions, or cerebral edema in the first 72 hours after head injury.

Central Venous Thrombosis

CT and Central Venous Thrombosis – A CTV or MRV is indicated for the definite evaluation of a central venous thrombosis/dural sinus thrombosis. The most frequent presentations are isolated headache, intracranial hypertension syndrome (headache, nausea/vomiting, transient visual obscurations, pulsatile tinnitus, CN VI palsy, papilledema), ⁽¹⁰⁵⁾ seizures, focal neurological deficits, and encephalopathy. Risk factors are hypercoagulable states inducing genetic prothrombotic conditions, antiphospholipid syndrome and other acquired prothrombotic diseases (such as cancer), oral contraceptives, pregnancy, puerperium (6-weeks postpartum), infections, and trauma. COVID-19 infection is associated with hypercoagulability, a thromboinflammatory response, and an increased incidence of venous thromboembolic events (VTE) ^(106,107). Since venous thrombosis can cause SAH, infarctions, and hemorrhage, parenchymal imaging with MRI/CT is also appropriate ^(21,108,109).

Stroke/TIA

Imaging for Stroke – Individuals presenting with symptoms of acute stroke should receive prompt imaging to determine whether they are candidates for treatment with tissue plasminogen activator. Non-contrast CT can evaluate for hemorrhage that would exclude the individual from reperfusion therapy. Functional imaging can be used to select individuals for thrombolytic therapy by measuring the mismatch between “infarct core” and “ischemic penumbra” and may define ischemic areas of the brain with the potential to respond positively to reperfusion therapy. Contrast-enhanced CT angiography (CTA) may follow the non-contrast CT imaging to identify areas of large vessel stenosis or occlusion which may be a target for therapy.

Recent stroke or transient ischemic attack – When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms ⁽¹¹⁰⁾. Diagnostic recommendations include neuroimaging evaluation as soon as

possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. ⁽¹¹¹⁾

Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

Neurological Deficits

Neurological Deficits – Examples of abnormal reflexes related to upper motor neuron lesion/central pathology include hyperreflexia, clonus, Hoffman sign and Babinski, snout, palmar grasp, and rooting reflexes.

Visual loss has many possible etiologies, and MRI or CT is only indicated in suspected neurological causes of visual loss based on history and exam. Visual field defects, such as bitemporal hemianopsia, homonymous hemianopsia, or quadrantanopsia, require imaging as well as does suspected optic nerve pathology. Subjective symptoms such as blurred vision or double vision with no clear correlate on neurological examination requires a comprehensive eye evaluation to exclude more common causes, such as cataracts, refractive errors, retinopathy, glaucoma, or macular degeneration. Transient visual loss with history consistent with TIA but normal exam at time of examination also should be imaged. Positive visual phenomena, such as photopsias or scintillations that march across the visual field, suggest migraine whereas negative phenomenon, such as shaded or blurred, is more characteristic of ischemia.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section <p><u>Added</u></p> <ul style="list-style-type: none"> • Updated Cancer sections • Vertigo with progressive unilateral hearing loss or tinnitus • Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms (also to (Brain CT /CTA combo) • Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH (Brain CT/CTA combo) <p><u>Deleted</u></p> <ul style="list-style-type: none"> • Tumor monitoring in neurocutaneous syndromes • Pulsatile tinnitus combo section

May 2023	<p>Updated and reformatted references</p> <p>Updated background section</p> <p>Reorganized indications</p> <p>General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline</p> <p>Added:</p> <ul style="list-style-type: none"> ● Indeterminate imaging section ● Lesion with atypical features for further evaluation or follow up ● Initial evaluation for a known syrinx or syringomyelia <ul style="list-style-type: none"> ○ Bulbar and Pseudobulbar symptoms to match Brain MRI <p>Clarified:</p> <ul style="list-style-type: none"> ● Abnormal reflexes (pathological, asymmetric, hyperreflexia) ● New onset headache - Related to activity or event (sexual activity, exertion, Valsalva, position), new or progressively worsening ● Tumor surveillance as per professional society recommendations ● Brain CT/Brain CTA - Headache associated with exercise, exertion, ● Valsalva or sexual activity <p>Deleted:</p> <ul style="list-style-type: none"> ● Anosmia (loss of smell) or dysosmia documented by objective testing that is persistent and of unknown origin
----------	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology. ACR Appropriateness Criteria® Headache. 2022; 2023:
2. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. Jan 2018; 38: 1-211. 10.1177/0333102417738202.
3. Micieli A, Kingston W. An Approach to Identifying Headache Patients That Require Neuroimaging. Front Public Health. 2019; 7: 52. 10.3389/fpubh.2019.00052.
4. Mitsikostas D D, Ashina M, Craven A, Diener H C, Goadsby P J et al. European Headache Federation consensus on technical investigation for primary headache disorders. J Headache Pain. 2016; 17: 5. 10.1186/s10194-016-0596-y.
5. González-Quintanilla V, Madera J, Pascual J. Update on headaches associated with physical exertion. Cephalalgia. 2023; 43: true. 10.1177/03331024221146989.
6. Ray J, Hutton E. Imaging in headache disorders. Australian prescriber. 2022; 45: 88-92.
7. Togha M, Karimitafti M, Ghorbani Z, Farham F, Naderi-Behdani F et al. Characteristics and comorbidities of headache in patients over 50 years of age: a cross-sectional study. BMC Geriatrics. 2022; 22: true. 10.1186/s12877-022-03027-1.
8. Hayes L, Palasis S, Bartel T, Booth T, Iyer R et al. ACR Appropriateness Criteria - Child. Journal of the American College of Radiology. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
9. Trofimova A, Vey B, Mullins M, Wolf D, Kadom N. Imaging of Children with Nontraumatic Headaches. AJR Am J Roentgenol. Jan 2018; 210: 8-17. 10.2214/ajr.17.18561.
10. American College of Radiology. American College of Radiology Appropriateness Criteria: Dizziness and Ataxia. 2023.
11. Harvey H, Watson L, Subramaniam R, Burns J, Bykowski J et al. ACR Appropriateness Criteria Movement Disorders and Neurodegenerative Diseases. Journal of the American College of Radiology. 2020; 17: S175 - S187. 10.1016/j.jacr.2020.01.042.
12. Kennedy T, Corey A, Policeni B, Agarwal V, Burns J et al. ACR Appropriateness Criteria; Orbits Vision and Visual Loss. Journal of the American College of Radiology. 2018; 15: S116 - S131. 10.1016/j.jacr.2018.03.023.
13. Sharma A, Kirsch C, Aulino J, Chakraborty S, Choudhri A et al. ACR Appropriateness Criteria Hearing Loss and/or Vertigo. Journal of the American College of Radiology. 2018; 15: S321 - S331. 10.1016/j.jacr.2018.09.020.
14. American College of Radiology. American College of Radiology Appropriateness Criteria: Altered Mental Status, Coma, Delirium and Psychosis. 2024.
15. American College of Radiology. American College of Radiology Appropriateness Criteria: Cerebrovascular Disease - Stroke and Stroke-Related Conditions. 2023.
16. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. 2019; 2023:
17. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. Br J Radiol. Aug 2014; 87: 20130699. 10.1259/bjr.20130699.
18. DeBaun M, Jordan L, King A, Schatz J, Vichinsky E et al. American Society of Hematology 2020 guidelines for sickle cell disease: prevention, diagnosis, and treatment of cerebrovascular disease in children and adults. Blood Adv. 2020; 4: 1554 - 1588. 10.1182/bloodadvances.2019001142.

19. DeBaun M, Jordan L, King A, Schatz J, Vichinsky E et al. American Society of Hematology 2020 guidelines for sickle cell disease: prevention, diagnosis, and treatment of cerebrovascular disease in children and adults. *Blood Adv.* Apr 28, 2020; 4: 1554-1588. 10.1182/bloodadvances.2019001142.
20. Ledbetter L, Burns J, Shih R, Ajam A, Brown M et al. ACR Appropriateness Criteria Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. *Journal of the American College of Radiology.* 2021; 18: S283 - S304. 10.1016/j.jacr.2021.08.012.
21. Ferro J, Canhão P, Aguiar de Sousa D. Cerebral venous thrombosis. *Presse Med.* Dec 2016; 45: e429-e450. 10.1016/j.lpm.2016.10.007.
22. American College of Radiology. ACR Appropriateness Criteria® Head Trauma. 2020; 2023:
23. Polinder S, Cnossen M, Real R, Covic A, Gorbunova A et al. A Multidimensional Approach to Post-concussion Symptoms in Mild Traumatic Brain Injury. *Front Neurol.* 2018; 9: 1113. 10.3389/fneur.2018.01113.
24. Alrajhi K, Perry J, Forster A. Intracranial bleeds after minor and minimal head injury in patients on warfarin. *J Emerg Med.* Feb 2015; 48: 137-42. 10.1016/j.jemermed.2014.08.016.
25. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Central Nervous System Cancers Version 2.2022. September 29, 2022; 2023:
26. Gomez C, Schiffman S, Bhatt A. Radiological review of skull lesions. *Insights Imaging.* Oct 2018; 9: 857-882. 10.1007/s13244-018-0643-0.
27. Go R, Jacobsen E, Baiocchi R, Buhtoiarov I, Butler E et al. Histiocytic Neoplasms, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw.* Nov 2021; 19: 1277-1303. 10.6004/jnccn.2021.0053.
28. Goyal G, Young J, Koster M, Tobin W, Vassallo R et al. The Mayo Clinic Histiocytosis Working Group Consensus Statement for the Diagnosis and Evaluation of Adult Patients with Histiocytic Neoplasms: Erdheim-Chester Disease, Langerhans Cell Histiocytosis, and Rosai-Dorfman Disease. *Mayo Clin Proc.* Oct 2019; 94: 2054-2071. 10.1016/j.mayocp.2019.02.023.
29. Cendes F, Theodore W, Brinkmann B, Sulc V, Cascino G. Neuroimaging of epilepsy. *Handb Clin Neurol.* 2016; 136: 985-1014. 10.1016/b978-0-444-53486-6.00051-x.
30. American College of Radiology. ACR Appropriateness Criteria® Seizures and Epilepsy. 2019; 2023:
31. Trofimova A, Milla S, Ryan M, Pruthi S, Blount J et al. ACR Appropriateness Criteria Seizures-Child. *Journal of the American College of Radiology.* 2021; 18: S199 - S211. 10.1016/j.jacr.2021.02.020.
32. Saberi A, Roudbary S, Ghayeghran A, Kazemi S, Hosseinienezhad M. Diagnosis of Meningitis Caused by Pathogenic Microorganisms Using Magnetic Resonance Imaging: A Systematic Review. *BCN.* 2018; 9: 73 - 86. 10.29252/nirp.bcn.9.2.73.
33. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis. *StatPearls.* October 12, 2022; 2023:
34. Health Quality Ontario. The appropriate use of neuroimaging in the diagnostic work-up of dementia: an evidence-based analysis. *Ont Health Technol Assess Ser.* 2014; 14: 1-64.
35. Narayanan L, Murray A. What can imaging tell us about cognitive impairment and dementia? *World J Radiol.* Mar 28, 2016; 8: 240-54. 10.4329/wjr.v8.i3.240.
36. Carpenter C, Bassett E, Fischer G, Shirshekan J, Galvin J. Four sensitive screening tools to detect cognitive dysfunction in geriatric emergency department patients: brief Alzheimer's Screen,

Short Blessed Test, Ottawa 3DY, and the caregiver-completed AD8. *Acad Emerg Med*. Apr 2011; 18: 374-84. 10.1111/j.1553-2712.2011.01040.x.

37. McDougall G. A review of screening instruments for assessing cognition and mental status in older adults. *Nurse Pract*. Nov 1990; 15: 18-28.

38. Sharifi S, Nederveen A, Booij J, van Rootselaar A. Neuroimaging essentials in essential tremor: a systematic review. *Neuroimage Clin*. 2014; 5: 217-31. 10.1016/j.nicl.2014.05.003.

39. Comella CL, National Organization for Rare Disorders. *Cervical Dystonia*. 2019; 2023:

40. Iliescu D, Timaru C, Alexe N, Gosav E, De Simone A et al. Management of diplopia. *Rom J Ophthalmol*. Jul-Sep 2017; 61: 166-170. 10.22336/rjo.2017.31.

41. Yoon L, Kim H, Kwak M, Park K, Bae M et al. Utility of Magnetic Resonance Imaging (MRI) in Children with Strabismus. *J Child Neurol*. Sep 2019; 34: 574-581. 10.1177/0883073819846807.

42. Sadaka A, Schockman S, Golnik K. Evaluation of Horner Syndrome in the MRI Era. *Journal of Neuro-Ophthalmology*. 2017; 37:

43. American College of Radiology. *ACR Appropriateness Criteria® Cranial Neuropathy*. 2022; 2023:

44. King R, Reiss J. The epidemiology and pathophysiology of pseudobulbar affect and its association with neurodegeneration. *Degener Neurol Neuromuscul Dis*. 2013; 3: 23-31. 10.2147/dnnd.S34160.

45. Tan A, Mankad K, Gonçalves F, Talenti G, Alexia E. Macrocephaly: Solving the Diagnostic Dilemma. *Top Magn Reson Imaging*. Aug 2018; 27: 197-217. 10.1097/rmr.0000000000000170.

46. Hanzlik E, Gigante J. Microcephaly. 2017; 4: 10.3390/children4060047.

47. Rossi A, Argyropoulou M, Zlatareva D, Boulouis G, Pizzini F et al. European recommendations on practices in pediatric neuroradiology: consensus document from the European Society of Neuroradiology (ESNR), European Society of Paediatric Radiology (ESPR) and European Union of Medical Specialists Division of Neuroradiology (UEMS). *Pediatric Radiology*. 2023; 53: 159 - 168. 10.1007/s00247-022-05479-4.

48. Kim H, Roh H, Lee I. Craniosynostosis: Updates in Radiologic Diagnosis. *Journal of Korean Neurosurgical Society*. 2016; 59: 219-26.

49. Kubota T, Adachi M, Kitaoka T, Hasegawa K, Ohata Y et al. Clinical Practice Guidelines for Achondroplasia. *Clin Pediatr Endocrinol*. 2020; 29: 25-42. 10.1297/cpe.29.25.

50. *Cerebral palsy in under 25s: assessment and management*. January 25, 2017; 2023:

51. National Organization for Rare Disorders. *Chiari Malformations*. 2014; 2023:

52. Whitson W, Lane J, Bauer D, Durham S. A prospective natural history study of nonoperatively managed Chiari I malformation: does follow-up MRI surveillance alter surgical decision making? *J Neurosurg Pediatr*. Aug 2015; 16: 159-66. 10.3171/2014.12.Peds14301.

53. Damasceno B. Neuroimaging in normal pressure hydrocephalus. *Dement Neuropsychol*. Oct-Dec 2015; 9: 350-355. 10.1590/1980-57642015dn94000350.

54. Kamenova M, Rychen J, Guzman R, Mariani L, Soleman J. Yield of early postoperative computed tomography after frontal ventriculoperitoneal shunt placement. *PLoS One*. 2018; 13: e0198752. 10.1371/journal.pone.0198752.

55. Wetzel J, Heaner D, Gabel B, Tubbs R, Chern J. Clinical evaluation and surveillance imaging of children with myelomeningocele and shunted hydrocephalus: a follow-up study. *J Neurosurg Pediatr*. Oct 19, 2018; 23: 153-158. 10.3171/2018.7.Peds1826.

56. Khalatbari H, Parisi M. Management of Hydrocephalus in Children: Anatomic Imaging Appearances of CSF Shunts and Their Complications. *American Journal of Roentgenology*. 2020; 216: 187 - 199. 10.2214/AJR.20.22888.
57. Severson M, Strecker-McGraw M. Cerebrospinal Fluid Leak. *StatPearls*. August 8, 2022; 2023:
58. Hiremath S, Gautam A, Sasindran V, Therakathu J, Benjamin G. Cerebrospinal fluid rhinorrhea and otorrhea: A multimodality imaging approach. *Diagn Interv Imaging*. Jan 2019; 100: 3-15. 10.1016/j.diii.2018.05.003.
59. Deline C, Schievink WI, National Organization for Rare Disorders. Spontaneous Intracranial Hypotension. September 1, 2020; 2023:
60. Garde A, Gibson N, Samuels M, Evans H. Recent advances in paediatric sleep disordered breathing. *Breathe*. 2022; 18: true. 10.1183/20734735.0151-2022.
61. Brignole M, Moya A, de Lange F, Deharo J, Elliott P et al. 2018 ESC Guidelines for the diagnosis and management of syncope. *Eur Heart J*. 2018; 39: 1883 - 1948. 10.1093/eurheartj/ehy037.
62. Hatharasinghe A, Etebar K, Wolsky R, Akhondi H, Ayutyanont N. An Assessment of the Diagnostic Value in Syncope Workup: A Retrospective Study. *HCA healthcare journal of medicine*. 2021; 2: 423-431.
63. Venkatesan T, Levinthal D, Tarbell S, Jaradeh S, Hasler W et al. Guidelines on management of cyclic vomiting syndrome in adults by the American Neurogastroenterology and Motility Society and the Cyclic Vomiting Syndrome Association. *Neurogastroenterol Motil*. Jun 2019; 31 Suppl 2: e13604. 10.1111/nmo.13604.
64. Raucci U, Borrelli O, Di Nardo G, Tambucci R, Pavone P et al. Cyclic Vomiting Syndrome in Children. *Frontiers in Neurology*. 2020; 11:
65. Garner H, Wessell D, Lenchik L, Ahlawat S, Baker J et al. ACR Appropriateness Criteria Soft Tissue Masses: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S234 - S245. 10.1016/j.jacr.2023.02.009.
66. Zhang J, Li Y, Zhao Y, Qiao J. CT and MRI of superficial solid tumors. *Quant Imaging Med Surg*. Mar 2018; 8: 232-251. 10.21037/qims.2018.03.03.
67. Kim H, An J, Woo J, Yoon R. Superficially Palpable Masses of the Scalp and Face: A Pictorial Essay. *Journal of the Korean Society of Radiology*. 2019; 80: 283-293.
68. American College of Radiology. ACR Appropriateness Criteria® Acute Mental Status Change, Delirium, and New Onset Psychosis. 2018; 2023:
69. Randhawa H, Bagale S, Umap R, Randhawa J. Brain Magnetic Resonance Imaging-Based Evaluation of Pediatric Patients With. *Cureus*. 2022; 14: e24051.
70. Ali A, Syed N, Murthy G, Nori M, Abkari A et al. Magnetic resonance imaging (MRI) evaluation of developmental delay in pediatric patients. *J Clin Diagn Res*. Jan 2015; 9: Tc21-4. 10.7860/jcdr/2015/11921.5478.
71. Tieder J, Bonkowsky J, Etzel R, Franklin W, Gremse D et al. Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants: Executive Summary. *Pediatrics*. May 2016; 137: 10.1542/peds.2016-0591.
72. Kleindorfer D, Towfighi A, Chaturvedi S, Cockroft K, Gutierrez J et al. 2021 Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack: A Guideline from the American Heart Association/American Stroke Association. *Stroke*. 2021; 52: e364-e467. 10.1161/STR.0000000000000375.

73. Pannell J, Corey A, Shih R, Austin M, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. J Am Coll Radiol. 2023.
74. Ledbetter L, Burns J, Shih R, Ajam A, Brown M et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. J Am Coll Radiol. 2021; 18: S283-S304. <https://doi.org/10.1016/j.jacr.2021.08.012>.
75. Utukuri P, Shih R, Ajam A, Callahan K, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. J Am Coll Radiol. 2023; 20: S70-S93. 10.1016/j.jacr.2023.02.018.
76. International Headache Society. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018; 38: 1-211. 10.1177/0333102417738202.
77. Robertson R, Palasis S, Rivkin M, Pruthi S, Bartel T et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. J Am Coll Radiol. May 2020; 17: S36-s54. 10.1016/j.jacr.2020.01.036.
78. Gonzalez N, Amin-Hanjani S, Bang O, Coffey C, Du R et al. Adult Moyamoya Disease and Syndrome: Current Perspectives and Future Directions: A Scientific Statement from the American Heart Association/American Stroke Association. Stroke. 2023; 54: e465-e479. 10.1161/STR.0000000000000443.
79. Burton T, Bushnell C. Reversible Cerebral Vasoconstriction Syndrome. Stroke. 2019; 50: 2253-2258. 10.1161/STROKEAHA.119.024416.
80. Zuccoli G, Pipitone N, Haldipur A, Brown R J, Hunder G. Imaging findings in primary central nervous system vasculitis. Clin Exp Rheumatol. Jan-Feb 2011; 29: S104-9.
81. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis [Updated 2023]. StatPearls Publishing. 2023.
82. Radic J, Cochrane D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. Paediatr Child Health. Sep 2018; 23: 383-387. 10.1093/pch/pxy012.
83. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. StatPearls. 2024.
84. Hatgaonkar A, Mahajan S, Hatgoankar K, Bandre G. MRI Insights in Chiari Malformation Type 1 and Variations With. Cureus. 2024; 16: e55676.
85. Mohammad S, Osman N, Ahmed K. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. Insights Imaging. Jan 28, 2019; 10: 3. 10.1186/s13244-019-0686-x.
86. Wang N, Bertalan M, Brastianos P. Leptomeningeal metastasis from systemic cancer: Review and update on management. Cancer. Jan 1, 2018; 124: 21-35. 10.1002/cncr.30911.
87. Behbehani R. Clinical approach to optic neuropathies. Clin Ophthalmol. Sep 2007; 1: 233-46.
88. Margolin E. The swollen optic nerve: an approach to diagnosis and management. Pract Neurol. Aug 2019; 19: 302-309. 10.1136/practneurol-2018-002057.
89. Holle D, Obermann M. The role of neuroimaging in the diagnosis of headache disorders. Ther Adv Neurol Disord. Nov 2013; 6: 369-74. 10.1177/1756285613489765.
90. Quinones-Hinojosa A, Gulati M, Singh V, Lawton M. Spontaneous intracerebral hemorrhage due to coagulation disorders. Neurosurg Focus. Oct 15, 2003; 15: E3. 10.3171/foc.2003.15.4.3.
91. Schaefer P, Miller J, Singhal A, Thrall J, Lee S. Headache: when is neurologic imaging indicated? J Am Coll Radiol. Aug 2007; 4: 566-9. 10.1016/j.jacr.2006.10.001.

92. Wilbrink L, Ferrari M, Kruit M, Haan J. Neuroimaging in trigeminal autonomic cephalgias: when, how, and of what? *Curr Opin Neurol*. Jun 2009; 22: 247-53. 10.1097/wco.0b013e32832b4bb3.
93. Jang Y, Cho E, Choi H, Kim S, Park H. Diagnostic Neuroimaging in Headache Patients: A Systematic Review and Meta-Analysis. *Psychiatry Investig*. Jun 2019; 16: 407-417. 10.30773/pi.2019.04.11.
94. Spierings E. Acute, subacute, and chronic headache. *Otolaryngol Clin North Am*. Dec 2003; 36: 1095-107, vi. 10.1016/s0030-6665(03)00128-2.
95. Tyagi A. New daily persistent headache. *Ann Indian Acad Neurol*. Aug 2012; 15: S62-5. 10.4103/0972-2327.100011.
96. Hadjikhani N, Vincent M. Neuroimaging clues of migraine aura. *J Headache Pain*. Apr 3, 2019; 20: 32. 10.1186/s10194-019-0983-2.
97. Nahas S. New Guidelines on Headache Imaging. January 8, 2020; 2023:
98. Whitehead M, Cardenas A, Corey A, Policeni B, Burns J et al. ACR Appropriateness Criteria® Headache. *J Am Coll Radiol*. Nov 2019; 16: S364-s377. 10.1016/j.jacr.2019.05.030.
99. Andersen B, Miranda C, Hatzoglou V, DeAngelis L, Miller A. Leptomeningeal metastases in glioma: The Memorial Sloan Kettering Cancer Center experience. *Neurology*. May 21, 2019; 92: e2483-e2491. 10.1212/wnl.00000000000007529.
100. Clarke J, Perez H, Jacks L, Panageas K, Deangelis L. Leptomeningeal metastases in the MRI era. *Neurology*. May 4, 2010; 74: 1449-54. 10.1212/WNL.0b013e3181dc1a69.
101. Maillie L, Salgado L, Lazarev S. A systematic review of craniospinal irradiation for leptomeningeal disease: past, present, and future. *Clin Transl Oncol*. Oct 2021; 23: 2109-2119. 10.1007/s12094-021-02615-8.
102. Ahmed A. MRI features of disseminated drop metastases *S Afr Med J*. Jul 2008; 98: 522-3.
103. Smith R, Leonidas J, Maytal J. The value of head ultrasound in infants with macrocephaly. *Pediatr Radiol*. Mar 1998; 28: 143-6. 10.1007/s002470050315.
104. Pindrik J, Ye X, Ji B, Pendleton C, Ahn E. Anterior fontanelle closure and size in full-term children based on head computed tomography. *Clin Pediatr (Phila)*. Oct 2014; 53: 1149-57. 10.1177/0009922814538492.
105. Jensen R, Radojicic A, Yri H. The diagnosis and management of idiopathic intracranial hypertension and the associated headache. *Ther Adv Neurol Disord*. Jul 2016; 9: 317-26. 10.1177/1756285616635987.
106. Connors J, Levy J. Thromboinflammation and the hypercoagulability of COVID-19. *J Thromb Haemost*. Jul 2020; 18: 1559-1561. 10.1111/jth.14849.
107. Tu T, Goh C, Tan Y, Leow A, Pang Y et al. Cerebral Venous Thrombosis in Patients with COVID-19 Infection: A Case Series and Systematic Review. *J Stroke Cerebrovasc Dis*. Dec 2020; 29: 105379. 10.1016/j.jstrokecerebrovasdis.2020.105379.
108. Bushnell C, Saposnik G. Evaluation and management of cerebral venous thrombosis. *Continuum (Minneap Minn)*. Apr 2014; 20: 335-51. 10.1212/01.CON.0000446105.67173.a8.
109. Coutinho J. Cerebral venous thrombosis. *J Thromb Haemost*. Jun 2015; 13 Suppl 1: S238-44. 10.1111/jth.12945.
110. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45: 2160-236. 10.1161/STR.0000000000000024.

111. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.



Evolent Clinical Guideline 006-1 for Temporal Bone, Mastoid, Orbits, Sella, Internal Auditory Canal CT

Guideline or Policy Number: Evolent_CG_006-1	<u>Applicable Codes</u>	
<i>“Evolent” refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION.....	3
PURPOSE.....	3
INDICATIONS FOR ORBIT CT	3
Orbit CT.....	3
INDICATIONS FOR COMBINATION STUDIES.....	4
Orbit CT.....	4
INDICATIONS FOR SELLA CT.....	4
Sella CT	4
INDICATIONS FOR TEMPORAL/MASTOID/INTERNAL AUDITORY CANAL CT	5
Hearing Loss (Documented on Audiogram).....	5
Tinnitus.....	5
Ear Infection	5
Cholesteatoma	5
CSF Otorrhea	5
Temporal Bone Fracture	6
Vascular Indications.....	6
Peripheral Vertigo.....	6
Bell's Palsy/Hemifacial Spasm	6
PRE-OPERATIVE/PROCEDURAL EVALUATION	6
Temporal Bone/Mastoid/Orbit/Sella/Internal Auditory Canal	6
POST-OPERATIVE/PROCEDURAL EVALUATION.....	6
Temporal Bone/Mastoid/Orbit/Sella/Internal Auditory Canal	6
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	7
CODING AND STANDARDS	7
CODING	7
CPT Codes.....	7
APPLICABLE LINES OF BUSINESS	7
BACKGROUND	7
CONTRAINDICATION AND PREFERRED STUDIES	7
POLICY HISTORY	8

<i>Summary</i>	8
LEGAL AND COMPLIANCE	8
GUIDELINE APPROVAL	8
<i>Committee</i>	8
DISCLAIMER	9
REFERENCES	10

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Temporal bone, mastoid, orbits, sella and internal auditory canal computed tomography (CT) is performed for problems, such as conductive hearing loss, chronic otitis media, mastoiditis, cholesteatoma, congenital hearing loss and cochlear implants. It is a modality of choice because it provides 3D positional information and offers a high degree of anatomic detail. It is rarely used for evaluation of VIIth or VIIIth nerve tumors.

INDICATIONS FOR ORBIT CT

Orbit CT

- Abnormal external or direct eye exam ⁽¹⁾:
 - Exophthalmos (proptosis) or enophthalmos
 - Ophthalmoplegia with concern for orbital pathology ⁽²⁾
 - Unilateral optic disk swelling if MRI is contraindicated or cannot be performed ^(3,4,5)
 - Documented visual defect if MRI is contraindicated or cannot be performed ^(6,7,8)
 - Unilateral or with abnormal optic disc(s) (i.e., optic disc blurring, edema, or pallor); **AND**
 - Not explained by an underlying diagnosis, glaucoma, or macular degeneration
- Optic Neuritis if MRI is contraindicated or cannot be performed
 - If atypical presentation (bilateral, absence of pain, optic nerve hemorrhages, severe visual impairment, lack of response to steroids, poor recovery or recurrence) ^(9,10,11)
 - If needed to confirm optic neuritis and rule out compressive lesions
- Orbital trauma
 - Physical findings of direct eye injury
 - Suspected orbital trauma with indeterminate x-ray

- For further evaluation of a fracture seen on x-ray for treatment or surgical planning
- Orbital or ocular mass/tumor, suspected, or known ^(1,12)
- Clinical suspicion of orbital infection ^(13,14)
- Clinical suspicion of osteomyelitis ^(15,16)
 - Direct visualization of bony deformity **OR**
 - Abnormal x-rays
- Clinical suspicion of Orbital Inflammatory Disease (e.g., eye pain and restricted eye movement with suspected orbital pseudotumor) if MRI is contraindicated or cannot be performed ⁽¹⁷⁾
- Congenital orbital anomalies ⁽¹⁸⁾
- Complex strabismus (with ophthalmoplegia or ophthalmoparesis) to aid in diagnosis, treatment and/or surgical planning ^(19,20,21)

CT is preferred for visualizing bony detail and calcifications. MRI is superior for the evaluation of the visual pathways, globe, and soft tissue. ^(1,22) Brain CT is often ordered along with CT of the orbit for head injury with orbital trauma. MRI Orbits is preferred over CT Orbits except in the case of orbital trauma, infection, or bone abnormalities.

INDICATIONS FOR COMBINATION STUDIES

Orbit CT

- Brain CT/Orbit CT if MRI is contraindicated or cannot be performed;
 - Optic neuropathy or unilateral optic disk swelling of unclear etiology to distinguish between a compressive lesion of the optic nerve, optic neuritis, ischemic optic neuropathy (arteritic or non-arteritic), central retinal vein occlusion, or optic nerve infiltrative disorders ⁽²³⁾
 - Bilateral optic disk swelling (papilledema) with vision loss ⁽⁴⁾
 - Approved indications as noted above and being performed in high-risk populations and will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽⁴⁾

INDICATIONS FOR SELLA CT ⁽²⁴⁾

Sella CT

When MRI is contraindicated or cannot be performed ^(25,26)

- For further evaluation of known sellar and parasellar masses
- Suspected pituitary gland disorder ⁽²⁷⁾ based on any of the following:
 - Documented visual field defect suggesting compression of the optic chiasm; **OR**
 - Laboratory findings suggesting pituitary dysfunction ⁽²⁸⁾; **OR**

- Pituitary apoplexy with sudden onset of neurological and hormonal symptoms;
OR
- Other imaging suggesting sella (pituitary) mass

INDICATIONS FOR TEMPORAL/MASTOID/INTERNAL AUDITORY CANAL CT

Hearing Loss (Documented on Audiogram) (29,30)

- Asymmetric sensorineural when MRI is contraindicated (31,32)
- Conductive or mixed (33)
- Congenital (33)
- Cochlear implant evaluation (34,35,36,37)

Note: For congenital/childhood sensorineural hearing loss suspected to be due to a structural abnormality, CT is the preferred imaging modality for the osseous structures and malformations of the inner ear. MRI is used for evaluating CNVIII, the brain parenchyma, or the membranous labyrinth.

Tinnitus (38,39,40)

- Pulsatile tinnitus with concern for osseous pathology of the temporal bone or a retrotympenic lesion seen on otoscopy
- Unilateral non-pulsatile tinnitus and MRI is contraindicated or cannot be performed

Ear Infection

- Clinical suspicion of acute mastoiditis as a complication of acute otitis media (41,42,43,44)
 - Systemic illness or toxic appearance
 - Signs of extracranial complications (e.g., postauricular swelling/erythema, auricular protrusion, retro-orbital pain, hearing loss, tinnitus, vertigo, nystagmus)
 - Not responding to treatment

Note: MRI is also indicated if there are signs of intracranial complications (e.g., meningeal signs, cranial nerve deficits, focal neurological findings, altered mental status). This is most common in the pediatric population

- Chronic Otitis Media (with or without cholesteatoma on exam) (42,45)
 - Failed treatment for acute otitis media

Cholesteatoma (46,47)

CSF Otorrhea (48,49)

- When looking to characterize a bony defect (for intermittent leaks and complex cases consider CT/MR/Nuclear Cisternography). There should be a high suspicion or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay)

Temporal Bone Fracture (50,51,52)

- Suspected based on mechanism of injury **OR**
- Indeterminate findings on initial imaging **OR**
- For further evaluation of a known fracture for treatment or surgical planning

Vascular Indications (53,54)

- Suspected or known with need for further evaluation
 - Dehiscence of the jugular bulb or carotid canal **OR**
 - Other vascular anomalies of the temporal bone (i.e., aberrant internal carotid artery, high jugular bulb, persistent stapedia artery, aberrant petrosal sinus)

Peripheral Vertigo (55,56,57)

- Based on clinical exam (Head-Impulse with saccade, Spontaneous unidirectional horizontal nystagmus, Dix-Hallpike maneuver); **AND**
 - Persistent symptoms after a trial of medication and four weeks of vestibular therapy (e.g., Epley's maneuvers)

Bell's Palsy/Hemifacial Spasm

If MRI is contraindicated or cannot be performed (for evaluation of the extracranial nerve course);

- If atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset ⁽⁵⁸⁾

PRE-OPERATIVE/PROCEDURAL EVALUATION

Temporal Bone/Mastoid/Orbit/Sella/Internal Auditory Canal

- Pre-operative evaluation for a planned surgery or procedure

POST-OPERATIVE/PROCEDURAL EVALUATION

Temporal Bone/Mastoid/Orbit/Sella/Internal Auditory Canal

- When imaging, physical, or laboratory findings indicate surgical or procedural complications
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING

Unless Follow-up is Otherwise Specified Within the Guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

70480, 70481, 70482, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Pulsatile tinnitus has many etiologies, and the choice of study should be based on accompanying signs and symptoms. For general screening, MRI brain with IAC/MRA brain and neck is approvable. If IIIH is suspected (typically with headache and vision changes in a younger woman with a high BMI) MRI/MRV brain is indicated. If there is concern for vascular etiology, CTA or MRA brain/neck is indicated. If there is associated hearing loss and neurological signs/symptoms, MRI brain with IAC is indicated. If the temporal bone is suspected to be involved and/or retrotympenic lesion is seen on otoscopy, CT temporal bone/IAC is indicated. If there is concurrent concern for boney and a vascular issue, CTA of the head and neck can be used to evaluate both.

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on

trimester)

- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Updated references and background • Added CPT code +0722T to align with UM Matrix Codes • Contraindications and preferred studies section added to the background • Added pulsatile tinnitus with concern for osseous pathology of the temporal bone <i>or a retrotympanic lesion seen on otoscopy</i>
April 2023	<ul style="list-style-type: none"> • Updated references • Added: <ul style="list-style-type: none"> ○ Note on congenital hearing loss ○ Section on further evaluation of indeterminate or questionable findings on prior imaging ○ General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Clarified: <ul style="list-style-type: none"> ○ There should be a high suspicion of CSF leak or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay)

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Hande, P. C., Talwar, I. Multimodality imaging of the orbit. *Indian J Radiol Imaging*; Jul 2012.
2. Stalcup, S. T., Tuan, A. S., Hesselink, J. R. Intracranial causes of ophthalmoplegia: the visual reflex pathways. *Radiographics*; Sep-Oct 2013.
3. Hata, M., Miyamoto, K. Causes and Prognosis of Unilateral and Bilateral Optic Disc Swelling. *Neuroophthalmology*; Aug 2017.
4. Margolin, E. The swollen optic nerve: an approach to diagnosis and management. *Pract Neurol*; Aug 2019.
5. Passi, N., Degnan, A. J., Levy, L. M. MR imaging of papilledema and visual pathways: effects of increased intracranial pressure and pathophysiologic mechanisms. *AJNR Am J Neuroradiol*; May 2013.
6. Fadzli, F., Ramli, N., Ramli, N. M. MRI of optic tract lesions: review and correlation with visual field defects. *Clin Radiol*; Oct 2013.
7. Prasad, S., Galetta, S. L. Approach to the patient with acute monocular visual loss. *Neurol Clin Pract*; Mar 2012.
8. Salvetat, Maria, Letizia, Pellegrini, Francesco, Spadea, Leopoldo, Salati, Carlo, Zeppieri, Marco. Non-Arteritic Anterior Ischemic Optic Neuropathy (NA-AION): A Comprehensive Overview. *Vision (Basel, Switzerland)*; 2023.
9. Consortium of Multiple Sclerosis Centers. 2018 MRI Protocol and Clinical Guidelines for MS. May 22, 2018.
10. Phuljhele, S., Kedar, S., Saxena, R. Approach to optic neuritis: An update. *Indian J Ophthalmol*; Sep 2021.
11. Spillers, Noah, J, Luther, Patrick, M, Talbot, Norris, C, Kidder, Evan, J, Doyle, Connor, A, Lutfallah, Salim, C, et al, . A Comparative Review of Typical and Atypical Optic Neuritis: Advancements in Treatments, Diagnostics, and Prognosis. *Cureus*; 2024.
12. Kedar, S., Ghatge, D., Corbett, J. J. Visual fields in neuro-ophthalmology. *Indian J Ophthalmol*; Mar-Apr 2011.
13. Gavito-Higuera, J., Mullins, C. B., Ramos-Duran, L., Sandoval, H., Akle, N., Figueroa, R. Sinusoidal Fungal Infections and Complications: A Pictorial Review. *J Clin Imaging Sci*; 2016.
14. Hagiwara, Mari, Policeni, Bruno, Juliano, Amy, F., Agarwal, Mohit, Burns, Judah, Dubey, Prachi, et al, . ACR Appropriateness Criteria® Sinusoidal Disease: 2021 Update. *Journal of the American College of Radiology*; 2022.
15. Lee, Y. J., Sadigh, S., Mankad, K., Kapse, N., Rajeswaran, G. The imaging of osteomyelitis. *Quant Imaging Med Surg*; Apr 2016.
16. Lim, Wanyin, Barras, Christen, D., Zadow, Steven, COSTA, André, Luiz, Ferreira. Radiologic Mimics of Osteomyelitis and Septic Arthritis: A Pictorial Essay. *Radiology Research and Practice*; 2021.
17. Ferreira, T. A., Saraiva, P., Genders, S. W., Buchem, M. V., Luyten, G. P. M., Beenakker, J. W. CT and MR imaging of orbital inflammation. *Neuroradiology*; Dec 2018.
18. Tawfik, H. A., Abdelhalim, A., Elkafrawy, M. H. Computed tomography of the orbit - A review and an update. *Saudi J Ophthalmol*; Oct 2012.
19. Engle, E. C. The genetic basis of complex strabismus. *Pediatr Res*; Mar 2006.

20. Kadom, N. Pediatric strabismus imaging. *Curr Opin Ophthalmol*; Sep 2008.
21. Peragallo, Jason, H, Pineles, Stacy, L, Demer, Joseph, L. Recent advances clarifying the etiologies of strabismus. *Journal of neuro-ophthalmology : the official journal of the North American*; 2015.
22. Kennedy, T. A., Corey, A. S., Policeni, B., Agarwal, V., Burns, J., Harvey, H. B., Hoang, J., Hunt, C. H., Juliano, A. F., Mack, W., Moonis, G., Murad, G. J. A., Pannell, J. S., Parsons, M. S., Powers, W. J., Schroeder, J. W., Setzen, G., Whitehead, M. T., Bykowski, J.. ACR Appropriateness Criteria(®) Orbits Vision and Visual Loss. *J Am Coll Radiol*; May 2018.
23. Behbehani, R. Clinical approach to optic neuropathies. *Clin Ophthalmol*; Sep 2007.
24. Kirsch, C. F. E. Imaging of Sella and Parasellar Region. *Neuroimaging Clin N Am*; Nov 2021.
25. Chaudhary, V., Bano, S. Imaging of the pituitary: Recent advances. *Indian J Endocrinol Metab*; Sep 2011.
26. Burns, Judah, Policeni, Bruno, Bykowski, Julie, Dubey, Prachi, Germano, Isabelle, M., Jain, Vikas, et al, . ACR Appropriateness Criteria® Neuroendocrine Imaging. *Journal of the American College of Radiology*; 2019.
27. Wu, L. M., Li, Y. L., Yin, Y. H., Hou, G. Q., Zhu, R., Hua, X. L., Xu, J. R., Chen, Z. A. Usefulness of dual-energy computed tomography imaging in the differential diagnosis of sellar meningiomas and pituitary adenomas: preliminary report. *PLoS One*; 2014.
28. Freda, P. U., Beckers, A. M., Katznelson, L., Molitch, M. E., Montori, V. M., Post, K. D., Vance, M. L. Pituitary incidentaloma: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab*; Apr 2011.
29. Cunnane, M. B. Imaging of Tinnitus. *Neuroimaging Clin N Am*; Feb 2019.
30. Sharma, Aseem, Kirsch, Claudia, F.E., Aulino, Joseph, M., Chakraborty, Santanu, Choudhri, Asim, F., Germano, Isabelle, M., et al, . ACR Appropriateness Criteria® Hearing Loss and/or Vertigo. *Journal of the American College of Radiology*; 2018.
31. Krause, N., Fink, K. T., Fink, J. R. Asymmetric sensorineural hearing loss caused by vestibular schwannoma: Characteristic imaging features before and after treatment with stereotactic radiosurgery. *Radiol Case Rep*; 2010.
32. Verbist, B. M. Imaging of sensorineural hearing loss: a pattern-based approach to diseases of the inner ear and cerebellopontine angle. *Insights Imaging*; Apr 2012.
33. Trojanowska, A., Drop, A., Trojanowski, P., Rosińska-Bogusiewicz, K., Klatka, J., Bobek-Billewicz, B. External and middle ear diseases: radiological diagnosis based on clinical signs and symptoms. *Insights Imaging*; Feb 2012.
34. Dewan, K., Wippold, F. J., 2nd, Lieu, J. E. Enlarged vestibular aqueduct in pediatric sensorineural hearing loss. *Otolaryngol Head Neck Surg*; Apr 2009.
35. Joshi, V. M., Navlekar, S. K., Kishore, G. R., Reddy, K. J., Kumar, E. C. CT and MR imaging of the inner ear and brain in children with congenital sensorineural hearing loss. *Radiographics*; May-Jun 2012.
36. Juliano, A. F., Ginat, D. T., Moonis, G. Imaging Review of the Temporal Bone: Part II. Traumatic, Postoperative, and Noninflammatory Nonneoplastic Conditions. *Radiology*; Sep 2015.

37. Ralli, M., Rolesi, R., Anzivino, R., Turchetta, R., Fetoni, A. R. Acquired sensorineural hearing loss in children: current research and therapeutic perspectives. *Acta Otorhinolaryngol Ital*; Dec 2017.
38. Cao, AC, Hwa, TP, Cavarocchi, C. Quimby, A. Eliades, SJ, Ruckenstein, MJ, et al, . Diagnostic Yield and Utility of Radiographic Imaging in the Evaluation of Pulsatile Tinnitus: A Systematic Review. *Otology & neurotology open*; 2023.
39. Jain, Vikas, Policeni, Bruno, Juliano, Amy, F., Adunka, Oliver, Agarwal, Mohit, Dubey, Prachi, et al, . ACR Appropriateness Criteria® Tinnitus: 2023 Update. *Journal of the American College of Radiology*; 2023.
40. Pegge, S. A. H., Steens, S. C. A., Kunst, H. P. M., Meijer, F. J. A. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*; 2017.
41. Kann, K. Acute Mastoiditis: Pearls and Pitfalls. March 27, 2016.
42. Patel, Kunal M., Almutairi, Abdulrahman, Mafee, Mahmood F. Acute otomastoiditis and its complications: Role of imaging. *Operative Techniques in Otolaryngology-Head and Neck Surgery*; 2014/03/01.
43. Platzek, I., Kitzler, H. H., Gudziol, V., Laniado, M., Hahn, G. Magnetic resonance imaging in acute mastoiditis. *Acta Radiol Short Rep*; Feb 2014.
44. Bertolaso, Chiara, Cammisa, Ignazio, Orsini, Nicola, Sollazzo, Michela, Sardaro, Valeria, Gatto, Antonio, Chiaretti, Antonio, Sergi, Bruno. Diagnosing acute mastoiditis in a Pediatric Emergency Department: a retrospective review. *Acta bio-medica : Atenei Parmensis*; 2023.
45. Gomaa, M. A., Abdel Karim, A. R., Abdel Ghany, H. S., Elhiny, A. A., Sadek, A. A. Evaluation of temporal bone cholesteatoma and the correlation between high resolution computed tomography and surgical finding. *Clin Med Insights Ear Nose Throat*; 2013.
46. Baráth, K., Huber, A. M., Stämpfli, P., Varga, Z., Kollias, S. Neuroradiology of cholesteatomas. *AJNR Am J Neuroradiol*; Feb 2011.
47. Chen, Y., Li, P. Application of high resolution computer tomography in external ear canal cholesteatoma diagnosis. *J Otol*; Mar 2018.
48. Hiremath, S. B., Gautam, A. A., Sasindran, V., Therakathu, J., Benjamin, G. Cerebrospinal fluid rhinorrhea and otorrhea: A multimodality imaging approach. *Diagn Interv Imaging*; Jan 2019.
49. Vemuri, Naga V., Karanam, Lakshmi S. P., Manchikanti, Venkatesh, Dandamudi, Srinivas, Puvvada, Sampath K., Vemuri, Vineet K. Imaging review of cerebrospinal fluid leaks. *The Indian journal of radiology & imaging*; Oct-Dec 2017.
50. Collins, J. M., Krishnamoorthy, A. K., Kubal, W. S., Johnson, M. H., Poon, C. S. Multidetector CT of temporal bone fractures. *Semin Ultrasound CT MR*; Oct 2012.
51. Kennedy, T. A., Avey, G. D., Gentry, L. R. Imaging of temporal bone trauma. *Neuroimaging Clin N Am*; Aug 2014.
52. Lantos, J. E., Leeman, K., Weidman, E. K., Dean, K. E., Peng, T., Pearlman, A. N. Imaging of Temporal Bone Trauma: A Clinicoradiologic Perspective. *Neuroimaging Clin N Am*; Feb 2019.
53. Bożek, Paweł, Kluczevska, Ewa, Misiółek, Maciej, Ścierański, Wojciech, Lisowska, Grażyna. The Prevalence of Persistent Petrosquamosal Sinus and Other Temporal Bone Anatomical Variations on High-Resolution Temporal Bone Computed Tomography. *Medical science monitor : international medical journal of experimental and clinical research*; 2016.

54. Muderris, T., Bercin, S., Sevil, E., Cetin, H., Kiris, M. A potentially catastrophic anatomical variation: aberrant internal carotid artery in the middle ear cavity. *Case Rep Otolaryngol*; 2013.
55. American College of Radiology, . ACR Appropriateness Criteria® Hearing Loss and/or Vertigo. 2018.
56. Muncie, H. L., Sirmans, S. M., James, E. Dizziness: Approach to Evaluation and Management. *Am Fam Physician*; Feb 1, 2017.
57. Strupp, M., Dieterich, M., Brandt, T. The treatment and natural course of peripheral and central vertigo. *Dtsch Arztebl Int*; Jul 2013.
58. Quesnel, A. M., Lindsay, R. W., Hadlock, T. A. When the bell tolls on Bell's palsy: finding occult malignancy in acute-onset facial paralysis. *Am J Otolaryngol*; Sep-Oct 2010.

EVOLENT CLINICAL GUIDELINE 009 FOR SINUS MAXILLOFACIAL CT, LIMITED OR LOCALIZED FOLLOW UP SINUS CT

Guideline or Policy Number: Evolent_CG_009	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS	3
SINUSITIS	3
<i>Rhinosinusitis</i>	3
<i>Pediatric Rhinosinusitis</i>	4
INFECTION	5
<i>Suspected</i>	5
KNOWN OR SUSPECTED STRUCTURAL ABNORMALITIES.....	5
<i>Deviated Nasal Septum, Polyp, or Other Structural Abnormality Seen on Direct Imaging/Visualization</i>	5
<i>Suspected Sinonasal Mass</i>	5
<i>Facial Mass</i>	5
FACIAL TRAUMA.....	5
CRANIAL NERVE ABNORMALITIES	5
<i>Trigeminal Neuralgia/Neuropathy</i>	5
<i>Anosmia or Dysosmia</i>	6
OTHER INDICATIONS.....	6
<i>Refractory Asthma</i>	6
<i>CSF Rhinorrhea</i>	6
<i>Salivary Glands</i>	6
<i>Osteonecrosis of Jaw</i>	6
<i>Prior to Bone Marrow Transplant (BMT)</i>	6
PROCEDURAL EVALUATIONS.....	7
<i>Post-operative/Procedural Evaluation</i>	7
<i>Pre-operative/Procedural Evaluation</i>	7
<i>Further Evaluation of Indeterminate Findings</i>	7
<i>Cone Beam CT</i>	7

GENETICS AND RARE SYNDROMES	7
<i>Granulomatosis</i>	7
COMBINATION STUDIES	7
<i>Neck/Face CT or MRI and PET</i>	7
<i>Sinus CT/Chest CT</i>	8
<i>Sinus CT/Chest CT/Abdomen and Pelvis CT/Brain MRI</i>	8
LEGISLATIVE REQUIREMENTS	8
STATE OF WASHINGTON	8
<i>Health Technology Clinical Committee 20150515A</i>	8
CODING AND STANDARDS	9
CODING	9
<i>CPT Codes</i>	9
APPLICABLE LINES OF BUSINESS	9
BACKGROUND	9
<i>Rhinosinusitis</i>	9
<i>COVID-19</i>	10
CONTRAINDICATIONS AND PREFERRED STUDIES	10
POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL	11
<i>Committee</i>	11
DISCLAIMER	12
REFERENCES	13

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Sinus/Maxillofacial Computed tomography (CT) primarily provides information about bony structures but may also be useful in evaluating soft tissue masses. It can help document the extent of facial bone fractures, facial infections, masses and abscesses. The primary role of CT scans is to aid in the diagnosis and management of recurrent and chronic sinusitis, or to define the anatomy of the sinuses prior to surgery.

Special Note

A single authorization for CPT codes 70486, 70487, 70488, or 76380 includes imaging of the entire maxillofacial area, including face and sinuses. Multiple authorizations are not required.

See **Legislative Requirements** for specific mandates in the State of Washington.

INDICATIONS

Sinusitis

Rhinosinusitis

- Clinical suspicion of fungal infection ^(1,2,3)
- Clinical suspicion of complications, such as ^(3,4):
 - Preseptal, orbital, or intracranial infection ⁽⁵⁾
 - Osteomyelitis
 - Cavernous sinus thrombosis
- Acute (< 4 weeks) or subacute (4-12 weeks) sinusitis (presumed infectious)

- Not responding to medical management including 2 or more courses of antibiotics in the past 3 months
- Recurrent acute rhinosinusitis with 4 or more annual episodes without persistent symptoms in-between
- Chronic recurrent sinusitis ⁽⁶⁾ (> 12 weeks)
 - Not responding to medical management* and with at least two of the following:
 - Mucopurulent discharge
 - Nasal obstruction and congestion
 - Facial pain, pressure, and fullness
 - Decreased or absent sense of smell
 - With nasal polyps especially unilateral polyps, concern for polyps extending outside of the nasal cavity, or other atypical presentations ⁽⁶⁾

***NOTE:** Medical management for chronic sinusitis includes nasal saline irrigation and/or topical intranasal steroids. In chronic sinusitis, repeat imaging is not necessary unless clinical signs or symptoms have changed. Biologics such as dupilumab can be used to treat chronic sinusitis with nasal polyposis.

- Allergic Rhinitis – sinus imaging usually not indicated unless there are signs of complicated infection, signs of neoplasm, or persistence of symptoms/chronic rhinosinusitis despite treatment (including antihistamines) and is a possible surgical candidate ⁽⁷⁾
- If suspected as a cause of poorly controlled asthma (endoscopic sinus surgery improves outcomes) ⁽⁸⁾
- To evaluate in the setting of unilateral nasal polyps or obstruction ⁽⁶⁾

NOTE: Imaging may be indicated in those predisposed to complications, including diabetes, immune-compromised state, immotile cilia disorders, or a history of facial trauma or surgery.

Pediatric Rhinosinusitis ⁽⁹⁾

- Persistent or recurrent sinusitis not responding to treatment (primarily antibiotics, treatment may require a change of antibiotics)
- Suspicion of orbital or central nervous system involvement (e.g., swollen eye, proptosis, altered consciousness, seizures, nerve deficit)
- Clinical suspicion of a fungal infection (more common in immunocompromised children)

Infection

Suspected

- Osteomyelitis (after x-rays and MRI cannot be performed) ⁽¹⁰⁾
- Abscess based on clinical signs and symptoms of infection

Known or Suspected Structural Abnormalities

Deviated Nasal Septum, Polyp, or Other Structural Abnormality Seen on Direct Imaging/Visualization

- Causing significant airway obstruction **AND**
- Imaging is needed to plan surgery or determine if surgery is appropriate ^(11,12)

Suspected Sinonasal Mass

- Based on exam, nasal endoscopy, or prior imaging ^(6,11)

Facial Mass ^(13,14)

- Present on physical exam and remains non-diagnostic after x-ray or ultrasound is completed, **OR**
- Known or highly suspected head and neck cancer on examination

Facial Trauma ^(15,16,17,18)

- Serious facial injury with concern for fracture on exam (e.g., bony step off, ecchymosis, nasal deformity, depression, malocclusion)
- **Note:** x-rays should be performed for isolated dental/mandibular injury
- Suspected facial bone fracture with indeterminate x-ray
- For further evaluation of a known fracture for treatment or surgical planning

Cranial Nerve Abnormalities

Trigeminal Neuralgia/Neuropathy ⁽¹⁾

*If MRI is contraindicated or cannot be performed (for evaluation of the extracranial nerve course)

- If atypical features (i.e., bilateral, hearing loss, dizziness/vertigo, visual changes, sensory loss, numbness, pain > 2 min, pain outside trigeminal nerve distribution, progression)

Anosmia or Dysosmia ^(11,19)

- When persistent, of unknown origin and nasal endoscopy has been performed for evaluation of peripheral sinonasal disease and/or bone-related pathology

Other Indications

Refractory Asthma

- These patients benefit from medical treatment and surgery together ^(8,20)

CSF Rhinorrhea

- When looking to characterize a bony defect ⁽¹¹⁾

Note: For intermittent leaks and complex cases, consider CT/MRI/Nuclear Cisternography. There should be a high suspicion or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay)

Salivary Glands

- Sialadenitis (infection and inflammation of the salivary glands) with indeterminate ultrasound, bilateral symptoms or concern for abscess ⁽²¹⁾
- Suspected or known salivary gland stones ⁽²²⁾

Osteonecrosis of Jaw ⁽²³⁾

- Possible etiologies: bisphosphonate treatment, dental procedures, Denosumab, radiation treatment

NOTE: MRI should be reserved for those patients who have soft tissue extension of the disease.

Prior to Bone Marrow Transplant (BMT)

- For initial workup

Procedural Evaluations

Post-operative/Procedural Evaluation

- When imaging, physical, or laboratory findings indicate surgical or procedural complications

Pre-operative/Procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure

Further Evaluation of Indeterminate Findings

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Cone Beam CT ^(11,24,25)

- Can be used in the evaluation of rhinosinusitis for the above-mentioned indications and for surgical planning/pre-operative evaluation in non-neoplastic indications.

*Cone beam CT is not approvable in the evaluation of dentomaxillofacial imaging

Genetics and Rare Syndromes

Granulomatosis

Granulomatosis with polyangiitis (Wegener's granulomatosis) disease ⁽²⁶⁾

Combination Studies

Neck/Face CT or MRI and PET

- Neck/Face CT or MRI is indicated **in addition to PET** for Head and Neck Cancer
 - For surgical or radiation planning
 - 3-4 months after end of treatment in patients with locoregionally advanced disease or with altered anatomy

Sinus CT/Chest CT

- Granulomatosis with polyangiitis (Wegener's granulomatosis) disease (GPA)

Sinus CT/Chest CT/Abdomen and Pelvis CT/Brain MRI

- Prior to Bone Marrow Transplant

LEGISLATIVE REQUIREMENTS

State of Washington⁽²⁷⁾

Health Technology Clinical Committee 20150515A

Number and Coverage Topic:

20150515A – Imaging for Rhinosinusitis

HTTC Coverage Determination:

Imaging for Rhinosinusitis is a **covered benefit with conditions** consistent with the criteria identified in the reimbursement determination.

HTCC Reimbursement Determination:

Limitations of Coverage

Imaging with Sinus Computed Tomography (CT) is covered in the context of rhinosinusitis for the following:

- Red Flags* OR
- Persistent Symptoms** > 12 weeks AND failure of medical therapy; OR
- Surgical planning
- Repeat scanning is not covered except for Red Flags or Surgical Planning

Magnetic Resonance Imaging (MRI) of the sinus is covered in the context of rhinosinusitis for the following:

- As above for sinus CT AND < 18 years of age OR pregnant

***Red Flags in the setting of Rhinosinusitis:** (From American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS))

- Swelling of orbit
- Altered mental status
- Neurological findings
- Signs of meningeal irritation
- Severe headache

- Signs of intracranial complication, including, but not limited to:
 - Meningitis,
 - Intracerebral abscess
 - Cavernous sinus thrombosis
- Involvement of nearby structures, including, but not limited to:
 - Periorbital cellulitis

****Persistent Symptoms defined as \geq two of the following:** (From AAO-HNS)

- Facial pain-pressure-fullness
- Mucopurulent drainage
- Nasal obstruction (congestion)
- Decreased sense of smell

Non-Covered Indicators

- Imaging of the sinus for rhinosinusitis using X-ray OR Ultrasound is not covered.

CODING AND STANDARDS

Coding

CPT Codes

70486, 70487, 70488, 76380, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Rhinosinusitis

Society consensus recommendation is not to order sinus computed tomography (CT) or indiscriminately prescribe antibiotics for uncomplicated acute rhinosinusitis. Viral infections cause the majority of acute rhinosinusitis and only 0.5 percent to 2 percent progress to bacterial infections. Most acute rhinosinusitis resolves without treatment in two weeks.

Uncomplicated acute rhinosinusitis is generally diagnosed clinically and does not require a sinus CT scan or other imaging. Antibiotics are not recommended for patients with uncomplicated acute rhinosinusitis who have mild illness and assurance of follow-up. If a decision is made to treat, amoxicillin with clavulanate should be first-line antibiotic treatment for most acute rhinosinusitis. If improvement is not demonstrated, it is recommended to change antibiotics to either high-dose amoxicillin plus clavulanate, doxycycline, a fluoroquinolone such as moxifloxacin or levofloxacin, or a dual treatment of clindamycin plus a third-generation oral cephalosporin. ⁽³⁾

COVID-19

Anosmia and dysgeusia have been reported as common early symptoms in patients with COVID-19, occurring in greater than 80 percent of patients. For isolated anosmia, imaging is typically not needed once the diagnosis of COVID has been made, given the high association. As such, COVID testing should be done prior to imaging. ^(28,29,30)

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background • Added contraindications and preferred studies to background • Added to initial workup prior to Bone Marrow Transplant (BMT) • Clarified anosmia indication • Added legislative requirements for WA State
May 2023	<ul style="list-style-type: none"> • Updated references • Updated background • Added: <ul style="list-style-type: none"> ◦ Nasal polyps as an indication for chronic recurrent sinusitis

Date	Summary
	<ul style="list-style-type: none"> ○ Cone Beam CT (CBCT) ○ Can be used in the evaluation of rhinosinusitis for the above-mentioned indications and for surgical planning/pre-operative evaluation in non-neoplastic indications. ○ Cone beam CT is not approvable in the evaluation of dentomaxillofacial imaging ○ Section on further evaluation of indeterminate or questionable findings on prior imaging ○ General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ○ Section on CSF rhinorrhea to characterize bony defect ○ Biologics such as dupilumab for chronic sinusitis with nasal polyposis ● Clarified: <ul style="list-style-type: none"> ○ Acute (< 4 weeks) or subacute (4-12 weeks) sinusitis (presumed infectious) - not responding to medical management including 2 or more courses of antibiotics in the past 3 months ○ When CT would be indicated for anosmia/dysosmia and removed when MRI is contraindicated ○ Serious facial injury with concern for fracture on exam (e.g. bony step off, ecchymosis, nasal deformity, depression, malocclusion) ○ Note: x-rays should be performed in isolated dental/mandibular injury ○ There should be a high suspicion of CSF leak or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay) ● Removed: <ul style="list-style-type: none"> ○ When MRI is contraindicated or if bony involvement suspected from suspected sinonasal mass ○ Lesion seen on x-ray or other study – covered in new indication

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology. ACR Appropriateness Criteria® Cranial Neuropathy. 2022; 2023:
2. Silveira M, Anselmo-Lima W, Faria F, Queiroz D, Nogueira R et al. Impact of early detection of acute invasive fungal rhinosinusitis in immunocompromised patients. *BMC Infect Dis*. Apr 5, 2019; 19: 310. 10.1186/s12879-019-3938-y.
3. Frerichs N, Brateanu A. Rhinosinusitis and the role of imaging. *Cleve Clin J Med*. Jul 31, 2020; 87: 485-492. 10.3949/ccjm.87a.19092.
4. Dankbaar J, van Bommel A, Pameijer F. Imaging findings of the orbital and intracranial complications of acute bacterial rhinosinusitis. *Insights Imaging*. Oct 2015; 6: 509-18. 10.1007/s13244-015-0424-y.
5. El Mograbi A, Ritter A, Najjar E, Soudry E. Orbital Complications of Rhinosinusitis in the Adult Population: Analysis of Cases Presenting to a Tertiary Medical Center Over a 13-Year Period. *Annals of Otolaryngology & Laryngology*. 2019; 128: 563 - 568. 10.1177/0003489419832624.
6. Rosenfeld R, Piccirillo J, Chandrasekhar S, Brook I, Ashok Kumar K et al. Clinical practice guideline (update): adult sinusitis. *Otolaryngol Head Neck Surg*. Apr 2015; 152: S1-s39. 10.1177/0194599815572097.
7. Seidman M, Gurgel R, Lin S, Schwartz S, Baroody F et al. Clinical Practice Guideline: Allergic Rhinitis. *Otolaryngol Head Neck Surg*. 2015/02/01; 152: S1-S43. 10.1177/0194599814561600.
8. Vashishta R, Soler Z, Nguyen S, Schlosser R. A systematic review and meta-analysis of asthma outcomes following endoscopic sinus surgery for chronic rhinosinusitis. *Int Forum Allergy Rhinol*. Oct 2013; 3: 788-94. 10.1002/alr.21182.
9. American College of Radiology. ACR Appropriateness Criteria® Sinusitis-Child. 2018.
10. Pincus D, Armstrong M, Thaller S. Osteomyelitis of the craniofacial skeleton. *Seminars in plastic surgery*. 2009; 23: 73-79. 10.1055/s-0029-1214159.
11. American College of Radiology. ACR Appropriateness Criteria® Sinonasal Disease. 2021.
12. Poorey V, Gupta N. Endoscopic and computed tomographic evaluation of influence of nasal septal deviation on lateral wall of nose and its relation to sinus diseases. *Indian J Otolaryngol Head Neck Surg*. Sep 2014; 66: 330-5. 10.1007/s12070-014-0726-2.
13. Bansal A, Oudsema R, Masseaux J, Rosenberg H. US of Pediatric Superficial Masses of the Head and Neck. *RadioGraphics*. 2018; 38: 1239 - 1263. 10.1148/rg.2018170165.
14. Razek A, Huang B. Soft Tissue Tumors of the Head and Neck: Imaging-based Review of the WHO Classification. *RadioGraphics*. 2011; 31: 1923 - 1954. 10.1148/rg.317115095.
15. American College of Radiology. ACR Appropriateness Criteria® Head Trauma. 2020.
16. American College of Radiology. ACR Appropriateness Criteria® Major Blunt Trauma. 2019
17. Oh J, Kim S, Whang K. Traumatic Cerebrospinal Fluid Leak: Diagnosis and Management. *Korean J Neurotrauma*. Oct 2017; 13: 63-67. 10.13004/kjnt.2017.13.2.63.
18. Reddy B, Naik D, Kenkere D. Role of Multidetector Computed Tomography in the Evaluation of Maxillofacial. *Cureus*. 2023; 15: e35008.
19. Lie G, Wilson A, Champion T, Adams A. What's that smell? A pictorial review of the olfactory pathways and imaging assessment of the myriad pathologies that can affect them. *Insights Imaging*. 2021; 12: 7. 10.1186/s13244-020-00951-x.

20. Sahay S, Gera K, Bhargava S, Shah A. Occurrence and impact of sinusitis in patients with asthma and/or allergic rhinitis. *J Asthma*. Aug 2016; 53: 635-43. 10.3109/02770903.2015.1091005.
21. Abdel Razek A, Mukherji S. Imaging of sialadenitis. *Neuroradiol J*. Jun 2017; 30: 205-215. 10.1177/1971400916682752.
22. Kalia V, Kalra G, Kaur S, Kapoor R. CT Scan as an Essential Tool in Diagnosis of Non-radiopaque Sialoliths. *J Maxillofac Oral Surg*. Mar 2015; 14: 240-4. 10.1007/s12663-012-0461-8.
23. Wongratwanich P, Shimabukuro K, Konishi M, Nagasaki T, Ohtsuka M et al. Do various imaging modalities provide potential early detection and diagnosis of medication-related osteonecrosis of the jaw? A review. *Dentomaxillofac Radiol*. 2021; 50: true. 10.1259/dmfr.20200417.
24. Bozdemir E, Gormez O, Yıldırım D, Aydogmus Erik A. Paranasal sinus pathoses on cone beam computed tomography. *J Istanbul Univ Fac Dent*. 2016; 50: 27-34. 10.17096/jiufd.47796.
25. Han M, Kim H, Choi J, Park D, Han J. Diagnostic usefulness of cone-beam computed tomography versus multi-detector computed tomography for sinonasal structure evaluation. *Laryngoscope Investig Otolaryngol*. Jun 2022; 7: 662-670. 10.1002/lio2.792.
26. Pakalniskis M G, Berg A D, Policeni B A, Gentry L R, Sato Y et al. The Many Faces of Granulomatosis With Polyangiitis: A Review of the Head and Neck Imaging Manifestations. *AJR Am J Roentgenol*. 2015; 205: W619-29. 10.2214/ajr.14.13864.
27. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20150515A – Imaging for Rhinosinusitis. [Final Adoption: July 10, 2015]. [https://www.hca.wa.gov/assets/program/rhino_final_findings_decision_071015\[1\].pdf](https://www.hca.wa.gov/assets/program/rhino_final_findings_decision_071015[1].pdf).
28. Geyer M, Nilssen E. Evidence-based management of a patient with anosmia. *Clin Otolaryngol*. Oct 2008; 33: 466-9. 10.1111/j.1749-4486.2008.01819.x.
29. Lechien J, Chiesa-Estomba C, De Siati D, Horoi M, Le Bon S et al. Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. *Eur Arch Otorhinolaryngol*. Aug 2020; 277: 2251-2261. 10.1007/s00405-020-05965-1.
30. Saniasiaya J, Islam M, Abdullah B. Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients. *Laryngoscope*. Apr 2021; 131: 865-878. 10.1002/lary.29286.



EVOLENT CLINICAL GUIDELINE 008-1 FOR NECK CT

Guideline or Policy Number: Evolent_CG_008-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS	3
SUSPECTED TUMOR OR CANCER	3
<i>Neck Mass or Lymphadenopathy (not parotid or thyroid region)</i>	3
<i>Neck Mass (parotid region)</i>	4
<i>Neck Mass (thyroid region)</i>	4
FOLLOW-UP OF KNOWN TUMOR OR CANCER	4
<i>Initial Staging</i>	4
<i>Restaging</i>	5
<i>Surveillance</i>	5
OTHER INDICATIONS	6
PREOPERATIVE/PROCEDURAL EVALUATION	7
POSTOPERATIVE/PROCEDURAL EVALUATION	7
COMBINATION STUDIES	7
<i>Neck/Chest CT</i>	7
<i>Neck/Face CT or MRI and PET</i>	7
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
CODING AND STANDARDS	8
CODING	8
<i>CPT Codes</i>	8
APPLICABLE LINES OF BUSINESS	8
BACKGROUND	8
CONTRAINDICATIONS AND PREFERRED STUDIES	9
POLICY HISTORY	9
<i>Summary</i>	9
LEGAL AND COMPLIANCE	9
GUIDELINE APPROVAL	9
<i>Committee</i>	9
DISCLAIMER	9

REFERENCES.....	11
-----------------	----

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

High resolution CT can visualize both normal and pathologic anatomy of the neck. It is used in the evaluation of neck soft tissues, masses, abscesses, and lymphadenopathy. Neck CT additionally provides details about the larynx, cervical trachea and pathologic conditions of the airway.

INDICATIONS

Suspected Tumor or Cancer

- Suspicious lesions in mouth or throat ⁽¹⁾
- Suspicious tumor or cancer mass/tumor found on another imaging study and needing clarification ⁽²⁾

Neck Mass or Lymphadenopathy (not parotid or thyroid region)

- Present on physical exam and remains non-diagnostic after ultrasound is completed ⁽¹⁾
- Mass or abnormality found on other imaging study and needing further evaluation
- Increased risk for malignancy ⁽²⁾ with one or more of the following findings ⁽³⁾:
 - Fixation to adjacent tissues
 - Firm consistency
 - Size > 1.5 cm
 - Ulceration of overlying skin

- Mass present \geq two weeks (or uncertain duration) without significant fluctuation and not considered of infectious cause
- History of cancer
- Failed 2 weeks of treatment for suspected infectious adenopathy ^(3,4)
- Pediatric (\leq 18 years old) considerations ⁽⁵⁾
 - Ultrasound should be inconclusive or suspicious unless there is a history of malignancy ⁽⁶⁾

Note: For discrete cystic lesions of the neck, an ultrasound should be performed as initial imaging unless there is a high suspicion of malignancy

Neck Mass (parotid region)

- Parotid mass found on other imaging study and needing further evaluation

Note: US is the initial imaging study of a parotid region mass to determine if the location is inside or outside the gland ^(2,7)

Neck Mass (thyroid region)

- Staging and monitoring for recurrence of known thyroid cancer ⁽⁸⁾
- To assess extent of thyroid tissue when other imaging suggests extension through the thoracic inlet into the mediastinum or concern for airway compression ⁽⁹⁾

Note: US is the initial imaging study of a thyroid region mass. Biopsy is usually the next step. In the evaluation of known thyroid malignancy, CT is preferred over MRI since there is less respiratory motion artifact. Chest CT may be included for preoperative assessment in some cases.

Follow-up of Known Tumor or Cancer ⁽¹⁰⁾

For malignancies not listed, Neck CT is only indicated when there are signs or symptoms of neck involvement (such as palpable masses/lymph nodes or dysphagia)

Initial Staging

- Neck CT is indicated for initial diagnostic workup for the following cancer types:
 - Head and neck cancers
 - Thyroid cancer

- B cell lymphomas (follicular lymphoma, diffuse large B cell lymphoma, Burkitt lymphoma, B-lymphoblastic lymphoma, post-transplant lymphoproliferative disorders)
- ALL
- AML
- Hodgkin lymphoma (pediatric and adult)
- Pediatric aggressive mature B cell lymphomas (Burkitt lymphoma, Diffuse large B cell lymphoma, primary mediastinal large B cell lymphoma)
- Occult primary

Restaging

- Neck CT is indicated during active treatment (every 2-3 cycles of chemotherapy or immunotherapy, following radiation and/or after surgery) for the following malignancies:
 - Head and neck cancers (and after radiation treatment)
 - Thyroid cancer (and after surgery and/or if any concern for recurrence or progression)
 - ALL
 - AML
 - B Cell lymphomas (follicular lymphoma, diffuse large B cell lymphoma, Burkitt lymphoma, B-lymphoblastic lymphoma, post-transplant lymphoproliferative disorders)
 - Hodgkin lymphoma (pediatric and adult)
 - Pediatric aggressive mature B cell lymphomas (Burkitt lymphoma, Diffuse large B cell lymphoma, primary mediastinal large B cell lymphoma)
 - Occult primary

Surveillance

- Neck CT is appropriate during surveillance for the following malignancies at the intervals defined below:
 - ALL if lymphomatous features present, every 3-6 months for 2 years
 - AML if extramedullary disease present, every 3-6 months for 2 years
 - B Cell lymphomas (pediatric and adult) every 6 months for 2 years then annually as clinically indicated

- Head and Neck cancer annually when specified that the area of original disease is difficult to follow on direct visualization (surveillance is typically with exam/scope rather than imaging)
- Hodgkin lymphoma (pediatric and adult) every 3-6 months for 2 years
- Occult primary every 3-6 months for 2 years, every 6-12 months for 3 years then annually

Note: There would need to be a sign or symptom of recurrence to consider Neck CT when the timeframe above for routine surveillance has elapsed OR when a cancer is not listed above because neck CT is not routinely a part of surveillance for that cancer in an asymptomatic patient.

Other Indications

- Known or suspected deep space infection or abscesses of the pharynx or neck with signs or symptoms of infection ⁽¹¹⁾
- Sialadenitis (infection and inflammation of the salivary glands) with indeterminate ultrasound, bilateral symptoms or concern for abscess ⁽¹²⁾
- Suspected or known salivary gland stones ^(12,13)
- To assess for foreign body when radiograph is inconclusive or negative ⁽¹⁴⁾
- Vocal cord lesions or vocal cord paralysis ⁽¹⁵⁾
- For evaluation of tracheal stenosis ⁽¹⁶⁾
- Dysphagia after appropriate work up including endoscopy and fluoroscopic studies (modified barium swallow, or biphasic Esophogram) ⁽¹⁷⁾
- Unexplained throat pain for more than 2 weeks when ordered by a specialist with all of the following: ^(18,19)
 - Complete otolaryngologic exam and laryngoscopy
 - No signs of infection
 - Evaluation for and failed treatment of laryngopharyngeal reflux
 - Risk factor for malignancy, i.e., tobacco use, alcohol use, dysphagia, weight loss **OR** age older than 50 years
- Unexplained ear pain when ordered by a specialist and MRI is contraindicated with all of the following: ⁽²⁰⁾
 - Otoscope exam, nasolaryngoscopy, lab evaluation (ESR, CBC) **AND**
 - Risk factor for malignancy, i.e., tobacco use, alcohol use, dysphagia, weight loss **OR** age older than 50 years
- Diagnosed primary hyperparathyroidism when surgery is planned ⁽²¹⁾
 - Previous nondiagnostic ultrasound or nuclear medicine scan

- Bell's palsy/hemifacial spasm, if MRI is contraindicated or cannot be performed (for evaluation of the extracranial nerve course)
 - If atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset ⁽²²⁾
- Objective cranial nerve palsy (CN IX-XII) if MRI is contraindicated or cannot be performed (for evaluation of the extracranial nerve course) ⁽²²⁾

Preoperative/Procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure

Postoperative/Procedural Evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Combination Studies

Neck/Chest CT

- Vocal cord paralysis on endoscopic exam and concern for recurrent laryngeal nerve lesion
- Phrenic nerve paralysis on diaphragm fluoroscopy (fluoroscopic sniff test)

Neck/Face CT or MRI and PET

- Neck/Face CT or MRI is indicated **in addition to PET** for Head and Neck Cancer
 - For surgical or radiation planning
 - 3-4 months after end of treatment in patients with locoregionally advanced disease or with altered anatomy

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is specified elsewhere in the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

70490, 70491, 70492, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

CT can define the extent of the primary neck tumor and identify lymph node spread. With the rise of human papillomavirus-related oral, pharyngeal, and laryngeal cancers in adults, contrast-enhanced neck CT has become more important for the evaluation of a neck mass, deemed at risk for malignancy, surpassing ultrasound for the initial evaluation in many cases. The American Academy of Otolaryngology-Head and Neck Surgery recently issued strong recommendations for neck CT or MRI, emphasizing the importance of a timely diagnosis.⁽³⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background • Added follow-up of known cancer section (initial staging, restaging, surveillance) • Added combo section
April 2023	<ul style="list-style-type: none"> • Updated references • Updated background • Removed additional resources • Added: <ul style="list-style-type: none"> ○ Section on further evaluation of indeterminate or questionable findings on prior imaging ○ General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization



management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Kuno H, Sakamaki K, Fujii S, Sekiya K, Otani K et al. Comparison of MR Imaging and Dual-Energy CT for the Evaluation of Cartilage Invasion by Laryngeal and Hypopharyngeal Squamous Cell Carcinoma. *American Journal of Neuroradiology*. 2018; 39: true. 10.3174/ajnr.A5530.
2. American College of Radiology. ACR Appropriateness Criteria® Neck Mass/Adenopathy. 2018; 2023:
3. Pynnonen M, Gillespie M, Roman B, Rosenfeld R, Tunkel D et al. Clinical Practice Guideline: Evaluation of the Neck Mass in Adults. *Otolaryngol Head Neck Surg*. Sep 2017; 157: S1-s30. 10.1177/0194599817722550.
4. Haynes J, Arnold K, Aguirre-Oskins C, Chandra S. Evaluation of neck masses in adults. *Am Fam Physician*. May 15, 2015; 91: 698-706.
5. Wai K, Wang T, Lee E, Rosbe K. Management of Persistent Pediatric Cervical Lymphadenopathy. *Archives of Otorhinolaryngology-Head & Neck Surgery (AOHNS)*. 2020; 4: 1. 10.24983/scitemed.aohns.2020.00121.
6. Brown R, Harave S. Diagnostic imaging of benign and malignant neck masses in children-a pictorial review. *Quant Imaging Med Surg*. Oct 2016; 6: 591-604. 10.21037/qims.2016.10.10.
7. Cicero G, D'Angelo T, Racchiusa S, Salamone I, Visalli C et al. Cross-sectional Imaging of Parotid Gland Nodules: A Brief Practical Guide. *J Clin Imaging Sci*. 2018; 8: 14. 10.4103/jcis.JCIS_8_18.
8. American College of Radiology. ACR Appropriateness Criteria® Thyroid Disease. 2018; 2023:
9. Gharib H, Papini E, Garber J, Duick D, Harrell R et al. AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS, AMERICAN COLLEGE OF ENDOCRINOLOGY, AND ASSOCIAZIONE MEDICI ENDOCRINOLOGI MEDICAL GUIDELINES FOR CLINICAL PRACTICE FOR THE DIAGNOSIS AND MANAGEMENT OF THYROID NODULES--2016 UPDATE. *Endocr Pract*. May 2016; 22: 622-39. 10.4158/ep161208.GI.
10. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Head and Neck Cancers Version 3.2024. 2024.
11. Kauffmann P, Cordesmeier R, Tröltzsch M, Sömmer C, Laskawi R. Deep neck infections: A single-center analysis of 63 cases. *Med Oral Patol Oral Cir Bucal*. Sep 1, 2017; 22: e536-e541. 10.4317/medoral.21799.
12. Abdel Razek A, Mukherji S. Imaging of sialadenitis. *Neuroradiol J*. Jun 2017; 30: 205-215. 10.1177/1971400916682752.
13. Kalia V, Kalra G, Kaur S, Kapoor R. CT Scan as an Essential Tool in Diagnosis of Non-radiopaque Sialoliths. *J Maxillofac Oral Surg*. Mar 2015; 14: 240-4. 10.1007/s12663-012-0461-8.
14. Pham S, Sakai O, Andreu-Arasa V. Imaging approach to ingested foreign bodies in the neck. *Neuroradiology*. 2024; 10.1007/s00234-024-03348-5.
15. Jain V. The role of imaging in the evaluation of hoarseness: A review. *Journal of Neuroimaging*. 2021; 31: 665 - 685. <https://doi.org/10.1111/jon.12866>.
16. Shepard J, Flores E, Abbott G. Imaging of the trachea. *Annals of cardiothoracic surgery*. 2018; 7: 197-209.
17. American College of Radiology. ACR Appropriateness Criteria® Dysphagia. 2018; 2023:
18. Jones D, Prowse S. Globus pharyngeus: an update for general practice. *Br J Gen Pract*. Oct 2015; 65: 554-5. 10.3399/bjgp15X687193.

19. Shephard E, Parkinson M, Hamilton W. Recognising laryngeal cancer in primary care: a large case-control study using electronic records. *Br J Gen Pract.* Feb 2019; 69: e127-e133. 10.3399/bjgp19X700997.
20. Earwood J, Rogers T, Rathjen N. Ear Pain: Diagnosing Common and Uncommon Causes. *Am Fam Physician.* Jan 1, 2018; 97: 20-27.
21. Zander D, Bunch P, Policeni B, Juliano A, Carneiro-Pla D et al. ACR Appropriateness Criteria: Parathyroid Adenoma. *Journal of the American College of Radiology.* 2021; 18: S406 - S422. 10.1016/j.jacr.2021.08.013.
22. American College of Radiology. ACR Appropriateness Criteria® Cranial Neuropathy. 2022; 2023:



EVOLENT CLINICAL GUIDELINE 004-1 FOR BRAIN CTA

Guideline or Policy Number: Evolent_CG_004-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR BRAIN CTA	3
EVALUATION OF SUSPECTED INTRACRANIAL VASCULAR DISEASE	3
Aneurysm Screening	3
Vascular Abnormalities.....	4
Cerebrovascular Disease	4
Vasculitis and Other Intracranial Vascular Disease	5
EVALUATION OF KNOWN INTRACRANIAL VASCULAR DISEASE	5
PRE-OPERATIVE/PROCEDURAL EVALUATION	6
POST-OPERATIVE/PROCEDURAL EVALUATION	6
FURTHER EVALUATION OF INDETERMINATE FINDINGS.....	6
GENETIC SYNDROMES AND RARE DISEASES.....	6
COMBINATION STUDIES	7
Brain CT and/or Brain CTA	7
Brain CT and/or Brain CTA and/or Neck CTA.....	7
Brain CTA and/or Neck CTA	8
Brain/Neck/Chest/Abdomen/Pelvis CTA	8
CODING AND STANDARDS	9
CODING	9
CPT Codes	9
APPLICABLE LINES OF BUSINESS.....	9
BACKGROUND	9
GENERAL OVERVIEW.....	9
CTA and Non-Aneurysmal Vascular Malformations.....	9
Pulsatile tinnitus.....	10
MRA vs CTA for CVA	10
CTA and Recent Stroke or Transient Ischemic Attack.....	10

<i>CTA and Intracerebral Hemorrhage</i>	11
<i>CTV and Central Venous Thrombosis</i>	11
<i>CTA and Dissection</i>	11
<i>Contraindications and Preferred Studies</i>	12
ACRONYMS / ABBREVIATIONS	12
POLICY HISTORY	12
<i>Summary</i>	12
LEGAL AND COMPLIANCE	14
GUIDELINE APPROVAL	14
<i>Committee</i>	14
DISCLAIMER.....	15
REFERENCES	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for performing computed tomography angiography (CTA) in the head/brain region.

NOTE: Authorization for CT Angiography covers both arterial and venous imaging. The term angiography refers to both arteriography and venography

Special Note

Brain CT/CTA are not approvable simultaneously unless they meet the criteria described below in the Indications for Brain CT/Brain CTA combination studies section. If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR BRAIN CTA

Evaluation of Suspected Intracranial Vascular Disease ^(1,2)

Aneurysm Screening

- Screening for intracranial aneurysm if two or more first-degree family members (parent, brother, sister, or child) of intracranial aneurysm ⁽¹⁾
 - **Note:** Repeat study is recommended every 5-7 years ⁽³⁾

- For one first degree relative with aneurysm, asymptomatic screening is not indicated - would require a neurological sign or symptom supporting clinical concern for aneurysm. ^(4,5,6)
- Screening for aneurysm in high-risk populations ^(1,7,8,9,10,11,12):
 - KNOWN genetic syndromes (see **Genetic Syndromes and Rare Diseases**)
 - Bicuspid aortic valve
 - Known aortic diseases (aneurysm, coarctation, dissection)

Vascular Abnormalities

- Suspected vascular malformation (arteriovenous malformation (AVM) or dural arteriovenous fistula) in patient with previous or indeterminate imaging study ⁽²⁾
- Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging. ^(13,14,15,16)
 - **Note:** Negative brain CT < 6 hours after headache onset excludes subarachnoid hemorrhage in neurologically intact patients ⁽¹⁵⁾. MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset. ^(13,17)
- Headache associated with exercise, exertion, Valsalva or sexual activity ⁽¹³⁾
- Isolated third nerve palsy (oculomotor) with pupil involvement to evaluate for aneurysm ^(18,19)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ⁽²⁰⁾
- Pulsatile tinnitus to identify a suspected arterial vascular etiology ^(21,22)

Note: MRI is the study of choice for detecting low flow malformations (see **background** section) ⁽²⁾

Cerebrovascular Disease

Ischemic

- Recent ischemic stroke or transient ischemic attack (See **background** section) ^(23,24)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech. ^(25,26,27,28)

- Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall ^(29,30)
- Suspected cerebral vasospasm ⁽¹⁾

Hemorrhagic

- Known subarachnoid hemorrhage (SAH) ^(1,2)
- Known cerebral intraparenchymal hemorrhage with concern for underlying vascular abnormality ^(2,24)

Venous and MRV is contraindicated or cannot be performed ⁽³¹⁾ – CTV**

- Suspected venous thrombosis (dural sinus thrombosis) ⁽²⁴⁾
- Distinguishing benign intracranial hypertension (pseudotumor cerebri) from dural sinus thrombosis ⁽¹⁶⁾

Sickle cells disease (ischemic and/or hemorrhagic) and MRA is contraindicated or cannot be performed ⁽³²⁾

- Neurological signs or symptoms in sickle cell disease
- Stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200

Vasculitis and Other Intracranial Vascular Disease

- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies ⁽¹⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(1,33,34)
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial involvement ^(35,36,37,38,39)
- Suspected Moyamoya disease ^(40,41)
- Suspected reversible cerebral vasoconstriction syndrome ^(16,42)

Note: Vessel wall MRI (ordered as Brain MRI) can also be performed in the evaluation of vasculitides ⁽⁴³⁾

Evaluation of Known Intracranial Vascular Disease ^(1,2)

- Known intracranial aneurysm, treated aneurysm, or known vascular malformation (i.e., AVM or dural arteriovenous fistula)
- Known vertebrobasilar insufficiency with new or worsening signs or symptoms (VBI) ^(25,26,28)

- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(44,45)
- Known vasculitis, reversible cerebral vasoconstriction syndrome or Moyamoya disease ^(2,34,46,47,48)

Pre-operative/procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure
- Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ^(49,50)

Post-operative/procedural Evaluation ^(51,52)

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD): ^(53,54)
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome: ^(55,56)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Loeys-Dietz: ⁽⁵⁷⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found

- Spontaneous coronary arteries dissection (SCAD) ⁽¹²⁾
 - One-time vascular study from brain to pelvis
- Takayasu's Arteritis: ⁽³⁹⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Brain CT and/or Brain CTA

- Recent ischemic stroke or transient ischemic attack (TIA) when MRI is contraindicated or cannot be performed ^(23,24)
- Acute, sudden onset of headache with personal history of a vascular abnormality or first-degree family history of aneurysm ^(1,16)
- Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH ⁽¹⁶⁾
- Headache associated with exercise, exertion, Valsalva or sexual activity when MRI is contraindicated or cannot be performed ⁽¹³⁾
- Suspected venous thrombosis (dural sinus thrombosis) and MRI is contraindicated or cannot be performed ⁽²⁴⁾ – **CT/CTV****
- Neurological signs or symptoms in sickle cell patients when MRI is contraindicated or cannot be performed ⁽⁵⁸⁾
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200 when MRI is contraindicated or cannot be performed ⁽⁵⁸⁾
- Known Moyamoya disease ^(2,41) or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms ^(16,42)
- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies when MRI is contraindicated or cannot be performed ⁽¹⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up when MRI is contraindicated or cannot be performed ^(1,33,34)

Brain CT and/or Brain CTA and/or Neck CTA

- Recent ischemic stroke or transient ischemic attack (TIA) ^(23,24) when MRI is contraindicated or cannot be performed.

- Suspected or known carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- Approved indications as noted above and being performed in high-risk populations (in whom MRI is contraindicated or cannot be performed) and will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology

***Note:** MRA and CTA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can alternatively be combined with Brain CTA/Neck CTA.

Brain CTA and/or Neck CTA

- Recent ischemic stroke or transient ischemic attack (see **background**)^(23,24)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech^(25,26,27,28)
- Suspected carotid⁽⁵⁹⁾ or vertebral⁽⁶⁰⁾ artery dissection; secondary to trauma⁽⁶¹⁾ or spontaneous due to weakness of vessel wall^(24,62,63)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment^(64,65,66)
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 70\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate^(67,68,69)
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 50\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate^(68,70)
- Pulsatile tinnitus to identify a suspected arterial vascular etiology^(21,22)
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement

Brain/Neck/Chest/Abdomen/Pelvis CTA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis^(53,54)



- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found ^(55,56)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found ⁽⁵⁷⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽⁷¹⁾

CODING AND STANDARDS

Coding

CPT Codes

70496

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview

Computed tomography angiography (CTA) is recognized as a valuable diagnostic tool for the management of patients with cerebrovascular disease. With its three-dimensional reconstructions, CTA can simultaneously demonstrate the bony skull base and its related vasculature. CTA's use of ionizing radiation and an iodine-based intravascular contrast medium is a disadvantage when compared to magnetic resonance angiography (MRA), but it is quicker and requires less patient cooperation than MRA. CTA is much less invasive than catheter angiography which involves injecting contrast material into an artery.

CTA and Non-Aneurysmal Vascular Malformations

Non-aneurysmal vascular malformations can be divided into low flow vascular malformations and high flow vascular malformations. Low flow vascular malformations include dural venous anomalies (DVA), cavernomas, and capillary telangiectasias. High flow vascular malformations include AVM and dural arteriovenous fistulas (dAVF). For low flow

malformations, MRI is the study of choice. There is limited medical literature to support vascular imaging (CTA or MRA). CTA plays a limited role in the assessment of cavernoma but may be used to demonstrate a DVA. MRA is not usually helpful in the assessment of cavernoma, capillary telangiectasia, and DVA. Vascular imaging is indicated in high flow vascular malformations. ^(1,2,72)

There is no evidence to support screening of first-degree relatives for AVMs ⁽⁷³⁾. The risk of having an AVM may be higher than in the general population, but absolute risk is low.

Pulsatile tinnitus

Pulsatile tinnitus has many etiologies, and the choice of study should be based on accompanying signs and symptoms. For general screening MRI brain with IAC/MRA brain and neck is approvable. If IIH is suspected (typically with headache and vision changes in a younger woman with a high BMI), MRI/MRV brain is indicated. If there is concern for vascular etiology, CTA or MRA brain/neck is indicated. If there is associated hearing loss and neurological signs/symptoms, MRI brain with IAC is indicated. If the temporal bone is suspected to be involved and/or retrotympenic lesion seen on otoscopy, CT temporal bone/IAC is indicated. If there is concurrent concern for bony and a vascular issue, CTA of the head and neck can be used to evaluate both.

MRA vs CTA for CVA

Preferred vascular imaging of the head and neck includes non-contrast head MRA and contrast-enhanced neck MRA. MRA may not be able to be performed in patients with claustrophobia, morbid obesity, or implanted device, but it can be useful in patients with renal failure or contrast allergies. In patients with high radiation exposure, MRA as an alternative should be considered. For acute stroke, CTA is preferred after CT (to rule of hemorrhage) and to look for thrombus/possible intervention that is time sensitive. ^(2,24)

CTA and Recent Stroke or Transient Ischemic Attack

- When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms ⁽⁷⁴⁾. Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. ⁽⁷⁵⁾
- Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on

imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

CTA and Intracerebral Hemorrhage ⁽⁷⁶⁾

CTA is useful as a screening tool for an underlying vascular abnormality in the evaluation of spontaneous intracerebral hemorrhage (ICH). Etiologies of spontaneous ICH include tumor, vascular malformation, aneurysm, hypertensive arteriopathy, cerebral amyloid angiopathy, venous thrombosis, vasculitis, RCVS, drug-induced vasospasm, venous sinus thrombosis, Moyamoya disease, anticoagulant use and hemorrhagic transformation of an ischemic infarct. History can help point to a specific etiology. Possible risk factors for the presence of underlying vascular abnormalities include age younger than 65, female, lobar or intraventricular location, and the absence of hypertension or impaired coagulation.

CTV and Central Venous Thrombosis**

CT Venogram is indicated for the evaluation of a central venous thrombosis/dural sinus thrombosis. The most frequent presentations are isolated headache, intracranial hypertension syndrome, seizures, focal neurological deficits, and encephalopathy. Risk factors are hypercoagulable states inducing genetic prothrombotic conditions, antiphospholipid syndrome and other acquired prothrombotic diseases, such as cancer, oral contraceptives, pregnancy, puerperium (6 weeks postpartum), infections, and trauma. Since venous thrombosis can cause SAH, infarctions, and hemorrhage, parenchymal imaging with MRI/CT is also appropriate. ^(31,77,78,79)

CTA and Dissection

Cranio-cervical dissections can be spontaneous or traumatic. Patients with blunt head or neck trauma who meet Denver Screening criteria should be assessed for cerebrovascular injury (although about 20% will not meet criteria). The criteria include: focal or lateralizing neurological deficits (not explained by head CT), infarct on head CT, face, basilar skull, or cervical spine fractures, cervical hematomas that are not expanding, Glasgow coma score less than 8 without CT findings, massive epistaxis, cervical bruit or thrill. ^(62,80,81,82)

Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms. There is often minor trauma or precipitating factor (i.e., exercise, neck manipulation). Dissection is thought to occur due to weakness of the vessel wall, and there may be an underlying connective tissue disorder. Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus which can migrate into the intracranial circulation causing ischemia. Therefore, vascular imaging of the head and neck is warranted. ^(63,83)

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Acronyms / Abbreviations

ADPKD: Autosomal Dominant Polycystic Kidney Disease
 AVM: Arteriovenous Malformation
 CNS: Central Nervous System
 CTA: Computed Tomography Angiography
 CTV: Computed Tomography Venography
 CVA: Cerebrovascular Accident
 dAVF: Dural Arteriovenous Fistulas
 DVA: Dural Venous Anomalies
 IAC: Internal Auditory Canal
 ICH: Intracerebral Hemorrhage
 MRA: Magnetic Resonance Angiography
 MRI: Magnetic Resonance Imaging
 MRV: Magnetic Resonance Venography
 SCAD: Spontaneous Coronary Arteries Dissection
 SAH: Subarachnoid Hemorrhage
 VBI: Vertebrobasilar Insufficiency
 TIA: Transient Ischemic Attack

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section • Clarified <ul style="list-style-type: none"> ◦ Frequency of screening in genetic syndromes • Added <ul style="list-style-type: none"> ◦ Screening for aneurysm in high-risk populations ◦ Bicuspid aortic valve

Date	Summary
	<ul style="list-style-type: none"> ○ Known aortic diseases (aneurysm, coarctation, dissection) ○ Suspected cerebral vasospasm ○ Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall (already in combo) ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (already in combo) ○ Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) - also in combo section ○ Genetic syndromes and rare disease section. ○ Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ○ Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management ○ To combo CT/CTA section Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH ○ Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement (Brain/Neck CTA combo) ○ Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms (Brain CTA/Brain CT combo) ○ Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies (Brain CTA /CT combo) when MRI is contraindicated or cannot be performed ○ Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ((Brain CTA /CT combo) when MRI is contraindicated or cannot be performed ● Deleted <ul style="list-style-type: none"> ○ Pulsatile tinnitus combo section
May 2023	<ul style="list-style-type: none"> ● Updated and reformatted references ● Updated background section ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

Date	Summary
	<ul style="list-style-type: none"> • Added statement regarding further evaluation of indeterminate findings on prior imaging • Added: <ul style="list-style-type: none"> ○ Section on further evaluation of indeterminate or questionable findings on prior imaging ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ○ Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management (also in combo section) ○ Note on CTA VS MRA • Clarified: <ul style="list-style-type: none"> ○ Screening for aneurysm in polycystic kidney disease (in adults) ○ Screening for intracranial aneurysm if two or more first-degree family members (parent brother, sister, or child) with history of intracranial aneurysm ○ For one first degree relative with aneurysm, asymptomatic screening is not indicated - would require a neurological sign or symptom supporting clinical concern for aneurysm. ○ Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging ○ Note: MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset ○ Headache associated with exercise, exertion, Valsalva or sexual activity (Also in Combo Brain CT/CTA) • Deleted: <ul style="list-style-type: none"> ○ Vascular abnormality visualized on previous brain imaging that is equivocal or needs further evaluation

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee



Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Ledbetter L, Burns J, Shih R, Ajam A, Brown M et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. *J Am Coll Radiol*. 2021; 18: S283-S304. <https://doi.org/10.1016/j.jacr.2021.08.012>.
2. Robertson R, Palasis S, Rivkin M, Pruthi S, Bartel T et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. *J Am Coll Radiol*. May 2020; 17: S36-s54. [10.1016/j.jacr.2020.01.036](https://doi.org/10.1016/j.jacr.2020.01.036).
3. Hoh B, Ko N, Amin-Hanjani S, Chou S, Cruz-Flores S et al. 2023 Guideline for the Management of Patients with Aneurysmal Subarachnoid Hemorrhage: A Guideline from the American Heart Association/ American Stroke Association. *Stroke*. 2023; 54: e314-e370. [10.1161/STR.0000000000000436](https://doi.org/10.1161/STR.0000000000000436).
4. Brown R J, Huston J, Hornung R, Foroud T, Kallmes D et al. Screening for brain aneurysm in the Familial Intracranial Aneurysm study: frequency and predictors of lesion detection. *J Neurosurg*. Jun 2008; 108: 1132-8. [10.3171/jns.2008.108.6.1132](https://doi.org/10.3171/jns.2008.108.6.1132).
5. Risks and benefits of screening for intracranial aneurysms in first-degree relatives of patients with sporadic subarachnoid hemorrhage. *N Engl J Med*. 1999; 341: 1344-50. [10.1056/nejm199910283411803](https://doi.org/10.1056/nejm199910283411803).
6. Rinkel G, Ruigrok Y. Preventive screening for intracranial aneurysms. *Int J Stroke*. Jan 2022; 17: 30-36. [10.1177/17474930211024584](https://doi.org/10.1177/17474930211024584).
7. Egbe A, Padang R, Brown R, Khan A, Luis S et al. Prevalence and predictors of intracranial aneurysms in patients with bicuspid aortic valve. *Heart*. Oct 2017; 103: 1508-1514. [10.1136/heartjnl-2016-311076](https://doi.org/10.1136/heartjnl-2016-311076).
8. Hitchcock E, Gibson W. A Review of the Genetics of Intracranial Berry Aneurysms and Implications for Genetic Counseling. *J Genet Couns*. Feb 2017; 26: 21-31. [10.1007/s10897-016-0029-8](https://doi.org/10.1007/s10897-016-0029-8).
9. Jung W, Kim J, Ahn S, Song S, Kim B et al. Prevalence of Intracranial Aneurysms in Patients with Aortic Dissection. *AJNR Am J Neuroradiol*. Nov 2017; 38: 2089-2093. [10.3174/ajnr.A5359](https://doi.org/10.3174/ajnr.A5359).
10. Pickard S, Prakash A, Newburger J, Malek A, Wong J. Screening for Intracranial Aneurysms in Coarctation of the Aorta: A Decision and Cost-Effectiveness Analysis. *Circ Cardiovasc Qual Outcomes*. 2020; 13: e006406. [10.1161/CIRCOUTCOMES.119.006406](https://doi.org/10.1161/CIRCOUTCOMES.119.006406).
11. Rouchaud A, Brandt M, Rydberg A, Kadirvel R, Flemming K et al. Prevalence of Intracranial Aneurysms in Patients with Aortic Aneurysms. *AJNR Am J Neuroradiol*. Sep 2016; 37: 1664-8. [10.3174/ajnr.A4827](https://doi.org/10.3174/ajnr.A4827).
12. Hayes S, Kim E, Saw J, Adlam D, Arslanian-Engoren C et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement from the American Heart Association. *Circulation*. May 8, 2018; 137: e523-e557. [10.1161/cir.0000000000000564](https://doi.org/10.1161/cir.0000000000000564).
13. International Headache Society. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018; 38: 1-211. [10.1177/0333102417738202](https://doi.org/10.1177/0333102417738202).
14. Hayes L, Palasis S, Bartel T, Booth T, Iyer R et al. ACR Appropriateness Criteria® Headache-Child. *J Am Coll Radiol*. 2018; 15: S78-S90. [10.1016/j.jacr.2018.03.017](https://doi.org/10.1016/j.jacr.2018.03.017).
15. Chen C, Fuh J. Evaluating thunderclap headache. *Curr Opin Neurol*. Jun 1, 2021; 34: 356-362. [10.1097/wco.0000000000000917](https://doi.org/10.1097/wco.0000000000000917).

16. Utukuri P, Shih R, Ajam A, Callahan K, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *J Am Coll Radiol*. 2023; 20: S70-S93. 10.1016/j.jacr.2023.02.018.
17. Marcolini E, Hine J. Approach to the Diagnosis and Management of Subarachnoid Hemorrhage. *West J Emerg Med*. Mar 2019; 20: 203-211. 10.5811/westjem.2019.1.37352.
18. Thompson B, Brown Jr R, Amin-Hanjani S, Broderick J, Cockroft K et al. Guidelines for the Management of Patients with Unruptured Intracranial Aneurysms: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association. *Stroke*. 2015; 46: 2368-400. 10.1161/STR.0000000000000070.
19. Pula J, Kwan K, Yuen C, Kattah J. Update on the evaluation of transient vision loss. *Clin Ophthalmol*. 2016; 10: 297-303. 10.2147/opth.S94971.
20. Kim J D, Hashemi N, Gelman R, Lee A G. Neuroimaging in ophthalmology. *Saudi J Ophthalmol*. 2012; 26: 401-7. 10.1016/j.sjopt.2012.07.001.
21. Hofmann E, Behr R, Neumann-Haefelin T, Schwager K. Pulsatile tinnitus: imaging and differential diagnosis. *Dtsch Arztebl Int*. Jun 2013; 110: 451-8. 10.3238/arztebl.2013.0451.
22. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*. 2017; 5: 5. 10.1007/s40134-017-0199-7.
23. Kleindorfer D, Towfighi A, Chaturvedi S, Cockroft K, Gutierrez J et al. 2021 Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack: A Guideline from the American Heart Association/American Stroke Association. *Stroke*. 2021; 52: e364-e467. 10.1161/STR.0000000000000375.
24. Pannell J, Corey A, Shih R, Austin M, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. *J Am Coll Radiol*. 2023.
25. Searls D, Pazdera L, Korbel E, Vysata O, Caplan L. Symptoms and signs of posterior circulation ischemia in the new England medical center posterior circulation registry. *Arch Neurol*. Mar 2012; 69: 346-51. 10.1001/archneurol.2011.2083.
26. Lima Neto A, Bittar R, Gattas G, Bor-Seng-Shu E, Oliveira M et al. Pathophysiology and Diagnosis of Vertebrobasilar Insufficiency: A Review of the Literature. *Int Arch Otorhinolaryngol*. Jul 2017; 21: 302-307. 10.1055/s-0036-1593448.
27. Pirau L, Lui F. Vertebrobasilar Insufficiency. StatPearls Publishing. 2023.
28. Wang L, Thompson T, Shih R, Ajam A, Bulsara K et al. ACR Appropriateness Criteria® Dizziness and Ataxia. *J Am Coll Radiol*. 2023.
29. Franz R W, Willette P A, Wood M J, Wright M L, Hartman J F. A Systematic Review and Meta-Analysis of Diagnostic Screening Criteria for Blunt Cerebrovascular Injuries. *Journal of the American College of Surgeons*. 2012; 214: doi:10.1016/j.jamcollsurg.2011.11.012.
30. Shakir H J, Davies J M, Shallwani H, Siddiqui A H, Levy E I. Carotid and Vertebral Dissection Imaging. *Current Pain and Headache Reports*. 2016; 20: true. 10.1007/s11916-016-0593-5.
31. Walecki J, Mruk B, Nawrocka-Laskus E, Piliszek A, Przelaskowski A. Neuroimaging of Cerebral Venous Thrombosis (CVT) - Old Dilemma and the New Diagnostic Methods. *Pol J Radiol*. 2015; 80: 368-73. 10.12659/pjr.894386.
32. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. *Br J Radiol*. 2014; 87: 20130699. 10.1259/bjr.20130699.
33. Zuccoli G, Pipitone N, Haldipur A, Brown R J, Hunder G. Imaging findings in primary central nervous system vasculitis. *Clin Exp Rheumatol*. Jan-Feb 2011; 29: S104-9.

34. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis [Updated 2023]. StatPearls Publishing. 2023.
35. Abdel Razek A A K, Alvarez H, Bagg S, Refaat S, Castillo M. Imaging spectrum of CNS vasculitis. *Radiographics*. 2014; 34: 873-94. 10.1148/rg.344135028.
36. Halbach C, McClelland C M, Chen J, Li S, Lee M S. Use of Noninvasive Imaging in Giant Cell Arteritis. *Asia Pac J Ophthalmol (Phila)*. 2018; 7: 260-264. 10.22608/APO.2018133.
37. Khan A, Dasgupta B. Imaging in Giant Cell Arteritis. *Curr Rheumatol Rep*. 2015; 17: 52. 10.1007/s11926-015-0527-y.
38. Koster M J, Matteson E L, Warrington K J. Large-vessel giant cell arteritis: diagnosis, monitoring and management. *Rheumatology (Oxford)*. 2018; 57: ii32-ii42. 10.1093/rheumatology/kex424.
39. Maz M, Chung S, Abril A, Langford C, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol*. 2021; 73: 1349-1365. 10.1002/art.41774.
40. Robertson R, Palasis S, Rivkin M, Pruthi S, Bartel T et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. *J Am Coll Radiol*. 2020; 17: S36-S54. 10.1016/j.jacr.2020.01.036.
41. Gonzalez N, Amin-Hanjani S, Bang O, Coffey C, Du R et al. Adult Moyamoya Disease and Syndrome: Current Perspectives and Future Directions: A Scientific Statement from the American Heart Association/American Stroke Association. *Stroke*. 2023; 54: e465-e479. 10.1161/STR.0000000000000443.
42. Burton T, Bushnell C. Reversible Cerebral Vasoconstriction Syndrome. *Stroke*. 2019; 50: 2253-2258. 10.1161/STROKEAHA.119.024416.
43. Edjlali M, Qiao Y, Boulouis G, Menjot N, Saba L et al. Vessel wall MR imaging for the detection of intracranial inflammatory vasculopathies. *Cardiovasc Diagn Ther*. 2020; 10: 1108-1119. 10.21037/cdt-20-324.
44. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi D. Recanalization of cervicocephalic artery dissection. *Brain circulation*. 2020; 6: 175-180. doi:10.4103/bc.bc_19_20.
45. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. 2017; 88: 646-652. doi:10.1212/wnl.0000000000003617.
46. Ancelet C, Boulouis G, Blauwblomme T, Kossorotoff M, Rodriguez-Regent C et al. [Imaging Moya-Moya disease]. *Rev Neurol (Paris)*. Jan 2015; 171: 45-57. 10.1016/j.neurol.2014.11.004.
47. Singhal A, Topcuoglu M, Fok J, Kursun O, Nogueira R et al. Reversible cerebral vasoconstriction syndromes and primary angiitis of the central nervous system: clinical, imaging, and angiographic comparison. *Ann Neurol*. Jun 2016; 79: 882-94. 10.1002/ana.24652.
48. Tarasów E, Kułakowska A, Lukaszewicz A, Kapica-Topczewska K, Korneluk-Sadzyńska A et al. Moyamoya disease: Diagnostic imaging. *Pol J Radiol*. Jan 2011; 76: 73-9.
49. Haller S, Etienne L, Kövari E, Varoquaux A D, Urbach H. Imaging of Neurovascular Compression Syndromes: Trigeminal Neuralgia, Hemifacial Spasm, Vestibular Paroxysmia, and Glossopharyngeal Neuralgia. *AJNR Am J Neuroradiol*. 2016; 37: 1384-92. 10.3174/ajnr.A4683.
50. Hermier M. Imaging of hemifacial spasm. *Neurochirurgie*. 2018; 64: 117-123. 10.1016/j.neuchi.2018.01.005.
51. Sanelli P C, Mifsud M J, Stieg P E. Role of CT angiography in guiding management decisions of newly diagnosed and residual arteriovenous malformations. *AJR Am J Roentgenol*. 2004; 183: 1123-6. 10.2214/ajr.183.4.1831123.

52. Wallace R C, Karis J P, Partovi S, Fiorella D. Noninvasive imaging of treated cerebral aneurysms, Part II: CT angiographic follow-up of surgically clipped aneurysms. *AJNR Am J Neuroradiol.* 2007; 28: 1207-12. 10.3174/ajnr.A0664.
53. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular medicine (London, England).* 2019; 24: 164-189.
54. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management.* 2023; 19: 543-556. 10.2147/VHRM.S388257.
55. Bowen J M, Hernandez M, Johnson D S, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK. *European journal of human genetics: EJHG.* 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
56. Byers P. Vascular Ehlers-Danlos Syndrome. 1999 Sep 2 [Updated 2019 Feb 21]. *GeneReviews® [Internet].* 2019.
57. Loeys B, Dietz H. Loeys-Dietz Syndrome. 2008 Feb 28 [Updated 2018 Mar 1]. *GeneReviews® [Internet].* 2018.
58. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. *Br J Radiol.* Aug 2014; 87: 20130699. 10.1259/bjr.20130699.
59. Goodfriend S, Tadi P, P, Koury R. Carotid Artery Dissection. StatPearls Publishing. 2022.
60. Britt T, Agarwal S. Vertebral Artery Dissection. StatPearls Publishing. 2023.
61. Harrigan M. Ischemic Stroke due to Blunt Traumatic Cerebrovascular Injury. *Stroke.* 2020; 51: 353-360. 10.1161/STROKEAHA.119.026810.
62. Franz R, Willette P, Wood M, Wright M, Hartman J. A systematic review and meta-analysis of diagnostic screening criteria for blunt cerebrovascular injuries. *J Am Coll Surg.* Mar 2012; 214: 313-27. 10.1016/j.jamcollsurg.2011.11.012.
63. Shakir H, Davies J, Shallwani H, Siddiqui A, Levy E. Carotid and Vertebral Dissection Imaging. *Curr Pain Headache Rep.* Dec 2016; 20: 68. 10.1007/s11916-016-0593-5.
64. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology.* Feb 14, 2017; 88: 646-652. 10.1212/wnl.00000000000003617.
65. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi S. Recanalization of cervicocephalic artery dissection. *Brain Circ.* Jul-Sep 2020; 6: 175-180. 10.4103/bc.bc_19_20.
66. Saposnik G, Barinagarrementeria F, Brown R J, Bushnell C, Cucchiara B et al. Diagnosis and management of cerebral venous thrombosis: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke.* Apr 2011; 42: 1158-92. 10.1161/STR.0b013e31820a8364.
67. DaCosta M, Tadi P, Surowiec S. Carotid Endarterectomy. StatPearls Publishing. 2023.
68. Brott T, Halperin J, Abbara S, Bacharach J, Barr J et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/ SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the Management of Patients with Extracranial Carotid and Vertebral Artery Disease. *Stroke.* 2011; 42: e464-540. 10.1161/STR.0b013e3182112cc2.
69. Marquardt L, Geraghty O, Mehta Z, Rothwell P. Low risk of ipsilateral stroke in patients with asymptomatic carotid stenosis on best medical treatment: a prospective, population-based study. *Stroke.* Jan 2010; 41: e11-7. 10.1161/strokeaha.109.561837.

70. Rerkasem K, Rothwell P. Carotid endarterectomy for symptomatic carotid stenosis. *Cochrane Database Syst Rev*. Apr 13, 2011; Cd001081. 10.1002/14651858.CD001081.pub2.
71. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
72. Lee M, Kim M. Image findings in brain developmental venous anomalies. *J Cerebrovasc Endovasc Neurosurg*. Mar 2012; 14: 37-43. 10.7461/jcen.2012.14.1.37.
73. van Beijnum J, van der Worp H, Algra A, Vandertop W, van den Berg R et al. Prevalence of brain arteriovenous malformations in first-degree relatives of patients with a brain arteriovenous malformation. *Stroke*. 2014; 45: 3231-5. 10.1161/STROKEAHA.114.005442.
74. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. Jul 2014; 45: 2160-236. 10.1161/str.0000000000000024.
75. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. Nov-Dec 2013; 34: E117-27. 10.3174/ajnr.A3690.
76. Greenberg S, Ziai W, Cordonnier C, Dowlathshahi D, Francis B et al. 2022 Guideline for the Management of Patients with Spontaneous Intracerebral Hemorrhage: A Guideline from the American Heart Association/American Stroke Association. *Stroke*. 2022; 53: e282-e361. 10.1161/STR.0000000000000407.
77. Bushnell C, Saposnik G. Evaluation and management of cerebral venous thrombosis. *Continuum (Minneapolis)*. Apr 2014; 20: 335-51. 10.1212/01.CON.0000446105.67173.a8.
78. Coutinho J. Cerebral venous thrombosis. *J Thromb Haemost*. Jun 2015; 13 Suppl 1: S238-44. 10.1111/jth.12945.
79. Ferro J, Canhão P, Aguiar de Sousa D. Cerebral venous thrombosis. *Presse Med*. Dec 2016; 45: e429-e450. 10.1016/j.lpm.2016.10.007.
80. Simon L, Nassar A, Mohseni M. Vertebral Artery Injury. StatPearls Publishing. 2024.
81. Liang T, Tso D, Chiu R, Nicolaou S. Imaging of blunt vascular neck injuries: a review of screening and imaging modalities. *AJR Am J Roentgenol*. Oct 2013; 201: 884-92. 10.2214/ajr.12.9664.
82. Mundinger G, Dorafshar A, Gilson M, Mithani S, Manson P. Blunt-mechanism facial fracture patterns associated with internal carotid artery injuries: recommendations for additional screening criteria based on analysis of 4,398 patients. *J Oral Maxillofac Surg*. Dec 2013; 71: 2092-100. 10.1016/j.joms.2013.07.005.
83. Nash M, Rafay M. Craniocervical Arterial Dissection in Children: Pathophysiology and Management. *Pediatr Neurol*. Jun 2019; 95: 9-18. 10.1016/j.pediatrneurol.2019.01.020.



EVOLENT CLINICAL GUIDELINE 012-1 FOR NECK CTA

Guideline or Policy Number: Evolent_CG_012-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR NECK CTA.....	3
CEREBROVASCULAR DISEASE.....	3
TUMOR/PULSATILE MASS	4
OTHER EXTRACRANIAL VASCULAR DISEASES	4
PRE- OR POST-OPERATIVE/PROCEDURAL EVALUATION	5
<i>Pre-operative evaluation for a planned surgery or procedure.....</i>	<i>5</i>
<i>Post-operative evaluation for a planned surgery or procedure</i>	<i>5</i>
FURTHER EVALUATION OF INDETERMINANT FINDINGS	5
GENETIC SYNDROMES AND RARE DISEASES.....	5
COMBINATION STUDIES	6
<i>Brain CT and/or Brain CTA and/or Neck CTA.....</i>	<i>6</i>
<i>Brain CTA and/or Neck CTA</i>	<i>6</i>
<i>Brain/Neck/Chest/Abdomen and Pelvis CTA</i>	<i>7</i>
<i>Neck/Chest/Abdomen/Pelvis CTA.....</i>	<i>7</i>
CODING AND STANDARDS	7
CODING	7
<i>CPT Codes</i>	<i>7</i>
APPLICABLE LINES OF BUSINESS.....	7
BACKGROUND	8
MRA VS CTA FOR CAROTID ARTERY EVALUATION	8
CTA AND DISSECTION	8
CTA AND RECENT STROKE OR TRANSIENT ISCHEMIC ATTACK.....	8
ACRONYMS	9
CONTRAINDICATIONS AND PREFERRED STUDIES.....	9
POLICY HISTORY	9
<i>Summary</i>	<i>9</i>



LEGAL AND COMPLIANCE	10
GUIDELINE APPROVAL	10
<i>Committee</i>	10
DISCLAIMER.....	10
REFERENCES	11

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for performing Computed Tomography Angiography (CTA) in the neck/cervical region.

Special Note

If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the "Indications for **Combinations Studies**" section, below)

INDICATIONS FOR NECK CTA

Cerebrovascular Disease

- Recent ischemic stroke or transient ischemic attack (see **Background**)^(1,2,3)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech^(4,5,6)

- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 70\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) ^(7,8,9)
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 50\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) ^(7,10,11)

Tumor/Pulsatile Mass

- Pulsatile mass on exam ⁽¹²⁾
- Known or suspected carotid body tumors, or other masses such as a paraganglioma, arteriovenous fistula pseudoaneurysm, atypical lymphovascular malformation ^(12,13)

Note: Ultrasound (US) may be used to identify a mass overlying or next to an artery in initial work up of a pulsatile mass.

Other Extracranial Vascular Diseases ⁽¹⁴⁾

- Large vessel vasculitis
 - Giant cell with suspected extracranial involvement ^(14,15,16,17)
 - Takayasu's Arteritis for evaluation at diagnosis and as clinically indicated for suspected extracranial involvement ⁽¹⁷⁾
- Subclavian steal syndrome when ultrasound is positive or indeterminate **OR** for planning interventions ⁽¹⁸⁾
- Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall ^(6,19,20)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(21,22)
- To identify an arterial source of bleeding in patients with hemorrhage of the head and neck ^(6,23)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ^(24,25)
- For evaluation of pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology ⁽²⁶⁾
- For further evaluation of a congenital vascular malformation of the head and neck
- Known extracranial vascular disease that needs follow-up or further evaluation

Pre- or Post-Operative/Procedural Evaluation

Pre-operative evaluation for a planned surgery or procedure

- Pre-operative evaluation for a planned surgery or procedure

Post-operative evaluation for a planned surgery or procedure

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested

Further Evaluation of Indeterminant Findings

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- For patients with Fibromuscular dysplasia (FMD):⁽²⁷⁾
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:⁽²⁸⁾
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Loeys-Dietz:⁽²⁹⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Takayasu's Arteritis:⁽¹⁷⁾
 - For evaluation at diagnosis then as clinically indicated
- Spontaneous coronary arteries dissection (SCAD) ⁽³⁰⁾
 - One-time vascular study from brain to pelvis

- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Brain CT and/or Brain CTA and/or Neck CTA

- Recent stroke or transient ischemic attack (TIA)
- Suspected carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- Approved vascular indications as noted above being performed in high-risk populations (in whom MRI is contraindicated or cannot be performed), will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology

Note: MRA and CTA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can alternatively be combined with Brain CTA/Neck CTA.

Brain CTA and/or Neck CTA

- Recent ischemic stroke or transient ischemic attack ^(31,32)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech ^(4,5)
- Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall ^(19,20)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(21,22)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ⁽²⁴⁾
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(21,22)
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 70\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(7,8,9)



- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 50\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(7,10,11)
- Pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology ⁽²⁶⁾
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement

Brain/Neck/Chest/Abdomen and Pelvis CTA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis ^(27,33)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found ^(28,34)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found ⁽²⁹⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽³⁵⁾

Neck/Chest/Abdomen/Pelvis CTA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated ⁽¹⁷⁾

CODING AND STANDARDS

Coding

CPT Codes

70498

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

MRA and CTA are generally comparable noninvasive imaging alternatives, each with their own advantages and disadvantages. CTA is quicker in the acute setting and MRA is an excellent screening test since it does not utilize ionizing radiation ⁽³⁶⁾

MRA vs CTA for Carotid Artery Evaluation ^(37,38)

Duplex ultrasound and contrast-MRA is a common choice for carotid artery evaluation. Limitations of MRA include difficulty in patients with claustrophobia and the risk of nephrogenic systemic sclerosis with gadolinium contrast agents in specific patients. Advantages of CTA over MRA include superior spatial resolution, rapid image acquisition, decreased susceptibility to motion artifacts and artifacts from calcification as well as being better able to evaluate slow flow and tandem lesions. However, CTA can also overestimate high-grade stenosis. Limitations of CTA include radiation exposure to the patient, necessity of IV contrast, and risk of contrast allergy and contrast nephropathy.

CTA and Dissection

Craniocervical dissections can be spontaneous or traumatic. Patients with blunt head or neck trauma who meet Denver Screening criteria should be assessed for cerebrovascular injury (although about 20% will not meet criteria). The criteria include: focal or lateralizing neurological deficits (not explained by head CT), infarct on head CT, face, basilar skull, or cervical spine fractures, cervical hematomas that are not expanding, Glasgow coma score less than 8 without CT findings, massive epistaxis, cervical bruit or thrill. ^(19,39,40,41)

Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms. There is often minor trauma or precipitating factor (e.g., exercise, neck manipulation). Dissection is thought to occur due to weakness of the vessel wall, and there may be an underlying connective tissue disorder. Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus, which can migrate into the intracranial circulation causing ischemia. Therefore, MRA of the head and neck is warranted. ^(20,42,43)

CTA and Recent Stroke or Transient Ischemic Attack

- When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms ⁽⁴⁴⁾. Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. ⁽⁴⁵⁾

- Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

Acronyms

CT: Computed tomography
 CTA: Computed tomography angiography
 CVA: Cerebrovascular accident
 FMD: Fibromuscular dysplasia
 MR: Magnetic Resonance
 MRA: Magnetic resonance angiography
 MRI: Magnetic resonance imaging
 SCAD: Spontaneous coronary artery dissection
 TIA: Transient Ischemic Attack
 US: Ultrasound
 VBI: Vertebrobasilar insufficiency

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section • Clarified <ul style="list-style-type: none"> ◦ Frequency of screening in genetic syndromes • Added <ul style="list-style-type: none"> ◦ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to

Date	Summary
	<ul style="list-style-type: none"> ○ guide anticoagulation treatment (already in combo) ○ Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) - also in combo section ○ Giant cell arteritis with suspected intracranial and extracranial involvement - also in combo section ○ Genetic syndromes and rare disease section ● Deleted <ul style="list-style-type: none"> ○ Aneurysm screening section ○ Pulsatile tinnitus combo section
May 2023	<ul style="list-style-type: none"> ● Updated References ● Added <ul style="list-style-type: none"> ○ For further evaluation of a congenital vascular malformation of the head and neck ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (Combo Neck/Brain CTA) ○ Section on further evaluation of indeterminate or questionable findings on prior imaging ○ General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Robertson R L, Palasis S, Rivkin M J, Pruthi S, Bartel T B et al. ACR Appropriateness Criteria; Cerebrovascular Disease-Child. *Journal of the American College of Radiology*. 2020; 17: S36 - S54. 10.1016/j.jacr.2020.01.036.
2. Salmela M B, Mortazavi S, Jagadeesan B D, Broderick D F, Burns J et al. ACR Appropriateness Criteria® Cerebrovascular Disease. *Journal of the American College of Radiology*. 2017; 14: S34 - S61. <https://doi.org/10.1016/j.jacr.2017.01.051>.
3. Pannell J S, Corey A S, Shih R Y, Austin M J, Chu S et al. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. 2023.
4. Lima Neto A, Roseli B, Gattas G S, Bor-Seng-Shu E, Oliveira M et al. Pathophysiology and Diagnosis of Vertebrobasilar Insufficiency: A Review of the Literature. *International Archives of Otorhinolaryngology*. 2017; 21: 302 - 307. 10.1055/s-0036-1593448.
5. Searls D E, Pazdera L, Korbel E, Vysata O, Caplan L R. Symptoms and Signs of Posterior Circulation Ischemia in the New England Medical Center Posterior Circulation Registry. *Arch Neurol*. 2012; 69: 346 - 351. 10.1001/archneurol.2011.2083.
6. American College of Radiology. ACR–ASNR–SPR PRACTICE PARAMETER FOR THE PERFORMANCE AND INTERPRETATION OF CERVICOCEREBRAL COMPUTED TOMOGRAPHY ANGIOGRAPHY (CTA). 2020.
7. Brott T G, Halperin J L, Abbara S, Bacharach J M, Barr J D et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease. *Circulation*. 2011; 124: e54 - e130. 10.1161/CIR.0b013e31820d8c98.
8. DaCosta M, Tadi P, Suroweic S. Carotid Endarterectomy. StatPearls Publishing Updated July 25, 2022. Accessed January 29, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK470582/>.
9. Marquardt L, Geraghty O C, Mehta Z, Rothwell P M. Low Risk of Ipsilateral Stroke in Patients With Asymptomatic Carotid Stenosis on Best Medical Treatment. *Stroke*. 2010; 41: e11 - e17. 10.1161/STROKEAHA.109.561837.
10. Chaturvedi S, Bruno A, Feasby T, Holloway R, Benavente O et al. Carotid endarterectomy--an evidence-based review: report of the Therapeutics and. *Neurology*. 2005; 65: 794-801. doi: 10.1212/01.wnl.0000176036.07558.82.
11. Rerkasem K, Rothwell P. Carotid endarterectomy for symptomatic carotid stenosis. The Cochrane database of systematic reviews. 2011; CD001081.
12. Aulino J M, Kirsch C F, Burns J, Busse P M, Chakraborty S et al. ACR Appropriateness Criteria Neck Mass-Adenopathy. *Journal of the American College of Radiology*. 2019; 16: S150 - S160. 10.1016/j.jacr.2019.02.025.
13. Nguyen R, Shah L, Quigley E, Harnsberger H, Wiggins R. Carotid Body Detection on CT Angiography. *American Journal of Neuroradiology*. 2011; 32: 1096–1099. 10.3174/ajnr.A2429.
14. Aghayev A, Steigner M L, Azene E M, Burns J, Chareonthaitawee P et al. ACR Appropriateness Criteria; Noncerebral Vasculitis. *Journal of the American College of Radiology*. 2021; 18: S380 - S393. 10.1016/j.jacr.2021.08.005.
15. Halbach C, McClelland C M, Chen J, Li S, Lee M S. Use of Noninvasive Imaging in Giant Cell Arteritis. *Asia-Pacific Journal of Ophthalmology*. 2018; 7: 260 - 264. <https://doi.org/10.22608/APO.2018133>.

16. Koster M J, Matteson E L, Warrington K J. Large-vessel giant cell arteritis: diagnosis, monitoring and management. *Rheumatology (Oxford)*. 2018; 57: ii32 - ii42. 10.1093/rheumatology/kex424.
17. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol*. 2021; 73: 1349 - 1365. <https://doi.org/10.1002/art.41774>.
18. Rafailidis V, Li X, Chrysogonidis I, Rengier F, Rajiah P et al. Multimodality Imaging and Endovascular Treatment Options of Subclavian Steal Syndrome. *Canadian Association of Radiologists Journal*. 2018; 69: 493 - 507. <https://doi.org/10.1016/j.carj.2018.08.003>.
19. Franz R W, Willette P A, Wood M J, Wright M L, Hartman J F. A Systematic Review and Meta-Analysis of Diagnostic Screening Criteria for Blunt Cerebrovascular Injuries. *Journal of the American College of Surgeons*. 2012; 214: doi:10.1016/j.jamcollsurg.2011.11.012.
20. Shakir H J, Davies J M, Shallwani H, Siddiqui A H, Levy E I. Carotid and Vertebral Dissection Imaging. *Current Pain and Headache Reports*. 2016; 20. 10.1007/s11916-016-0593-5.
21. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi D. Recanalization of cervicocephalic artery dissection. *Brain circulation*. 2020; 6: 175-180. doi:10.4103/bc.bc_19_20.
22. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. 2017; 88: 646-652. doi:10.1212/wnl.0000000000003617.
23. Travis Caton M, Miskin N, Guenette J P. The role of computed tomography angiography as initial imaging tool for acute hemorrhage in the head and neck. *Emergency Radiology*. 2021; 28: 215 - 221. 10.1007/s10140-020-01835-9.
24. Kim J, Hashemi N, Gelman R, Lee A. Neuroimaging in ophthalmology. *Saudi journal of ophthalmology: official journal of the Saudi Ophthalmological*. 2012; 26: 401-7. doi:10.1016/j.sjopt.2012.07.001.
25. Davagnanam I, Fraser C, Miskiel K, Daniel C, Plant G. Adult Horner's syndrome: a combined clinical, pharmacological, and imaging algorithm. *Eye*. 2013; 27: 291 - 298. 10.1038/eye.2012.281.
26. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Current radiology reports*. 2017; 5: 5. doi:10.1007/s40134-017-0199-7.
27. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
28. Byers P. Vascular Ehlers-Danlos Syndrome. 1999 Sep 2 [Updated 2019 Feb 21]. *GeneReviews® [Internet]*. 2019.
29. Loeys B, Dietz H. Loeys-Dietz Syndrome. 2008 Feb 28 [Updated 2018 Mar 1]. *GeneReviews® [Internet]*. 2018.
30. Hayes S N, Kim E S, Saw J, Adlam D, Arslanian-Engoren C et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. *Circulation*. 2018; 137: e523 - e557. 10.1161/CIR.0000000000000564.
31. Kleindorfer D, Towfighi A, Chaturvedi S, Cockroft K, Gutierrez J et al. 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2021; 52: e364-e467. 10.1161/STR.0000000000000375.
32. Pannell J, Corey A, Shih R, Austin M, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. *J Am Coll Radiol*. 2023.

33. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
34. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European journal of human genetics*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
35. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
36. American College of Radiology. ACR–ASNR–SNIS–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF CERVICOCEREBRAL MAGNETIC RESONANCE ANGIOGRAPHY (MRA). Updated 2020. Accessed May 6, 2024.
37. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Disease. American College of Radiology (ACR). Updated 2016. Accessed February 8, 2023. <https://acsearch.acr.org/docs/69478/Narrative/>.
38. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Diseases- Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. American College of Radiology (ACR). Updated 2021. Accessed February 8, 2023. <https://acsearch.acr.org/docs/3149013/Narrative/>.
39. Liang T, Tso D K, Chiu R Y W, Nicolaou S. Imaging of Blunt Vascular Neck Injuries: A Review of Screening and Imaging Modalities. *American Journal of Roentgenology*. 2013; 201: 884 - 892. 10.2214/AJR.12.9664.
40. Mundinger G S, Dorafshar A H, Gilson M M, Mithani S K, Manson P N. Blunt-Mechanism Facial Fracture Patterns Associated With Internal Carotid Artery Injuries: Recommendations for Additional Screening Criteria Based on Analysis of 4,398 Patients. *Journal of Oral and Maxillofacial Surgery*. 2013; 71: 2092 - 2100. 10.1016/j.joms.2013.07.005.
41. Simon L V, Nassar A K, Mohseni M. Vertebral Artery Injury. StatPearls Publishing Updated July 18, 2022. Accessed January 29, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK470363/>.
42. Nash M, Rafay M F. Craniocervical Arterial Dissection in Children: Pathophysiology and Management. *Pediatric Neurology*. 2019; 95: 9 - 18. 10.1016/j.pediatrneurol.2019.01.020.
43. Clark M, Unnam S, Ghosh S. A review of carotid and vertebral artery dissection. *British Journal of Hospital Medicine*. 2022; 83: 1 - 11. 10.12968/hmed.2021.0421.
44. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45: 2160-236. 10.1161/STR.0000000000000024.
45. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.

EVOLENT CLINICAL GUIDELINE 014 FOR SINUS, FACE, ORBIT, NECK, AND INTERNAL AUDITORY CANAL MRI

Guideline or Policy Number: Evolent_CG_014	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2007 - 2025 Evolent. All rights Reserved.		
Original Date: November 2007	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
<i>Legislative Requirements</i>	<i>3</i>
INDICATIONS FOR ORBIT MRI.....	3
<i>Orbit MRI</i>	<i>4</i>
INDICATIONS FOR COMBINATION STUDIES.....	4
<i>Orbit/Brain MRI Combination Studies</i>	<i>4</i>
INDICATIONS FOR FACE/SINUS MRI	5
<i>Face/Sinus MRI.....</i>	<i>5</i>
INDICATIONS FOR COMBINATION STUDIES.....	6
<i>Face/Sinus and Brain MRI Combination Studies.....</i>	<i>6</i>
INDICATIONS FOR NECK MRI.....	6
<i>Suspected tumor or cancer.....</i>	<i>6</i>
<i>Other indications for a Neck MRI</i>	<i>7</i>
INDICATIONS FOR COMBINATION STUDIES.....	8
<i>Neck and Brain MRI Combination Studies</i>	<i>8</i>
<i>Chest CT and Neck /Abdomen MRI.....</i>	<i>8</i>
<i>Neck/Face CT or MRI and PET</i>	<i>8</i>
INDICATIONS FOR INTERNAL AUDITORY CANAL (IAC) MRI	9
<i>Not Including Brain.....</i>	<i>9</i>
ADDITIONAL ONCOLOGIC INDICATIONS	9
<i>Abdomen/Neck/Pelvis MRI and Chest CT.....</i>	<i>9</i>
<i>Neck/Face CT or MRI and PET</i>	<i>9</i>
<i>Orbit/Face/Sinus/Neck MRI</i>	<i>10</i>
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	<i>10</i>
PRE-OPERATIVE/PROCEDURAL EVALUATION	10

POST-OPERATIVE/PROCEDURAL EVALUATION	10
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	10
GENETICS AND RARE DISEASES	11
LEGISLATIVE REQUIREMENTS	11
<i>State of Washington</i>	<i>11</i>
CODING AND STANDARDS	12
CODING	12
<i>CPT Codes</i>	<i>12</i>
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
SINUS	12
ANOSMIA	13
CSF (CEREBROSPINAL FLUID) LEAKS	13
TRIGEMINAL NEURALGIA	13
CONTRAINDICATION AND PREFERRED STUDIES	13
POLICY HISTORY	14
<i>Summary</i>	<i>14</i>
LEGAL AND COMPLIANCE	14
GUIDELINE APPROVAL	14
<i>Committee</i>	<i>14</i>
DISCLAIMER	14
REFERENCES	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance imaging (MRI) is used in the evaluation of orbit, face and neck region masses, trauma, and infection. The soft tissue contrast between normal and abnormal tissues provided by MRI is sensitive for differentiating between inflammatory disease and malignant tumors and permits the precise delineation of tumor margins. MRI is used for therapy planning and follow-up of face and neck neoplasms. It is also used for the evaluation of neck lymphadenopathy and vocal cord lesions.

Special Note

If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the combination section as noted in the guidelines)

Legislative Requirements

See [Legislative Requirements](#) for specific mandates in the State of Washington

INDICATIONS FOR ORBIT MRI

MRI is superior for the evaluation of the visual pathways, globe and soft tissues; CT is preferred for visualizing bony detail and calcifications ^(1,2)

Orbit MRI

- Abnormal external or direct eye exam
 - Exophthalmos (proptosis) or enophthalmos
 - Ophthalmoplegia with concern for orbital pathology
 - Unilateral optic disk swelling ^(3,4,5)
 - Documented visual field defect ^(6,7,8)
 - Unilateral or with abnormal optic disc(s) (e.g., optic disc blurring, edema, or pallor); **AND**
 - Not explained by underlying diagnosis, glaucoma, or macular degeneration
- Optic neuritis ^(9,10)
 - If atypical presentation (bilateral, absence of pain, optic nerve hemorrhages, severe visual impairment, lack of response to steroids, poor recovery or recurrence) ^(11,12)
 - If needed to confirm optic neuritis and rule out compressive lesions
- Orbital trauma ^(13,14)
 - Physical findings of direct eye injury
 - Suspected orbital trauma with indeterminate x-ray or ultrasound
- Orbital or ocular mass/tumor, suspected or known ^(1,15)
- Clinical suspicion of orbital infection ^(1,2)
- Clinical suspicion of osteomyelitis ^(16,17)
 - Direct visualization of bony deformity **OR**
 - Abnormal x-rays
- Clinical suspicion of Orbital Inflammatory Disease (e.g., eye pain and restricted eye movement with suspected orbital pseudotumor) ⁽¹⁸⁾
- Congenital orbital anomalies
- Complex strabismus syndromes (with ophthalmoplegia or ophthalmoparesis) to aid in diagnosis, treatment and/or surgical planning ^(19,20,21)

NOTE: ADDITIONAL **ONCOLOGIC** ORBIT MRI INDICATIONS

Indications for Combination Studies

Orbit/Brain MRI Combination Studies

- Optic neuropathy or unilateral optic disk swelling of unclear etiology to distinguish between a compressive lesion of the optic nerve, optic neuritis, ischemic optic

neuropathy (arteritic or non-arteritic), central retinal vein occlusion or optic nerve infiltrative disorders ⁽²²⁾

- Bilateral optic disk swelling (papilledema) with vision loss ⁽⁵⁾
- Optic neuritis
 - If atypical presentation (bilateral, absence of pain, optic nerve hemorrhages, severe visual impairment, lack of response to steroids, poor recovery or recurrence) ^(9,10,11,12,23,24)
 - If needed to confirm optic neuritis and rule out compressive lesions
- Known or suspected neuromyelitis optica spectrum disorder with severe, recurrent, or bilateral optic neuritis ⁽²⁵⁾
- Suspected retinoblastoma ^(26,27)
- For approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽²⁸⁾

INDICATIONS FOR FACE/SINUS MRI

Face/Sinus MRI

- Rhinosinusitis ⁽²⁹⁾
 - Clinical suspicion of fungal infection ⁽³⁰⁾
 - Clinical suspicion of orbital or intracranial complications ^(16,17) such as;
 - Preseptal, orbital, or central nervous system infection
 - Osteomyelitis
 - Cavernous sinus thrombosis
- Sinonasal obstruction, suspected mass, based on exam, nasal endoscopy, or prior imaging ^(29,31)
- Anosmia or Dysosmia that is persistent and of unknown origin after a thorough history and nasal and neurological examination ^(32,33)
- Suspected infection
 - Osteomyelitis (after x-rays) ⁽³⁴⁾
 - Abscess based on clinical signs and symptoms of infection
- Face mass ^(29,35,36)
 - Present on physical exam and remains non-diagnostic after x-ray or ultrasound is completed
 - Known or highly suspected head and neck cancer on examination

- Failed 2 weeks of treatment for suspected infectious adenopathy⁽³⁷⁾
- Facial trauma⁽³⁸⁾
 - Concern for soft tissue injury to further evaluate for treatment or surgical planning⁽³⁹⁾
- Granulomatosis with polyangiitis (Wegener's granulomatosis) disease⁽³⁰⁾
- Trigeminal neuralgia/neuropathy (for evaluation of the extracranial nerve course)
 - If atypical features (e.g., bilateral, hearing loss, dizziness/vertigo, visual changes, sensory loss, numbness, pain > 2 min, pain outside trigeminal nerve distribution, progression)^(32,40)

NOTE: ADDITIONAL **ONCOLOGIC** FACE/SINUS MRI INDICATIONS

Indications for Combination Studies

Face/Sinus and Brain MRI Combination Studies

- Granulomatosis with polyangiitis (Wegener's granulomatosis) disease⁽⁴¹⁾
- Trigeminal neuralgia that meets the above criteria^(32,40)
- For approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology⁽²⁸⁾

INDICATIONS FOR NECK MRI

Suspected tumor or cancer⁽⁴²⁾

- Suspicious lesions in mouth or throat⁽³⁶⁾
- Suspicious mass/tumor found on another imaging study and needing clarification
- Neck mass or lymphadenopathy (non-parotid or non-thyroid)
 - Present on physical exam and remains non-diagnostic after ultrasound is completed
 - Mass or abnormality found on other imaging study and needing further evaluation
 - Increased risk for malignancy with one or more of the following findings:⁽⁴³⁾
 - Fixation to adjacent tissues
 - Firm consistency
 - Size >1.5 cm
 - Ulceration of overlying skin

- Mass present \geq two weeks (or uncertain duration) without significant fluctuation and not considered of infectious cause
- History of cancer
- Failed 2 weeks of treatment for suspected infectious adenopathy ⁽³⁷⁾
- Pediatric (≤ 18 years old) considerations ⁽⁴⁴⁾
 - Ultrasound should be inconclusive or suspicious unless there is a history of malignancy ⁽²³⁾

Note: For discrete cystic lesions of the neck, an ultrasound should be performed as initial imaging unless there is a high suspicion of malignancy

- Neck Mass (parotid) ⁽⁴²⁾
 - Parotid mass found on other imaging study and needing further evaluation (US is the initial imaging study of a parotid region mass)
- Neck Mass (thyroid) ⁽⁴⁵⁾
 - Staging and monitoring for recurrence of known thyroid cancer
 - To assess extent of thyroid tissue when other imaging suggests extension through the thoracic inlet into the mediastinum or concern for airway compression ^(46,47)

Note: US is the initial imaging study of a thyroid region mass. Biopsy is usually the next step. In the evaluation of known thyroid malignancy, CT is preferred over MRI since there is less respiratory motion artifact. Chest CT may be included for preoperative assessment in some cases.

Other indications for a Neck MRI

- Known or suspected deep space infections or abscesses of the pharynx or neck with signs or symptoms of infection ⁽⁴⁸⁾
- MR Sialography to evaluate salivary ducts ^(49,50)
- Vocal cord lesions or vocal cord paralysis ⁽⁵¹⁾
- Unexplained ear pain when ordered by a specialist with all of the following ⁽⁵²⁾
 - Otoloscopic exam, nasolaryngoscopy, lab evaluation (ESR, CBC) **AND**
 - Risk factor for malignancy i.e., tobacco use, alcohol use, dysphagia, weight loss **OR** age older than 50 years
- Diagnosed primary hyperparathyroidism when surgery is planned
 - Previous nondiagnostic ultrasound or nuclear medicine scan ^(53,54)
- Hereditary Paraganglioma-Pheochromocytoma (PGL/PCC) Syndrome (SDHx mutations) every 2 years when whole body MRI (CPT 76498) is not available
- Bell's palsy/hemifacial spasm (for evaluation of the extracranial nerve course)

- If atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset ⁽⁵⁵⁾
- Objective cranial nerve palsy (CN IX-XII) (for evaluation of the extracranial nerve course) ^(32,56)
- Brachial plexopathy ⁽⁵⁷⁾
 - Traumatic Brachial Plexopathy: If mechanism of injury is highly suspicious for brachial plexopathy (such as mid-clavicular fracture, shoulder dislocation, contact injury to the neck (burner or stinger syndrome) or penetrating injury)
 - Non-traumatic Brachial Plexopathy when Electromyography/Nerve Conduction Velocity (EMG/NCV) studies are suggestive of brachial plexopathy

NOTE: Either Neck MRI, Shoulder MRI or Chest MRI may be appropriate depending on the location of the injury/plexopathy. Only one of these three studies is indicated.

NOTE: ADDITIONAL **ONCOLOGIC** NECK MRI INDICATIONS

Indications for Combination Studies

Neck and Brain MRI Combination Studies

- Objective cranial nerve palsy (CN IX-XII) (for evaluation of the extracranial nerve course) ^(32,56)
- Bell's Palsy/hemifacial spasm that meets the above criteria ⁽⁵⁵⁾
- For approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽²⁸⁾

Chest CT and Neck /Abdomen MRI

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **not** available ⁽⁵⁸⁾ (see Unlisted Studies Evolent_CG_063) ⁽⁵⁹⁾

Neck/Face CT or MRI and PET

- Neck/Face CT or MRI is indicated **in addition to PET** for Head and Neck Cancer
 - For surgical or radiation planning
 - 3-4 months after end of treatment in patients with locoregionally advanced disease or with altered anatomy

INDICATIONS FOR INTERNAL AUDITORY CANAL (IAC) MRI

Not Including Brain

- Unilateral non-pulsatile tinnitus
- Pulsatile tinnitus
- Suspected acoustic neuroma (Schwannoma) or cerebellar pontine angle tumor with any of the following signs and symptoms: unilateral hearing loss by audiometry, headache, disturbed balance or gait, unilateral tinnitus, facial weakness, or altered sense of taste
- Suspected cholesteatoma
- Suspected glomus tumor
- Asymmetric sensorineural hearing loss on audiogram
- Congenital/childhood sensorineural hearing loss suspected to be due to a structural abnormality^(60,61,62) (CNVIII, the brain parenchyma, or the membranous labyrinth). CT is the preferred imaging modality for the osseous anatomy and malformations of the inner ear.
- CSF otorrhea (MRI/Nuclear Cisternography for intermittent leaks, CT for active leaks); there should be a high suspicion or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay)
- Bell's Palsy for evaluation of the extracranial nerve course -if atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset⁽⁵⁵⁾

ADDITIONAL ONCOLOGIC INDICATIONS

Abdomen/Neck/Pelvis MRI and Chest CT

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **NOT** available⁽⁵⁸⁾ (see Unlisted Studies Evolent_CG_063)⁽⁵⁹⁾

Neck/Face CT or MRI and PET

- Neck/Face CT or MRI is indicated **in addition to PET** for Head and Neck Cancer
 - For surgical or radiation planning
 - 3-4 months after end of treatment in patients with locoregionally advanced disease or with altered anatomy

Orbit/Face/Sinus/Neck MRI

Follow-up of known Tumor or Cancer ⁽⁶³⁾

- For initial staging, restaging, and suspected recurrence of head and neck cancer
- Head and Neck cancer annually when specified that the area of original disease is difficult to follow on direct visualization (surveillance is typically with exam/scope rather than imaging)

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

PRE-OPERATIVE/PROCEDURAL EVALUATION

- Pre-operative evaluation for a planned surgery or procedure

POST-OPERATIVE/PROCEDURAL EVALUATION

- When imaging, physical, or laboratory findings indicate surgical or procedural complications

FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification ⁽³⁵⁾
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

GENETICS AND RARE DISEASES

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **NOT** available ⁽⁵⁸⁾ (see Unlisted Studies Evolent_CG_063) ⁽⁵⁹⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

LEGISLATIVE REQUIREMENTS

State of Washington ⁽⁶⁴⁾

Washington State Health Care Authority Technology Assessment: Health Technology Clinical Committee

Number and Coverage Topic:

20150515A – Imaging for Rhinosinusitis

HTTC Coverage Determination:

Imaging for Rhinosinusitis is a **covered benefit with conditions** consistent with the criteria identified in the reimbursement determination.

HTCC Reimbursement Determination:

Limitations of Coverage

Imaging with Sinus Computed Tomography (CT) is covered in the context of rhinosinusitis for the following:

- Red Flags* OR
- Persistent Symptoms** > 12 weeks AND failure of medical therapy; OR
- Surgical planning
- Repeat scanning is not covered except for Red Flags or Surgical Planning

Magnetic Resonance Imaging (MRI) of the sinus is covered in the context of rhinosinusitis for the following:

- As above for sinus CT AND < 18 years of age OR pregnant

***Red Flags in the setting of Rhinosinusitis:** (From American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS))

- Swelling of orbit
- Altered mental status
- Neurological findings
- Signs of meningeal irritation
- Severe headache

- Signs of intracranial complication, including, but not limited to:
 - Meningitis,
 - Intracerebral abscess
 - Cavernous sinus thrombosis
- Involvement of nearby structures, including, but not limited to:
 - Periorbital cellulitis

****Persistent Symptoms defined as \geq two of the following:** (From AAO-HNS)

- Facial pain-pressure-fullness
- Mucopurulent drainage
- Nasal obstruction (congestion)
- Decreased sense of smell

Non-Covered Indicators

- Imaging of the sinus for rhinosinusitis using X-ray OR Ultrasound is not covered.

CODING AND STANDARDS

Coding

CPT Codes

70540, 70542, 70543, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Sinus

CT scanning remains the study of choice for the imaging evaluation of acute and chronic inflammatory diseases of the sinonasal cavities. MRI is not considered the first-line study for routine sinus imaging because of limitations in the definition of the bony anatomy and length of imaging time. MRI for confirmation of diagnosis of sinusitis is discouraged because of

hypersensitivity (overdiagnosis) in comparison to CT without contrast. MRI, however, is superior to CT in differentiating inflammatory conditions from neoplastic processes. MRI may better depict intraorbital and intracranial complications in cases of aggressive sinus infection, as well as differentiating soft-tissue masses from inflammatory mucosal disease. MRI may also identify fungal invasive sinusitis or encephaloceles.

Anosmia

Nonstructural causes of anosmia include post viral symptoms, medications (Amitriptyline, Enalapril, Nifedipine, Propranolol, Penicillamine, Sumatriptan, Cisplatin, Trifluoperazine, Propylthiouracil). These should be considered prior to advanced imaging to look for a structural cause. Anosmia and dysgeusia have been reported as common early symptoms in patients with COVID-19, occurring in greater than 80 percent of patients. For isolated anosmia, imaging is typically not needed once the diagnosis of COVID has been made given the high association. As such, COVID testing should be done prior to imaging^(65,66,67) MRI Orbits, Face, and Neck MRI rather than MRI Brain is the mainstay for directly imaging the olfactory apparatus and sinonasal or anterior cranial fossa tumors that may impair or directly involve the olfactory apparatus.⁽⁶⁸⁾

CSF (Cerebrospinal Fluid) Leaks

For CSF rhinorrhea, Sinus CT is indicated when looking to characterize a bony defect. For CSF otorrhea, Temporal Bone CT is indicated. For intermittent leaks and complex cases, consider CT/MRI/Nuclear Cisternography. There should be a high suspicion or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay).^(69,70)

Trigeminal Neuralgia

According to the International Headache Society, Trigeminal Neuralgia (TN) is defined as a disorder characterized by recurrent unilateral brief electric shock-like pain, abrupt in onset and termination, limited to the distribution of one or more divisions of the trigeminal nerve and triggered by innocuous stimuli.⁽⁷¹⁾

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> References Updated Background updated Contraindications and preferred studies section added to the background Expanded combination section Clarified traumatic and non-traumatic brachial plexopathy Added Hereditary Paraganglioma-Pheochromocytoma (PGL/PCC) Syndrome (SDHx mutations) every 2 years when whole body MRI (CPT 76498) is not available Added follow-up of known cancer section (initial staging, restaging, surveillance) Added Legislative Language for the State of Washington
May 2023	<ul style="list-style-type: none"> Updated references Updated background Added: <ul style="list-style-type: none"> Combo Orbit/Brain MRI -Suspected retinoblastoma Combo Neck/Brain MRI -Bell's Palsy/hemifacial spasm that meets the above criteria Section on further evaluation of indeterminate or questionable findings on prior imaging General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline Removed additional resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage



may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Hande P, Talwar I. Multimodality imaging of the orbit. *Indian J Radiol Imaging*. Jul 2012; 22: 227-39. 10.4103/0971-3026.107184.
2. Kennedy T, Corey A, Policeni B, Agarwal V, Burns J et al. ACR Appropriateness Criteria(®) Orbits Vision and Visual Loss. *J Am Coll Radiol*. May 2018; 15: S116-s131. 10.1016/j.jacr.2018.03.023.
3. Hata M, Miyamoto K. Causes and Prognosis of Unilateral and Bilateral Optic Disc Swelling. *Neuroophthalmology*. Aug 2017; 41: 187-191. 10.1080/01658107.2017.1299766.
4. Passi N, Degnan A, Levy L. MR imaging of papilledema and visual pathways: effects of increased intracranial pressure and pathophysiologic mechanisms. *AJNR Am J Neuroradiol*. May 2013; 34: 919-24. 10.3174/ajnr.A3022.
5. Margolin E. The swollen optic nerve: an approach to diagnosis and management. *Pract Neurol*. Aug 2019; 19: 302-309. 10.1136/practneurol-2018-002057.
6. Fadzli F, Ramli N, Ramli N. MRI of optic tract lesions: review and correlation with visual field defects. *Clin Radiol*. Oct 2013; 68: e538-51. 10.1016/j.crad.2013.05.104.
7. Prasad S, Galetta S. Approach to the patient with acute monocular visual loss. *Neurol Clin Pract*. Mar 2012; 2: 14-23. 10.1212/CPJ.0b013e31824cb084.
8. Salvatat M L, Pellegrini F, Spadea L, Salati C, Zeppieri M. Non-Arteritic Anterior Ischemic Optic Neuropathy (NA-AION): A Comprehensive Overview. 2023; 7: 10.3390/vision7040072.
9. Gala F. Magnetic resonance imaging of optic nerve. *Indian J Radiol Imaging*. Oct-Dec 2015; 25: 421-38. 10.4103/0971-3026.169462.
10. Srikajon J, Siritho S, Ngamsombat C, Prayoonwiwat N, Chirapapaisan N. Differences in clinical features between optic neuritis in neuromyelitis optica spectrum disorders and in multiple sclerosis. *Mult Scler J Exp Transl Clin*. Jul-Sep 2018; 4: 2055217318791196. 10.1177/2055217318791196.
11. Kaur K, Gurnani B, Devy N. Atypical optic neuritis - a case with a new surprise every visit. *GMS Ophthalmol Cases*. 2020; 10: Doc11. 10.3205/oc000138.
12. Phuljhele S, Kedar S, Saxena R. Approach to optic neuritis: An update. *Indian J Ophthalmol*. Sep 2021; 69: 2266-2276. 10.4103/ijo.IJO_3415_20.
13. Lin K, Ngai P, Echegoyen J, Tao J. Imaging in orbital trauma. *Saudi J Ophthalmol*. Oct 2012; 26: 427-32. 10.1016/j.sjopt.2012.08.002.
14. Sung E, Nadgir R, Fujita A, Siegel C, Ghafouri R et al. Injuries of the globe: what can the radiologist offer? *Radiographics*. May-Jun 2014; 34: 764-76. 10.1148/rg.343135120.
15. Kedar S, Ghate D, Corbett J. Visual fields in neuro-ophthalmology. *Indian J Ophthalmol*. Mar-Apr 2011; 59: 103-9. 10.4103/0301-4738.77013.
16. Arunkumar J, Naik A, Prasad K, Santhosh S. Role of nasal endoscopy in chronic osteomyelitis of maxilla and zygoma: a case report. *Case Rep Med*. 2011; 2011: 802964. 10.1155/2011/802964.
17. Lee Y, Sadigh S, Mankad K, Kapse N, Rajeswaran G. The imaging of osteomyelitis. *Quantitative imaging in medicine and surgery*. 2016; 6: 184-198. 10.21037/qims.2016.04.01.
18. Pakdaman M, Sepahdari A, Elkharnay S. Orbital inflammatory disease: Pictorial review and differential diagnosis. *World J Radiol*. Apr 28, 2014; 6: 106-15. 10.4329/wjr.v6.i4.106.
19. Kadom N. Pediatric strabismus imaging. *Curr Opin Ophthalmol*. Sep 2008; 19: 371-8. 10.1097/ICU.0b013e328309f165.

20. Demer J, Clark R, Kono R, Wright W, Velez F. A 12-year, prospective study of extraocular muscle imaging in complex strabismus. *J aapos*. Dec 2002; 6: 337-47. 10.1067/mpa.2002.129040.
21. Engle E. The genetic basis of complex strabismus. *Pediatr Res*. Mar 2006; 59: 343-8. 10.1203/01.pdr.0000200797.91630.08.
22. Behbehani R. Clinical approach to optic neuropathies. *Clin Ophthalmol*. Sep 2007; 1: 233-46.
23. Consortium of Multiple Sclerosis Centers. 2018 MRI Protocol and Clinical Guidelines for MS. May 22, 2018; 2023:
24. Voss E, Raab P, Trebst C, Stangel M. Clinical approach to optic neuritis: pitfalls, red flags and differential diagnosis. *Ther Adv Neurol Disord*. Mar 2011; 4: 123-34. 10.1177/1756285611398702.
25. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology*. Jul 14 2015; 85: 177-89. 10.1212/wnl.0000000000001729.
26. de Graaf P, Göricke S, Rodjan F, Galluzzi P, Maeder P et al. Guidelines for imaging retinoblastoma: imaging principles and MRI standardization. *Pediatr Radiol*. Jan 2012; 42: 2-14. 10.1007/s00247-011-2201-5.
27. Razek A, Elkharny S. MRI of retinoblastoma. *Br J Radiol*. Sep 2011; 84: 775-84. 10.1259/bjr/32022497.
28. Lawson G. Controversy: Sedation of children for magnetic resonance imaging. *Arch Dis Child*. Feb 2000; 82: 150-3. 10.1136/adc.82.2.150.
29. Hagiwara M, Policeni B, Juliano A F, Agarwal M, Burns J et al. ACR Appropriateness Criteria® Sinonasal Disease: 2021 Update. *Journal of the American College of Radiology*. 2022; 19: S175 - S193. 10.1016/j.jacr.2022.02.011.
30. Gavito-Higuera J, Mullins C, Ramos-Duran L, Sandoval H, Akle N. Sinonasal Fungal Infections and Complications: A Pictorial Review. *J Clin Imaging Sci*. 2016; 6: 23. 10.4103/2156-7514.184010.
31. Rosenfeld R, Piccirillo J, Chandrasekhar S, Brook I, Ashok Kumar K et al. Clinical practice guideline (update): adult sinusitis. *Otolaryngol Head Neck Surg*. Apr 2015; 152: S1-s39. 10.1177/0194599815572097.
32. Rath T J, Policeni B, Juliano A F, Agarwal M, Block A M et al. ACR Appropriateness Criteria® Cranial Neuropathy: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S266 - S303. 10.1016/j.jacr.2022.09.021.
33. Zaghouani H, Slim I, Zina N, Mallat N, Tajouri H. Kallmann syndrome: MRI findings. *Indian J Endocrinol Metab*. Oct 2013; 17: S142-5. 10.4103/2230-8210.119536.
34. Pincus D, Armstrong M, Thaller S. Osteomyelitis of the craniofacial skeleton. *Seminars in plastic surgery*. 2009; 23: 73-79. 10.1055/s-0029-1214159.
35. Koeller K. Radiologic Features of Sinonasal Tumors. *Head Neck Pathol*. Mar 2016; 10: 1-12. 10.1007/s12105-016-0686-9.
36. Kuno H, Onaya H, Fujii S, Ojiri H, Otani K. Primary staging of laryngeal and hypopharyngeal cancer: CT, MR imaging and dual-energy CT. *Eur J Radiol*. Jan 2014; 83: e23-35. 10.1016/j.ejrad.2013.10.022.
37. Haynes J, Arnold K, Aguirre-Oskins C, Chandra S. Evaluation of neck masses in adults. *Am Fam Physician*. May 15, 2015; 91: 698-706.
38. Echo A, Troy J, Hollier L J. Frontal sinus fractures. *Seminars in plastic surgery*. 2010; 24: 375-382. 10.1055/s-0030-1269766.

39. Kozakiewicz M, Olszycki M, Arkuszewski P, Stefańczyk L. [Magnetic resonance imaging in facial injuries and digital fusion CT/MRI]. *Otolaryngol Pol.* 2006; 60: 911-6.
40. Hughes M, Frederickson A, Branstetter B, Zhu X, Sekula R J. MRI of the Trigeminal Nerve in Patients With Trigeminal Neuralgia Secondary to Vascular Compression. *AJR Am J Roentgenol.* Mar 2016; 206: 595-600. 10.2214/ajr.14.14156.
41. Pakalniskis M, Berg A, Policeni B, Gentry L, Sato Y et al. The Many Faces of Granulomatosis With Polyangiitis: A Review of the Head and Neck Imaging Manifestations. *AJR Am J Roentgenol.* Dec 2015; 205: W619-29. 10.2214/ajr.14.13864.
42. Aulino J M, Kirsch C F, Burns J, Busse P M, Chakraborty S et al. ACR Appropriateness Criteria® Neck Mass-Adenopathy. *Journal of the American College of Radiology.* 2019; 16: S150 - S160. 10.1016/j.jacr.2019.02.025.
43. Pynnonen M, Gillespie M, Roman B, Rosenfeld R, Tunkel D et al. Clinical Practice Guideline: Evaluation of the Neck Mass in Adults. *Otolaryngol Head Neck Surg.* Sep 2017; 157: S1-s30. 10.1177/0194599817722550.
44. Beck R, Cleary P, Anderson M J, Keltner J, Shults W et al. A randomized, controlled trial of corticosteroids in the treatment of acute optic neuritis. The Optic Neuritis Study Group. *N Engl J Med.* Feb 27, 1992; 326: 581-8. 10.1056/nejm199202273260901.
45. Hoang J K, Oldan J D, Mandel S J, Policeni B, Agarwal V et al. ACR Appropriateness Criteria® Thyroid Disease. *Journal of the American College of Radiology.* 2019; 16: S300 - S314. 10.1016/j.jacr.2019.02.004.
46. Gharib H, Papini E, Garber J, Duick D, Harrell R et al. AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS, AMERICAN COLLEGE OF ENDOCRINOLOGY, AND ASSOCIAZIONE MEDICI ENDOCRINOLOGI MEDICAL GUIDELINES FOR CLINICAL PRACTICE FOR THE DIAGNOSIS AND MANAGEMENT OF THYROID NODULES--2016 UPDATE. *Endocr Pract.* May 2016; 22: 622-39. 10.4158/ep161208.GI.
47. Lin Y, Wu H, Lee C, Hsu C, Chao T. Surgical management of substernal goitres at a tertiary referral centre: A retrospective cohort study of 2,104 patients. *Int J Surg.* Mar 2016; 27: 46-52. 10.1016/j.ijsu.2016.01.032.
48. Meyer A, Kimbrough T, Finkelstein M, Sidman J. Symptom duration and CT findings in pediatric deep neck infection. *Otolaryngol Head Neck Surg.* Feb 2009; 140: 183-6. 10.1016/j.otohns.2008.11.005.
49. Burke C, Thomas R, Howlett D. Imaging the major salivary glands. *Br J Oral Maxillofac Surg.* Jun 2011; 49: 261-9. 10.1016/j.bjoms.2010.03.002.
50. Ren Y, Li X, Zhang J, Long L, Li W. Conventional MRI techniques combined with MR sialography on T2-3D-DRIVE in Sjögren syndrome. *Int J Clin Exp Med.* 2015; 8: 3974-82.
51. Dankbaar J, Pameijer F. Vocal cord paralysis: anatomy, imaging and pathology. *Insights Imaging.* Dec 2014; 5: 743-51. 10.1007/s13244-014-0364-y.
52. Earwood J, Rogers T, Rathjen N. Ear Pain: Diagnosing Common and Uncommon Causes. *Am Fam Physician.* Jan 1, 2018; 97: 20-27.
53. Khan M, Rafiq S, Lanitis S, Mirza F, Gwozdziwicz L et al. Surgical treatment of primary hyperparathyroidism: description of techniques and advances in the field. *Indian J Surg.* Aug 2014; 76: 308-15. 10.1007/s12262-013-0898-0.
54. Piciocchi S, Barone D, Gavelli G, Dubini A, Oboldi D. Primary hyperparathyroidism: imaging to pathology. *J Clin Imaging Sci.* 2012; 2: 59. 10.4103/2156-7514.102053.

55. Quesnel A, Lindsay R, Hadlock T. When the bell tolls on Bell's palsy: finding occult malignancy in acute-onset facial paralysis. *Am J Otolaryngol*. Sep-Oct 2010; 31: 339-42. 10.1016/j.amjoto.2009.04.003.
56. Mumtaz S, Jensen M. Facial neuropathy with imaging enhancement of the facial nerve: a case report. *Future Neurol*. Nov 1, 2014; 9: 571-576. 10.2217/fnl.14.55.
57. Boulter D J, Job J, Shah L M, Wessell D E, Lenchik L et al. ACR Appropriateness Criteria® Plexopathy: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S423 - S441. 10.1016/j.jacr.2021.08.014.
58. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. [Updated 2023 Sep 21]. *GeneReviews®* [Internet]. 2023.
59. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; Accessed May 2024:
60. Dewan K, Wippold F 2, Lieu J. Enlarged vestibular aqueduct in pediatric sensorineural hearing loss. *Otolaryngol Head Neck Surg*. Apr 2009; 140: 552-8. 10.1016/j.otohns.2008.12.035.
61. Joshi V, Navlekar S, Kishore G, Reddy K, Kumar E. CT and MR imaging of the inner ear and brain in children with congenital sensorineural hearing loss. *Radiographics*. May-Jun 2012; 32: 683-98. 10.1148/rg.323115073.
62. Ralli M, Rolesi R, Anzivino R, Turchetta R, Fetoni A. Acquired sensorineural hearing loss in children: current research and therapeutic perspectives. *Acta Otorhinolaryngol Ital*. Dec 2017; 37: 500-508. 10.14639/0392-100x-1574.
63. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Head and Neck Cancers Version 4.2024. National Comprehensive Cancer Network®. 2024.
64. Washington State Health Care Authority. Health Technology Assessment: Imaging for Rhinosinusitis. 2015.
65. Geyer M, Nilssen E. Evidence-based management of a patient with anosmia. *Clin Otolaryngol*. Oct 2008; 33: 466-9. 10.1111/j.1749-4486.2008.01819.x.
66. Lechien J, Chiesa-Estomba C, De Siati D, Horoi M, Le Bon S et al. Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. *Eur Arch Otorhinolaryngol*. Aug 2020; 277: 2251-2261. 10.1007/s00405-020-05965-1.
67. Saniasiaya J, Islam M, Abdullah B. Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients. *Laryngoscope*. Apr 2021; 131: 865-878. 10.1002/lary.29286.
68. American College of Radiology. ACR Appropriateness Criteria® Cranial Neuropathy. 2022; 2023:
69. Mantur M, Łukaszewicz-Zajac M, Mroczko B, Kułakowska A, Ganslandt O et al. Cerebrospinal fluid leakage--reliable diagnostic methods. *Clin Chim Acta*. May 12, 2011; 412: 837-40. 10.1016/j.cca.2011.02.017.
70. Selcuk H, Albayram S, Ozer H, Ulus S, Sanus G et al. Intrathecal gadolinium-enhanced MR cisternography in the evaluation of CSF leakage. *AJNR Am J Neuroradiol*. Jan 2010; 31: 71-5. 10.3174/ajnr.A1788.
71. IHS. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018; 38: 1 - 211. 10.1177/0333102417738202.



EVOLENT CLINICAL GUIDELINE 004-2 FOR BRAIN MRA_MRV

Guideline or Policy Number: Evolent_CG_004-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR BRAIN MR ANGIOGRAPHY/MR VENOGRAPHY	4
EVALUATION OF SUSPECTED INTRACRANIAL VASCULAR DISEASE	4
Aneurysm Screening	4
Suspected Vascular Abnormalities	4
Cerebrovascular Disease	5
Vasculitis and Other Intracranial Vascular Disease	5
EVALUATION OF KNOWN INTRACRANIAL VASCULAR DISEASE	6
PRE-OPERATIVE/PROCEDURAL EVALUATION	6
POST-OPERATIVE/PROCEDURAL EVALUATION	6
FURTHER EVALUATION OF INDETERMINATE FINDINGS	6
GENETIC SYNDROMES AND RARE DISEASES	7
COMBINATION STUDIES	7
Brain MRA and Neck MRA	7
Brain MRI and Brain MRA	8
Brain MRI/Brain MRA/Neck MRA	9
Brain/Neck/Chest/Abdomen/Pelvis MRA	9
CODING AND STANDARDS	9
CODING	9
CPT Codes	9
APPLICABLE LINES OF BUSINESS	10
BACKGROUND	10
GENERAL OVERVIEW	10
MRA and Non-Aneurysmal Vascular Malformations	10
Pulsatile tinnitus	10
MRA and Recent Stroke or Transient Ischemic Attack	11
MRA vs CTA for CVA	11

<i>MRA and Intracerebral Hemorrhage</i>	11
<i>MRV and Central Venous Thrombosis</i>	12
<i>MRA and Dissection</i>	12
<i>Moyamoya Disease</i>	12
<i>Combination MRI/MRA of the Brain</i>	12
<i>Contraindications and Preferred Studies</i>	13
ACRONYMS / ABBREVIATIONS	13
POLICY HISTORY	13
<i>Summary</i>	13
LEGAL AND COMPLIANCE	15
GUIDELINE APPROVAL	15
<i>Committee</i>	15
DISCLAIMER.....	16
REFERENCES	17

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for performing Magnetic Resonance Angiography (MRA) or Magnetic Resonance Venography (MRV) of the head/brain.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term angiography refers to both arteriography and venography

Special Note

Brain MRI/MRA are not approvable simultaneously unless they meet the criteria described below in the indications for Brain MRI/Brain MRA combination studies section. If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR BRAIN MR ANGIOGRAPHY/MR VENOGRAPHY

Evaluation of Suspected Intracranial Vascular Disease ^(1,2)

Aneurysm Screening

- Screening for intracranial aneurysm if two or more first-degree family members (parent, brother, sister, or child) with history of intracranial aneurysm ⁽¹⁾
 - **Note:** Repeat study is recommended every 5-7 years ⁽³⁾
- For one first degree relative with aneurysm, asymptomatic screening is not indicated - would require a neurological sign or symptom supporting clinical concern for aneurysm. ⁽⁴⁾
- Screening for aneurysm in high-risk populations ^(1,5,6,7,8,9,10):
 - KNOWN genetic syndromes (see **Genetic Syndromes and Rare Diseases**)
 - Bicuspid aortic valve
 - Known aortic diseases (aneurysm, coarctation, dissection)

Suspected Vascular Abnormalities

- Suspected vascular malformation (arteriovenous malformation (AVM) or dural arteriovenous fistula) in patient with previous or indeterminate imaging study ⁽²⁾
- Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging. ^(11,12,13,14)
 - **Note:** Negative brain CT < 6 hours after headache onset excludes subarachnoid hemorrhage in neurologically intact patients ⁽¹³⁾. MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset. ^(11,15)
- Headache associated with exercise, exertion, Valsalva or sexual activity ⁽¹¹⁾
- Isolated third nerve palsy (oculomotor) with pupil involvement to evaluate for aneurysm ^(16,17)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ⁽¹⁸⁾
- Pulsatile tinnitus to identify a suspected arterial vascular etiology ^(19,20)

Note: MRI is the study of choice for detecting cavernomas, developmental venous anomalies and capillary telangiectasia (see **background** section) ⁽²⁾

Cerebrovascular Disease

Ischemic

- Recent ischemic stroke or transient ischemic attack (See **background** section) ^(21,22)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech. ^(23,24,25,26)
- Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall ^(27,28)

Hemorrhagic

- Known subarachnoid hemorrhage (SAH) – CTA is favored over MRA ^(1,2)
- Known cerebral intraparenchymal hemorrhage with concern for underlying vascular abnormality ^(2,22)

Venous – MRV*** ^(14,22)

- Suspected venous thrombosis (dural sinus thrombosis)
- Distinguishing benign intracranial hypertension (pseudotumor cerebri) from dural sinus thrombosis

Sickle cells disease (ischemic and/or hemorrhagic) ⁽²⁹⁾

- Neurological signs or symptoms in sickle cell disease
- Stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200

Vasculitis and Other Intracranial Vascular Disease

- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies ⁽¹⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(1,30,31)
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial involvement ^(32,33,34,35,36)
- Suspected Moyamoya disease ^(2,37)
- Suspected reversible cerebral vasoconstriction syndrome ^(14,38)

Note: Vessel wall MRI (ordered as Brain MRI) can also be performed in the evaluation of vasculitides ⁽³⁹⁾

Evaluation of Known Intracranial Vascular Disease ^(1,2)

- Known intracranial aneurysm, treated aneurysm, or known vascular malformation (i.e., AVM or dural arteriovenous fistula)
- Known vertebrobasilar insufficiency with new or worsening signs or symptoms (VBI) ^(23,24,26)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(40,41)
- Known vasculitis, reversible cerebral vasoconstriction syndrome or Moyamoya disease ^(2,31,42,43,44,45)

Pre-operative/procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure
- Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ^(46,47)

Post-operative/procedural Evaluation ^(48,49)

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- Fibromuscular dysplasia (FMD):^(50,51)
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:^(52,53)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Loeys-Dietz:⁽⁵⁴⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Spontaneous coronary arteries dissection (SCAD)⁽⁵⁵⁾
 - One-time vascular study from brain to pelvis
- Fabry disease annual neurologic assessment with brain MRI/MRA every two to three years beginning at age 18 years⁽⁵⁶⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Brain MRA and Neck MRA

- Recent ischemic stroke or transient ischemic attack^(21,22)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech^(23,24,25,26)
- Suspected carotid⁽⁵⁷⁾ or vertebral⁽⁵⁸⁾ artery dissection; secondary to trauma⁽⁵⁹⁾ or spontaneous due to weakness of vessel wall^(22,27,28)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment^(22,60,61)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis)⁽¹⁸⁾
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 70\%$, technically limited study, aberrant direction of

flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(62,63,64)

- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 50\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(62,65)
- Pulsatile tinnitus to identify a suspected arterial vascular etiology ^(19,20)

Brain MRI and Brain MRA

- Recent ischemic stroke or transient ischemic attack (TIA) ^(21,22)
- Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging ^(11,12,13,14)
 - **Note:** Negative brain CT < 6 hours after headache onset excludes subarachnoid hemorrhage in neurologically intact patients ⁽¹³⁾. MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset. ^(11,15)
- Acute, sudden onset of headache with personal history of a vascular abnormality or first-degree family history of aneurysm ^(1,14)
- Headache associated with exercise, exertion, Valsalva or sexual activity ⁽¹¹⁾
- Suspected venous thrombosis (dural sinus thrombosis) ⁽²²⁾— **MRI/MRV****
- Neurological signs or symptoms in sickle cell patients ⁽²⁹⁾
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200 ⁽²⁹⁾
- Known Moyamoya disease ^(2,37) or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms ^(14,38)
- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies ⁽¹⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(1,30,31)
- Giant cell arteritis with suspected intracranial involvement
- Fabry disease annual neurologic assessment with brain MRI/MRA every two to three years beginning at age 18 years ⁽⁵⁶⁾

Brain MRI/Brain MRA/Neck MRA

- Recent ischemic stroke or transient ischemic attack (TIA) ^(21,22)
- Suspected carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- Pulsatile tinnitus with concern for a suspected arterial vascular and/or intracranial etiology ^(19,20) (**Brain MRI should include IAC**)
- Giant cell arteritis with suspected intracranial and extracranial involvement
- Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽⁶⁶⁾

Note: CTA and MRA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can be combined with Brain CTA/Neck CTA.

Brain/Neck/Chest/Abdomen/Pelvis MRA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis ^(50,51)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found ^(52,53)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found ⁽⁵⁴⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽⁶⁷⁾

CODING AND STANDARDS

Coding

CPT Codes

70544, 70545, 70546

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview

Magnetic resonance angiography (MRA) or magnetic resonance venography (MRV) can be used as a first-line investigation of intracranial vascular disease. It is an alternative to invasive intra-catheter angiography that was once the mainstay for the investigation of intracranial vascular disease. MRA/MRV may use a contrast agent, gadolinium, which is non-iodine-based, for better visualization. It can be used in patients who have history of contrast allergy and who are at high risk of kidney failure. A single authorization covers both MRA and MRV.

MRA and Non-Aneurysmal Vascular Malformations

Non-aneurysmal vascular malformations can be divided in low flow vascular malformations and high flow vascular malformations. Low flow vascular malformations include dural venous anomalies (DVA), cavernomas, and capillary telangiectasias. High flow vascular malformations include AVM and dural arteriovenous fistulas (dAVF). For low flow malformations, MRI is the study of choice. There is limited medical literature to support vascular imaging (CTA or MRA). CTA plays a limited role in the assessment of cavernoma but may be used to demonstrate a DVA. MRA is not usually helpful in the assessment of cavernoma, capillary telangiectasia, and DVA. Vascular imaging is indicated in high flow vascular malformations. ^(1,2,68)

There is no evidence to support screening of first-degree relatives for AVMs ⁽⁶⁹⁾. The risk of having an AVM may be higher than in the general population, but absolute risk is low.

Pulsatile tinnitus

Pulsatile tinnitus has many etiologies, and the choice of study should be based on accompanying signs and symptoms. For general screening MRI brain with IAC/MRA brain and neck is approvable. If IIIH is suspected (typically with headache and vision changes in a younger woman with a high BMI), MRI/MRV brain is indicated. If there is concern for vascular etiology, CTA or MRA brain/neck is indicated. If there is associated hearing loss and neurological signs/symptoms, MRI brain with IAC is indicated. If the temporal bone is

suspected to be involved and/or retrotymppanic lesion seen on otoscopy, CT temporal bone/IAC is indicated. If there is concurrent concern for boney and a vascular issue, CTA of the head and neck can be used to evaluate both.

MRA and Recent Stroke or Transient Ischemic Attack

- When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms ⁽⁷⁰⁾. Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. ⁽⁷¹⁾
- Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

MRA vs CTA for CVA

Preferred vascular imaging of the head and neck includes non-contrast head MRA and contrast-enhanced neck MRA. MRA may not be able to be performed in patients with claustrophobia, morbid obesity, or implanted device, but it can be useful in patients with renal failure or contrast allergies. In patients with high radiation exposure, MRA as an alternative should be considered. For acute stroke, CTA is preferred after CT (to rule of hemorrhage) and to look for thrombus/possible intervention that is time-sensitive. ^(2,22)

MRA and Intracerebral Hemorrhage ⁽⁷²⁾

MRA is useful as a screening tool for an underlying vascular abnormality in the evaluation of spontaneous intracerebral hemorrhage (ICH). Etiologies of spontaneous ICH include tumor, vascular malformation, aneurysm, hypertensive arteriopathy, cerebral amyloid angiopathy, venous thrombosis, vasculitis, RCVS, drug-induced vasospasm, venous sinus thrombosis, Moyamoya disease, anticoagulant use and hemorrhagic transformation of an ischemic infarct. History can help point to a specific etiology. Possible risk factors for the presence of underlying vascular abnormalities include age younger than 65, female, lobar or intraventricular location, and the absence of hypertension or impaired coagulation.

MRV and Central Venous Thrombosis **

MR Venogram is indicated for the evaluation of a central venous thrombosis/dural sinus thrombosis. The most frequent presentations are isolated headache, intracranial hypertension syndrome (headache, nausea/vomiting, transient visual obscurations, pulsatile tinnitus, CN VI palsy, papilledema) ⁽⁷³⁾, seizures, focal neurological deficits, and encephalopathy. Risk factors are hypercoagulable states inducing genetic prothrombotic conditions, antiphospholipid syndrome and other acquired prothrombotic diseases (such as cancer), oral contraceptives, pregnancy, puerperium (6 weeks postpartum), infections, and trauma. COVID-19 infection is associated with hypercoagulability, a thromboinflammatory response, and an increased incidence of venous thromboembolic events (VTE) ^(74,75). Since venous thrombosis can cause SAH, infarctions, and hemorrhage, parenchymal imaging with MRI/CT is also appropriate ^(76,77,78).

MRA and Dissection

Craniocervical dissections can be spontaneous or traumatic. Patients with blunt head or neck trauma who meet Denver Screening criteria should be assessed for cerebrovascular injury (although about 20% will not meet criteria). The criteria include focal or lateralizing neurological deficits (not explained by head CT); infarct on head CT; face, basilar skull, or cervical spine fractures; cervical hematomas that are not expanding; Glasgow coma score less than 8 without CT findings; massive epistaxis; cervical bruit or thrill. ^(27,79,80)

Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms. There is often minor trauma or precipitating factor (i.e., exercise, neck manipulation). Dissection is thought to occur due to weakness of the vessel wall, and there may be an underlying connective tissue disorder. Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus which can migrate into the intracranial circulation, causing ischemia. Therefore, MRA of the head and neck is warranted. ^(28,81)

Moyamoya Disease

Family members of Moyamoya Disease (MMD) patients may also have MMD, but not have any obvious symptoms. Routine screening should be implemented for all family members of MMD patients. TCD may be the preferred choice for screening because it is inexpensive and safe and as a high diagnostic agreement with MRA.

Combination MRI/MRA of the Brain

This is one of the most misused combination studies and other than what is indicated above these examinations should be ordered in sequence, not together. Vascular abnormalities can be visualized on the brain MRI.

Patients presenting with a new migraine with aura (especially an atypical or complex aura) can mimic a transient ischemic attack or an acute stroke. If there is a new neurologic deficit,

imaging should be guided by concern for cerebrovascular disease, not that the patient has a headache. ⁽¹⁴⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Acronyms / Abbreviations

ADPKD: Autosomal Dominant Polycystic Kidney Disease
 AVM: Arteriovenous Malformation
 CNS: Central Nervous System
 CTA: Computed Tomography Angiography
 CTV: Computed Tomography Venography
 CVA: Cerebrovascular Accident
 dAVF: Dural Arteriovenous Fistulas
 DVA: Dural Venous Anomalies
 IAC: Internal Auditory Canal
 ICH: Intracerebral Hemorrhage
 MDCTA: Multidetector CT Angiography
 MMD: Moyamoya Disease
 MRA: Magnetic Resonance Angiography
 MRI: Magnetic Resonance Imaging
 MRV: Magnetic Resonance Venography
 SCAD: Spontaneous Coronary Arteries Dissection
 SAH: Subarachnoid Hemorrhage
 VBI: Vertebrobasilar Insufficiency
 TIA: Transient Ischemic Attack

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section

Date	Summary
	<ul style="list-style-type: none"> ● Clarified <ul style="list-style-type: none"> ○ Frequency of screening in genetic syndromes ● Added <ul style="list-style-type: none"> ○ Screening for aneurysm in high-risk populations ○ Bicuspid aortic valve ○ Known aortic diseases (aneurysm, coarctation, dissection) ○ Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall (already in combo) ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (already in combo) ○ Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) - also in combo section ○ Vessel wall MRI (ordered as Brain MRI) can also be performed in the evaluation of vasculitides ○ Genetic syndromes and rare disease section. ○ Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ○ Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms (Brain MRA/MRI combo) ○ Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies (Brain MRA /MRI combo) ○ Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up (Brain MRA /MRI combo) ○ Large vessels vasculitis with suspected intracranial and extracranial involvement (Brain MRA /Neck/ Brain MRI combo) ○ Giant cell arteritis with suspected intracranial involvement (combos) ● Deleted <ul style="list-style-type: none"> ○ MRI Brain with IAC/MRA Head/MRA Neck section
May 2023	<ul style="list-style-type: none"> ● Updated and reformatted references ● Updated background section ● Added: <ul style="list-style-type: none"> ○ Section on further evaluation of indeterminate or questionable findings on prior imaging

Date	Summary
	<ul style="list-style-type: none"> ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (Combo Brain/Neck MRA) ○ Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management (also in combo section) ○ Note on CTA VS MRA ● Clarified: <ul style="list-style-type: none"> ○ Screening for aneurysm in polycystic kidney disease (in adults) ○ Screening for intracranial aneurysm if two or more first-degree family members (parent brother, sister, or child) with history of intracranial aneurysm ○ For one first degree relative with aneurysm, asymptomatic screening is not indicated - would require a neurological sign or symptom supporting clinical concern for aneurysm. ○ Thunderclap headache with continued concern for underlying vascular abnormality (i.e. aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging ○ Note: MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset (also in Combo Brain MRI/MRA section) ○ Headache associated with exercise, exertion, Valsalva or sexual activity (Also in Combo Brain MRI/MRA) ○ Known subarachnoid hemorrhage (SAH) – CTA is favored over MRA ● Deleted: <ul style="list-style-type: none"> ○ Vascular abnormality visualized on previous brain imaging that is equivocal or needs further evaluation

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee



Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Ledbetter L, Burns J, Shih R, Ajam A, Brown M et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. J Am Coll Radiol. 2021; 18: S283-S304. <https://doi.org/10.1016/j.jacr.2021.08.012>.
2. Robertson R, Palasis S, Rivkin M, Pruthi S, Bartel T et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. J Am Coll Radiol. 2020; 17: S36-S54. [10.1016/j.jacr.2020.01.036](https://doi.org/10.1016/j.jacr.2020.01.036).
3. Hoh B, Ko N, Amin-Hanjani S, Chou S, Cruz-Flores S et al. 2023 Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage: A Guideline From the American Heart Association/ American Stroke Association. Stroke. 2023; 54: e314-e370. [10.1161/STR.0000000000000436](https://doi.org/10.1161/STR.0000000000000436).
4. Rinkel G, Ruigrok Y. Preventive screening for intracranial aneurysms. Int J Stroke. 2022; 17: 30-36. [10.1177/17474930211024584](https://doi.org/10.1177/17474930211024584).
5. Hayes S, Kim E, Saw J, Adlam D, Arslanian-Engoren C et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. Circulation. 2018; 137: e523-e557. [10.1161/CIR.0000000000000564](https://doi.org/10.1161/CIR.0000000000000564).
6. Jung W, Kim J, Ahn S, Song S, Kim B et al. Prevalence of Intracranial Aneurysms in Patients with Aortic Dissection. AJNR Am J Neuroradiol. Nov 2017; 38: 2089-2093. [10.3174/ajnr.A5359](https://doi.org/10.3174/ajnr.A5359).
7. Pickard S, Prakash A, Newburger J, Malek A, Wong J. Screening for Intracranial Aneurysms in Coarctation of the Aorta: A Decision and Cost-Effectiveness Analysis. Circ Cardiovasc Qual Outcomes. 2020; 13: e006406. [10.1161/CIRCOUTCOMES.119.006406](https://doi.org/10.1161/CIRCOUTCOMES.119.006406).
8. Rouchaud A, Brandt M, Rydberg A, Kadirvel R, Flemming K et al. Prevalence of Intracranial Aneurysms in Patients with Aortic Aneurysms. AJNR Am J Neuroradiol. Sep 2016; 37: 1664-8. [10.3174/ajnr.A4827](https://doi.org/10.3174/ajnr.A4827).
9. Egbe A, Padang R, Brown R, Khan A, Luis S et al. Prevalence and predictors of intracranial aneurysms in patients with bicuspid aortic valve. Heart. Oct 2017; 103: 1508-1514. [10.1136/heartjnl-2016-311076](https://doi.org/10.1136/heartjnl-2016-311076).
10. Hitchcock E, Gibson W. A Review of the Genetics of Intracranial Berry Aneurysms and Implications for Genetic Counseling. J Genet Couns. Feb 2017; 26: 21-31. [10.1007/s10897-016-0029-8](https://doi.org/10.1007/s10897-016-0029-8).
11. International Headache Society. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018; 38: 1-211. [10.1177/0333102417738202](https://doi.org/10.1177/0333102417738202).
12. Hayes L, Palasis S, Bartel T, Booth T, Iyer R et al. ACR Appropriateness Criteria® Headache-Child. J Am Coll Radiol. 2018; 15: S78-S90. [10.1016/j.jacr.2018.03.017](https://doi.org/10.1016/j.jacr.2018.03.017).
13. Chen C, Fuh J. Evaluating thunderclap headache. Curr Opin Neurol. Jun 1, 2021; 34: 356-362. [10.1097/wco.0000000000000917](https://doi.org/10.1097/wco.0000000000000917).
14. Utukuri P, Shih R, Ajam A, Callahan K, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. J Am Coll Radiol. 2023; 20: S70-S93. [10.1016/j.jacr.2023.02.018](https://doi.org/10.1016/j.jacr.2023.02.018).
15. Marcolini E, Hine J. Approach to the Diagnosis and Management of Subarachnoid Hemorrhage. West J Emerg Med. 2019; 20: 203-211. [10.5811/westjem.2019.1.37352](https://doi.org/10.5811/westjem.2019.1.37352).
16. Thompson B, Brown Jr R, Amin-Hanjani S, Broderick J, Cockroft K et al. Guidelines for the Management of Patients With Unruptured Intracranial Aneurysms: A Guideline for Healthcare

- Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2015; 46: 2368-400. 10.1161/STR.0000000000000070.
17. Pula J, Kwan K, Yuen C, Kattah J. Update on the evaluation of transient vision loss. *Clin Ophthalmol*. 2016; 10: 297-303. 10.2147/opth.S94971.
 18. Kim J D, Hashemi N, Gelman R, Lee A G. Neuroimaging in ophthalmology. *Saudi J Ophthalmol*. 2012; 26: 401-7. 10.1016/j.sjopt.2012.07.001.
 19. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*. 2017; 5: 5. 10.1007/s40134-017-0199-7.
 20. Hofmann E, Behr R, Neumann-Haefelin T, Schwager K. Pulsatile tinnitus: imaging and differential diagnosis. *Dtsch Arztebl Int*. Jun 2013; 110: 451-8. 10.3238/arztebl.2013.0451.
 21. Kleindorfer D, Towfighi A, Chaturvedi S, Cockroft K, Gutierrez J et al. 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2021; 52: e364-e467. 10.1161/STR.0000000000000375.
 22. Pannell J, Corey A, Shih R, Austin M, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. *J Am Coll Radiol*. 2023.
 23. Searls D, Pazdera L, Korbel E, Vysata O, Caplan L. Symptoms and signs of posterior circulation ischemia in the new England medical center posterior circulation registry. *Arch Neurol*. Mar 2012; 69: 346-51. 10.1001/archneurol.2011.2083.
 24. Lima Neto A, Bittar R, Gattas G, Bor-Seng-Shu E, Oliveira M et al. Pathophysiology and Diagnosis of Vertebrobasilar Insufficiency: A Review of the Literature. *Int Arch Otorhinolaryngol*. Jul 2017; 21: 302-307. 10.1055/s-0036-1593448.
 25. Pirau L, Lui F. Vertebrobasilar Insufficiency. StatPearls Publishing. 2023.
 26. Wang L, Thompson T, Shih R, Ajam A, Bulsara K et al. ACR Appropriateness Criteria® Dizziness and Ataxia. *J Am Coll Radiol*. 2023.
 27. Franz R, Willette P, Wood M, Wright M, Hartman J. A systematic review and meta-analysis of diagnostic screening criteria for blunt cerebrovascular injuries. *Journal of the American College of Surgeons*. 2012; 214: 313 - 327. 10.1016/j.jamcollsurg.2011.11.012.
 28. Shakir H, Davies J, Shallwani H, Siddiqui A, Levy E. Carotid and Vertebral Dissection Imaging. *Curr Pain Headache Rep*. Dec 2016; 20: 68. 10.1007/s11916-016-0593-5.
 29. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. *Br J Radiol*. 2014; 87: 20130699. 10.1259/bjr.20130699.
 30. Zuccoli G, Pipitone N, Haldipur A, Brown Jr R D, Hunder G. Imaging findings in primary central nervous system vasculitis. *Clinical and experimental rheumatology*. 2011; 29: S104-9.
 31. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis [Updated 2023]. StatPearls Publishing. 2023.
 32. Abdel Razek A, Alvarez H, Bagg S, Refaat S, Castillo M. Imaging spectrum of CNS vasculitis. *Radiographics*. Jul-Aug 2014; 34: 873-94. 10.1148/rg.344135028.
 33. Halbach C, McClelland C, Chen J, Li S, Lee M. Use of Noninvasive Imaging in Giant Cell Arteritis. *Asia Pac J Ophthalmol (Phila)*. Jul-Aug 2018; 7: 260-264. 10.22608/apo.2018133.
 34. Khan A, Dasgupta B. Imaging in Giant Cell Arteritis. *Curr Rheumatol Rep*. Aug 2015; 17: 52. 10.1007/s11926-015-0527-y.

35. Koster M, Matteson E, Warrington K. Large-vessel giant cell arteritis: diagnosis, monitoring and management. *Rheumatology (Oxford)*. Feb 1, 2018; 57: ii32-ii42. 10.1093/rheumatology/kex424.
36. Maz M, Chung S, Abril A, Langford C, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol*. 2021; 73: 1349-1365. 10.1002/art.41774.
37. Gonzalez N, Amin-Hanjani S, Bang O, Coffey C, Du R et al. Adult Moyamoya Disease and Syndrome: Current Perspectives and Future Directions: A Scientific Statement From the American Heart Association/American Stroke Association. *Stroke*. 2023; 54: e465-e479. 10.1161/STR.0000000000000443.
38. Burton T, Bushnell C. Reversible Cerebral Vasoconstriction Syndrome. *Stroke*. 2019; 50: 2253-2258. 10.1161/STROKEAHA.119.024416.
39. Edjlali M, Qiao Y, Boulouis G, Menjot N, Saba L et al. Vessel wall MR imaging for the detection of intracranial inflammatory vasculopathies. *Cardiovasc Diagn Ther*. 2020; 10: 1108-1119. 10.21037/cdt-20-324.
40. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi D. Recanalization of cervicocephalic artery dissection. *Brain circulation*. 2020; 6: 175-180. doi:10.4103/bc.bc_19_20.
41. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. 2017; 88: 646-652. doi:10.1212/wnl.0000000000003617.
42. Ancelet C, Boulouis G, Blauwblomme T, Kossorotoff M, Rodriguez-Regent C et al. [Imaging Moya-Moya disease]. *Rev Neurol (Paris)*. Jan 2015; 171: 45-57. 10.1016/j.neurol.2014.11.004.
43. Obusez E, Hui F, Hajj-Ali R, Cerejo R, Calabrese L et al. High-resolution MRI vessel wall imaging: spatial and temporal patterns of reversible cerebral vasoconstriction syndrome and central nervous system vasculitis. *AJNR Am J Neuroradiol*. Aug 2014; 35: 1527-32. 10.3174/ajnr.A3909.
44. Singhal A, Topcuoglu M, Fok J, Kursun O, Nogueira R et al. Reversible cerebral vasoconstriction syndromes and primary angiitis of the central nervous system: clinical, imaging, and angiographic comparison. *Ann Neurol*. Jun 2016; 79: 882-94. 10.1002/ana.24652.
45. Tarasów E, Kułakowska A, Lukaszewicz A, Kapica-Topczewska K, Korneluk-Sadzyńska A et al. Moyamoya disease: Diagnostic imaging. *Pol J Radiol*. Jan 2011; 76: 73-9.
46. Haller S, Etienne L, Kövari E, Varoquaux A D, Urbach H. Imaging of Neurovascular Compression Syndromes: Trigeminal Neuralgia, Hemifacial Spasm, Vestibular Paroxysmia, and Glossopharyngeal Neuralgia. *AJNR Am J Neuroradiol*. 2016; 37: 1384-92. 10.3174/ajnr.A4683.
47. Hermier M. Imaging of hemifacial spasm. *Neurochirurgie*. 2018; 64: 117-123. 10.1016/j.neuchi.2018.01.005.
48. Lee C, Reardon M, Ball B, Chen C, Yen C et al. The predictive value of magnetic resonance imaging in evaluating intracranial arteriovenous malformation obliteration after stereotactic radiosurgery. *J Neurosurg*. Jul 2015; 123: 136-44. 10.3171/2014.10.Jns141565.
49. Serafin Z, Strześniewski P, Lasek W, Beuth W. Follow-up after embolization of ruptured intracranial aneurysms: a prospective comparison of two-dimensional digital subtraction angiography, three-dimensional digital subtraction angiography, and time-of-flight magnetic resonance angiography. *Neuroradiology*. Nov 2012; 54: 1253-60. 10.1007/s00234-012-1030-z.
50. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular medicine (London, England)*. 2019; 24: 164-189.

51. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vasc Health Risk Manag*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
52. Bowen J M, Hernandez M, Johnson D S, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK. *European journal of human genetics: EJHG*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
53. Byers P. Vascular Ehlers-Danlos Syndrome. 1999 Sep 2 [Updated 2019 Feb 21]. *GeneReviews®* [Internet]. 2019.
54. Loeys B, Dietz H. Loeys-Dietz Syndrome [Updated 2018]. *GeneReviews®*. 2018.
55. Hayes S N, Kim E S, Saw J, Adlam D, Arslanian-Engoren C et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. *Circulation*. 2018; 137: e523 - e557. 10.1161/CIR.0000000000000564.
56. Mehta A, Hughes D A. Fabry Disease. [Accessed 24 May 2024]. *GeneReviews®*. 1993.
57. Goodfriend S, Tadi P, Koury R. Carotid Artery Dissection. *StatPearls Publishing*. 2022.
58. Britt T, Agarwal S. Vertebral Artery Dissection. *StatPearls Publishing*. 2023.
59. Harrigan M. Ischemic Stroke due to Blunt Traumatic Cerebrovascular Injury. *Stroke*. 2020; 51: 353-360. 10.1161/STROKEAHA.119.026810.
60. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. Feb 14, 2017; 88: 646-652. 10.1212/wnl.00000000000003617.
61. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi S. Recanalization of cervicocephalic artery dissection. *Brain Circ*. Jul-Sep 2020; 6: 175-180. 10.4103/bc.bc_19_20.
62. Brott T, Halperin J, Abbara S, Bacharach J, Barr J et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/ SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease. *Stroke*. 2011; 42: e464-540. 10.1161/STR.0b013e3182112cc2.
63. DaCosta M, Tadi P, Surowiec S. Carotid Endarterectomy. *StatPearls Publishing*. 2023.
64. Marquardt L, Geraghty O, Mehta Z, Rothwell P. Low risk of ipsilateral stroke in patients with asymptomatic carotid stenosis on best medical treatment: a prospective, population-based study. *Stroke*. Jan 2010; 41: e11-7. 10.1161/strokeaha.109.561837.
65. Rerkasem K, Rothwell P. Carotid endarterectomy for symptomatic carotid stenosis. *Cochrane Database Syst Rev*. Apr 13, 2011; Cd001081. 10.1002/14651858.CD001081.pub2.
66. Lawson G. Controversy: Sedation of children for magnetic resonance imaging. *Arch Dis Child*. Feb 2000; 82: 150-3. 10.1136/adc.82.2.150.
67. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
68. Lee M, Kim M. Image findings in brain developmental venous anomalies. *J Cerebrovasc Endovasc Neurosurg*. Mar 2012; 14: 37-43. 10.7461/jcen.2012.14.1.37.
69. van Beijnum J, van der Worp H, Algra A, Vandertop W, van den Berg R et al. Prevalence of brain arteriovenous malformations in first-degree relatives of patients with a brain arteriovenous malformation. *Stroke*. 2014; 45: 3231-5. 10.1161/STROKEAHA.114.005442.
70. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals

from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45: 2160-236. 10.1161/STR.0000000000000024.

71. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.

72. Greenberg S, Ziai W, Cordonnier C, Dowlatshahi D, Francis B et al. 2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2022; 53: e282-e361. 10.1161/STR.0000000000000407.

73. Jensen R, Radojicic A, Yri H. The diagnosis and management of idiopathic intracranial hypertension and the associated headache. *Ther Adv Neurol Disord*. Jul 2016; 9: 317-26. 10.1177/1756285616635987.

74. Connors J, Levy J. Thromboinflammation and the hypercoagulability of COVID-19. *J Thromb Haemost*. Jul 2020; 18: 1559-1561. 10.1111/jth.14849.

75. Tu T M, Goh C, Tan Y K, Leow A S, Pang Y Z et al. Cerebral Venous Thrombosis in Patients with COVID-19 Infection: A Case Series and Systematic Review. *J Stroke Cerebrovasc Dis*. Dec 2020; 29: 105379. 10.1016/j.jstrokecerebrovasdis.2020.105379.

76. Bushnell C, Saposnik G. Evaluation and management of cerebral venous thrombosis. *Continuum (Minneapolis)*. Apr 2014; 20: 335-51. 10.1212/01.CON.0000446105.67173.a8.

77. Coutinho J. Cerebral venous thrombosis. *J Thromb Haemost*. Jun 2015; 13 Suppl 1: S238-44. 10.1111/jth.12945.

78. Ferro J, Canhão P, Aguiar de Sousa D. Cerebral venous thrombosis. *Presse Med*. Dec 2016; 45: e429-e450. 10.1016/j.lpm.2016.10.007.

79. Liang T, Tso D, Chiu R, Nicolaou S. Imaging of blunt vascular neck injuries: a review of screening and imaging modalities. *AJR Am J Roentgenol*. 2013; 201: 884-92. 10.2214/AJR.12.9664.

80. Simon L, Nassar A, Mohseni M. *Vertebral Artery Injury*. StatPearls Publishing. 2023.

81. Nash M, Rafay M. Craniocervical Arterial Dissection in Children: Pathophysiology and Management. *Pediatr Neurol*. 2019; 95: 9-18. 10.1016/j.pediatrneurol.2019.01.020.



EVOLENT CLINICAL GUIDELINE 012-2 FOR NECK MRA_MRV

Guideline or Policy Number: Evolent_CG_012-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR NECK MRA.....	3
CEREBROVASCULAR DISEASE.....	3
TUMOR/PULSATILE MASS	4
OTHER EXTRACRANIAL VASCULAR DISEASES	4
PRE- OR POST-OPERATIVE/PROCEDURAL EVALUATION	4
<i>Pre-operative/procedural evaluation</i>	<i>4</i>
<i>Post-operative/procedural evaluation.....</i>	<i>5</i>
FURTHER EVALUATION OF INDETERMINANT FINDINGS	5
GENETIC SYNDROMES AND RARE DISEASES.....	5
COMBINATION STUDIES	6
<i>Brain/Neck/Chest/Abdomen/Pelvis MRA</i>	<i>6</i>
<i>Brain MRA and Neck MRA.....</i>	<i>6</i>
<i>Brain MRI/Brain MRA/Neck MRA.....</i>	<i>7</i>
<i>Neck/Chest/Abdomen/Pelvis MRA.....</i>	<i>7</i>
CODING AND STANDARDS	7
CODING	7
<i>CPT Codes</i>	<i>7</i>
APPLICABLE LINES OF BUSINESS.....	7
BACKGROUND.....	7
MRA VS CTA FOR CAROTID ARTERY EVALUATION	8
MRA AND DISSECTION	8
MRA AND RECENT STROKE OR TRANSIENT ISCHEMIC ATTACK	8
ACRONYMS	9
CONTRAINDICATIONS AND PREFERRED STUDIES.....	9
POLICY HISTORY	9
<i>Summary</i>	<i>9</i>



LEGAL AND COMPLIANCE	10
GUIDELINE APPROVAL	10
<i>Committee</i>	10
DISCLAIMER	10
REFERENCES	11

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for performing Magnetic Resonance Angiography (MRA) or Magnetic Resonance Venography (MRV) in the neck/cervical region.

Special Note

If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **Combination Section** as noted in the guidelines)

INDICATIONS FOR NECK MRA

Cerebrovascular Disease

- Recent ischemic stroke or transient ischemic attack (see **Background**)^(1,2,3)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech^(4,5,6)

- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 70\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) ^(7,8,9)
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis $\geq 50\%$, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) ^(7,10,11)

Tumor/Pulsatile Mass

- Pulsatile mass on exam ⁽¹²⁾
- Known carotid body tumors, or other masses such as a paraganglioma, arteriovenous fistula, pseudoaneurysm, atypical lymphovascular malformation ^(12,13,14)

Note: Ultrasound (US) may be used to identify a mass overlying or next to an artery in initial work up of a pulsatile mass.

Other Extracranial Vascular Diseases

- Large vessel vasculitis
 - Giant cell with suspected extracranial involvement ^(15,16,17,18)
 - Takayasu's Arteritis for evaluation at diagnosis and as clinically indicated for suspected extracranial involvement ⁽¹⁸⁾
- Subclavian steal syndrome when ultrasound is positive or indeterminate OR for planning an intervention ⁽¹⁹⁾
- Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall ^(20,21)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(22,23)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ^(24,25)
- For evaluation of pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology ^(26,27)
- For further evaluation of a congenital vascular malformation of the head and neck ⁽²⁸⁾
- Known extracranial vascular disease that needs follow-up or further evaluation ^(29,30,31)

Pre- or Post-Operative/Procedural Evaluation

Pre-operative/procedural evaluation

- Pre-operative evaluation for a planned surgery or procedure

Post-operative/procedural evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery; or to evaluate postsurgical/posttreatment changes ⁽²⁸⁾ Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminant Findings

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):⁽³²⁾
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:⁽³³⁾
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Loeys-Dietz:^(18,34)
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Takayasu's Arteritis:⁽¹⁸⁾
 - For evaluation at diagnosis then as clinically indicated
- Spontaneous coronary arteries dissection (SCAD) ⁽³⁵⁾
 - One-time vascular study from brain to pelvis
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Brain/Neck/Chest/Abdomen/Pelvis MRA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis ^(36,37)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found ^(38,39)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found ⁽⁴⁰⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽⁴¹⁾

Brain MRA and Neck MRA

- Recent ischemic stroke or transient ischemic attack (TIA) (see **Background**) ^(1,2,42)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech ^(4,5)
- Suspected carotid ⁽⁴³⁾ or vertebral ⁽⁴⁴⁾ artery dissection; secondary to trauma ⁽⁴⁵⁾ or spontaneous due to weakness of vessel wall ^(3,20,21)
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment ^(3,22,23)
- Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) ⁽²⁴⁾
- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., internal carotid stenosis > 70%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(7,8,9)
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis ≥ 50%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate ^(7,8,10)
- For evaluation of pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology ⁽²⁶⁾



Brain MRI/Brain MRA/Neck MRA

- Recent ischemic stroke or transient ischemic attack (See **Background**)
- Suspected carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- Pulsatile tinnitus with concern for a suspected arterial vascular and/or intracranial etiology (should include IACs) ^(46,47)
- Giant cell arteritis with suspected intracranial and extracranial involvement
- Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent vascular and intracranial pathology ⁽⁴⁸⁾

Note: CTA and MRA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can be combined with Brain CTA/Neck CTA.

Neck/Chest/Abdomen/Pelvis MRA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated ⁽¹⁸⁾

CODING AND STANDARDS

Coding

CPT Codes

70547, 70548, 70549

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

MRA and CTA are generally comparable noninvasive imaging alternatives, each with their own advantages and disadvantages. MRA is an excellent screening test since it does not utilize ionizing radiation ⁽²⁸⁾

MRA vs CTA for Carotid Artery Evaluation (49,50)

Duplex US, CTA and contrast-MRA are common choices for carotid artery evaluation.

Limitations of MRA include difficulty in patients with claustrophobia and the risk of nephrogenic systemic sclerosis with gadolinium contrast agents in specific patients.

Advantages of CTA over MRA include superior spatial resolution, rapid image acquisition, decreased susceptibility to motion artifacts and artifacts from calcification as well as being better able to evaluate slow flow and tandem lesions. However, it can also overestimate high-grade stenosis. Limitations of CTA include radiation exposure to the patient, necessity of IV contrast, and risk of contrast allergy and contrast nephropathy.

MRA and Dissection

Craniocervical dissections can be spontaneous or traumatic. Patients with blunt head or neck trauma who meet Denver Screening criteria should be assessed for cerebrovascular injury (although about 20% will not meet criteria). The criteria include: focal or lateralizing neurological deficits (not explained by head CT), infarct on head CT, face, basilar skull, or cervical spine fractures, cervical hematomas that are not expanding, glasgow coma score less than 8 without CT findings, massive epistaxis, cervical bruit or thrill. (20,51,52) Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms.

There is often minor trauma or precipitating factor (e.g., exercise, neck manipulation). Dissection is thought to occur due to weakness of the vessel wall, and there may be an underlying connective tissue disorder. Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus, which can migrate into the intracranial circulation causing ischemia. Therefore, MRA of the head and neck is warranted. (21,53,54)

MRA and Recent Stroke or Transient Ischemic Attack

- When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms (55). Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. (56)
- Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

Acronyms

CTA: Computed tomography angiography
 CVA: Cerebrovascular accident
 FMD: Fibromuscular dysplasia
 IAC: Internal auditory canal
 IV: Intravenous
 MRA: Magnetic resonance angiography
 MRV: Magnetic resonance venography
 SCAD: Spontaneous coronary artery dissection
 TIA: Transient ischemic attack
 US: Ultrasound
 VBI: Vertebrobasilar Insufficiency

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
April 2025	<ul style="list-style-type: none"> • Under Applicable Lines of Business, unchecked Medicare Advantage
June 2024	<ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section • Clarified <ul style="list-style-type: none"> ○ Frequency of screening in genetic syndromes • Added <ul style="list-style-type: none"> ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (already in combo) ○ Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) - also in combo section ○ Genetic syndromes and rare disease section

Date	Summary
	<ul style="list-style-type: none"> ○ Giant cell arteritis with suspected intracranial and extracranial involvement (combos) ○ Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement (combos) ● Deleted <ul style="list-style-type: none"> ○ Aneurysm screening section ○ MRI Brain with IAC/MRA Head/MRA Neck section
May 2023	<ul style="list-style-type: none"> ● Updated references ● Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (Combo Neck/Brain MRA) ● Section on further evaluation of indeterminate or questionable findings on prior imaging ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Robertson R L, Palasis S, Rivkin M J, Pruthi S, Bartel T B et al. ACR Appropriateness Criteria: Cerebrovascular Disease-Child. *Journal of the American College of Radiology*. 2020; 17: S36 - S54. 10.1016/j.jacr.2020.01.036.
2. Salmela M B, Mortazavi S, Jagadeesan B D, Broderick D F, Burns J et al. ACR Appropriateness Criteria® Cerebrovascular Disease. *Journal of the American College of Radiology*. 2017; 14: S34 - S61. <https://doi.org/10.1016/j.jacr.2017.01.051>.
3. Pannell J S, Corey A S, Shih R Y, Austin M J, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. 2023.
4. Lima Neto A, Roseli B, Gattas G S, Bor-Seng-Shu E, Oliveira M et al. Pathophysiology and Diagnosis of Vertebrobasilar Insufficiency: A Review of the Literature. *International Archives of Otorhinolaryngology*. 2017; 21: 302 - 307. 10.1055/s-0036-1593448.
5. Searls D E, Pazdera L, Korbel E, Vysata O, Caplan L R. Symptoms and Signs of Posterior Circulation Ischemia in the New England Medical Center Posterior Circulation Registry. *Arch Neurol*. 2012; 69: 346 - 351. 10.1001/archneurol.2011.2083.
6. Yang C W, Carr J C, Futterer S F, Morasch M D, Yang B P et al. Contrast-Enhanced MR Angiography of the Carotid and Vertebrobasilar Circulations. *American Journal of Neuroradiology*. 2005; 26: 2095-2101.
7. Brott T G, Halperin J L, Abbara S, Bacharach J M, Barr J D et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease. *Circulation*. 2011; 124: e54 - e130. 10.1161/CIR.0b013e31820d8c98.
8. DaCosta M, Tadi P, Suroweic S. Carotid Endarterectomy. StatPearls Publishing Updated July 25, 2022. Accessed January 29, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK470582/>.
9. Marquardt L, Geraghty O C, Mehta Z, Rothwell P M. Low Risk of Ipsilateral Stroke in Patients With Asymptomatic Carotid Stenosis on Best Medical Treatment. *Stroke*. 2010; 41: e11 - e17. 10.1161/STROKEAHA.109.561837.
10. Rerkasem K, Rothwell P. Carotid endarterectomy for symptomatic carotid stenosis. The Cochrane database of systematic reviews. 2011; CD001081.
11. Chaturvedi S, Bruno A, Feasby T, Holloway R, Benavente O et al. Carotid endarterectomy--an evidence-based review: report of the Therapeutics and. *Neurology*. 2005; 65: 794-801. doi: 10.1212/01.wnl.0000176036.07558.82.
12. Aulino J M, Kirsch C F, Burns J, Busse P M, Chakraborty S et al. ACR Appropriateness Criteria Neck Mass-Adenopathy. *Journal of the American College of Radiology*. 2019; 16: S150 - S160. 10.1016/j.jacr.2019.02.025.
13. Al-Rawaq K, Al-Naqqash M, Al-Shewered A, Al-Awadi A. Carotid Body Tumour a Challenging Management: Rare Case Report in Baghdad Radiation Oncology Center, Medical City, Baghdad, Iraq. *JCTI*. 2018; 7: 1-6. doi: 10.9734/JCTI/2018/40034.
14. Nguyen R, Shah L, Quigley E, Harnsberger H, Wiggins R. Carotid Body Detection on CT Angiography. *American Journal of Neuroradiology*. 2011; 32: 1096–1099. 10.3174/ajnr.A2429.
15. Aghayev A, Steigner M L, Azene E M, Burns J, Chareonthaitawee P et al. ACR Appropriateness Criteria; Noncerebral Vasculitis. *Journal of the American College of Radiology*. 2021; 18: S380 - S393. 10.1016/j.jacr.2021.08.005.

16. Halbach C, McClelland C M, Chen J, Li S, Lee M S. Use of Noninvasive Imaging in Giant Cell Arteritis. *Asia-Pacific Journal of Ophthalmology*. 2018; 7: 260 - 264. <https://doi.org/10.22608/APO.2018133>.
17. Koster M J, Matteson E L, Warrington K J. Large-vessel giant cell arteritis: diagnosis, monitoring and management. *Rheumatology (Oxford)*. 2018; 57: ii32 - ii42. 10.1093/rheumatology/kex424.
18. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol*. 2021; 73: 1349 - 1365. <https://doi.org/10.1002/art.41774>.
19. Rafailidis V, Li X, Chrysosgonidis I, Rengier F, Rajiah P et al. Multimodality Imaging and Endovascular Treatment Options of Subclavian Steal Syndrome. *Canadian Association of Radiologists Journal*. 2018; 69: 493 - 507. <https://doi.org/10.1016/j.carj.2018.08.003>.
20. Franz R W, Willette P A, Wood M J, Wright M L, Hartman J F. A Systematic Review and Meta-Analysis of Diagnostic Screening Criteria for Blunt Cerebrovascular Injuries. *Journal of the American College of Surgeons*. 2012; 214: doi:10.1016/j.jamcollsurg.2011.11.012.
21. Shakir H J, Davies J M, Shallwani H, Siddiqui A H, Levy E I. Carotid and Vertebral Dissection Imaging. *Current Pain and Headache Reports*. 2016; 20. 10.1007/s11916-016-0593-5.
22. Patel S, Haynes R, Staff I, Tunguturi A, Elmoursi D. Recanalization of cervicocephalic artery dissection. *Brain circulation*. 2020; 6: 175-180. doi:10.4103/bc.bc_19_20.
23. Larsson S, King A, Madigan J, Levi C, Norris J. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. 2017; 88: 646-652. doi:10.1212/wnl.0000000000003617.
24. Kim J, Hashemi N, Gelman R, Lee A. Neuroimaging in ophthalmology. *Saudi journal of ophthalmology: official journal of the Saudi Ophthalmological*. 2012; 26: 401-7. doi:10.1016/j.sjopt.2012.07.001.
25. Davagnanam I, Fraser C L, Miskiel K, Daniel C S, Plant G T. Adult Horner's syndrome: a combined clinical, pharmacological, and imaging algorithm. *Eye*. 2013; 27: 291 - 298. 10.1038/eye.2012.281.
26. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Current radiology reports*. 2017; 5: 5. doi:10.1007/s40134-017-0199-7.
27. Hofmann E, Behr R, Neumann-Haefelin T, Schwager K. Pulsatile Tinnitus: imaging and differential diagnosis. *Dtsch Arztebl International*. 2013; 110: 451 - 458. 10.3238/arztebl.2013.0451.
28. American College of Radiology. ACR–ASNR–SNIS–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF CERVICOCEREBRAL MAGNETIC RESONANCE ANGIOGRAPHY (MRA). Updated 2020. Accessed May 6, 2024.
29. Brahmbhatt A N, Skalski K A, Bhatt A A. Vascular lesions of the head and neck: an update on classification and imaging review. *Insights into Imaging*. 2020; 11. 10.1186/s13244-019-0818-3.
30. Nair S. Vascular Anomalies of the Head and Neck Region. *Journal of maxillofacial and oral surgery*. 2018; 17: 1-12. 10.1007/s12663-017-1063-2.
31. Flors L, Leiva-Salinas C, Maged I M, Norton P T, Matsumoto A H et al. MR Imaging of Soft-Tissue Vascular Malformations: Diagnosis, Classification, and Therapy Follow-up. *RadioGraphics*. 2011; 31: 1321 - 1340. 10.1148/rg.315105213.
32. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular medicine (London, England)*. 2019; 24: 164-189.

33. Byers P. Vascular Ehlers-Danlos Syndrome. 1999 Sep 2 [Updated 2019 Feb 21]. GeneReviews® [Internet]. 2019.
34. Loeys B, Dietz H. Loeys-Dietz Syndrome. 2008 Feb 28 [Updated 2018 Mar 1]. GeneReviews® [Internet]. 2018.
35. Hayes S N, Kim E S, Saw J, Adlam D, Arslanian-Engoren C et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. *Circulation*. 2018; 137: e523 - e557. 10.1161/CIR.0000000000000564.
36. Gornik H, Persu A, Adlam D, Aparicio L, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
37. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
38. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European Journal of Human Genetics*. 2023; 31: 749 - 760. 10.1038/s41431-023-01343-7.
39. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. GeneReviews® [Internet]. 2019.
40. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 March 1]. GeneReviews® [Internet]. 2018.
41. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
42. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging Recommendations for Acute Stroke and Transient Ischemic Attack Patients: A Joint Statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *American Journal of Neuroradiology*. 2013; 34: E117-27. 10.3174/ajnr.A3690.
43. Goodfriend S, Tadi T, Koury R. Carotid Artery Dissection. StatPearls Publishing. 2022.
44. Britt T, Agarwal S. Vertebral Artery Dissection. StatPearls Publishing. 2023.
45. Harrigan M. Ischemic Stroke due to Blunt Traumatic Cerebrovascular Injury. *Stroke*. 2020; 51: 353-360. 10.1161/STROKEAHA.119.026810.
46. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*. 2017; 5: 5. 10.1007/s40134-017-0199-7.
47. Yew K. Diagnostic approach to patients with tinnitus. *Am Fam Physician*. 2014; 89: 106-13.
48. Lawson G. Sedation of children for magnetic resonance imaging. *Archives of Disease in Childhood*. 2000; 82: 150–153. 10.1136/adc.82.2.150.
49. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. American College of Radiology (ACR). Updated 2021. Accessed February 8, 2023. <https://acsearch.acr.org/docs/3149013/Narrative/>.
50. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Disease. American College of Radiology (ACR). Updated 2016. Accessed February 8, 2023. <https://acsearch.acr.org/docs/69478/Narrative/>.
51. Liang T, Tso D K, Chiu R Y W, Nicolaou S. Imaging of Blunt Vascular Neck Injuries: A Review of Screening and Imaging Modalities. *American Journal of Roentgenology*. 2013; 201: 884 - 892. 10.2214/AJR.12.9664.

52. Simon L V, Nassar A K, Mohseni M. Vertebral Artery Injury. StatPearls Publishing Updated July 18, 2022. Accessed January 29, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK470363/>.
53. Nash M, Rafay M F. Craniocervical Arterial Dissection in Children: Pathophysiology and Management. *Pediatric Neurology*. 2019; 95: 9 - 18. 10.1016/j.pediatrneurol.2019.01.020.
54. Clark M, Unnam S, Ghosh S. A review of carotid and vertebral artery dissection. *British Journal of Hospital Medicine*. 2022; 83: 1 - 11. 10.12968/hmed.2021.0421.
55. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45: 2160-236. 10.1161/STR.0000000000000024.
56. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.



EVOLENT CLINICAL GUIDELINE 001 FOR BRAIN MRI

Guideline or Policy Number: Evolent_CG_001	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	4
GENERAL INFORMATION	4
SPECIAL NOTE	4
PURPOSE	4
INDICATIONS	4
HEADACHE	4
<i>Evaluation of Headache</i>	<i>4</i>
<i>Special Considerations in the Pediatric Population with Persistent Headache</i>	<i>5</i>
NEUROLOGICAL SYMPTOMS OR DEFICITS	6
STROKE AND VASCULAR DISEASE	6
<i>Evaluation of Known or Suspected Stroke</i>	<i>6</i>
<i>Evaluation of Known or Suspected Vascular Disease</i>	<i>6</i>
HEAD TRAUMA	7
<i>Evaluation of Known or Suspected Trauma</i>	<i>7</i>
BRAIN TUMOR, MASS, OR METASTASIS	7
<i>Evaluation of Suspected Tumor/Mass/Cyst</i>	<i>7</i>
<i>Evaluation of Known Brain Lesion/Cyst</i>	<i>9</i>
BRAIN MRI FOR KNOWN CANCER	9
<i>Initial Staging</i>	<i>9</i>
<i>Restaging</i>	<i>10</i>
<i>Surveillance</i>	<i>10</i>
<i>Combination Studies for Initial Staging, Active Monitoring, or Evaluation of Suspected Metastases</i>	<i>11</i>
SEIZURE DISORDERS	12
<i>Evaluation of Known or Suspected Seizure Disorder</i>	<i>12</i>
<i>Special considerations in the pediatric population</i>	<i>12</i>
MULTIPLE SCLEROSIS	12
<i>Evaluation of Suspected Multiple Sclerosis</i>	<i>12</i>
<i>Evaluation of Known Multiple Sclerosis</i>	<i>13</i>
INFECTIOUS OR INFLAMMATORY DISEASE	13
<i>Evaluation of Known or Suspected Infection or Inflammatory Disease</i>	<i>13</i>
COGNITIVE IMPAIRMENT	15
<i>Evaluation of Cognitive Impairment</i>	<i>15</i>
<i>Treatment of Alzheimer's disease with anti-amyloid-β monoclonal antibodies</i>	<i>15</i>

MOVEMENT DISORDERS	15
<i>Evaluation of Movement Disorders</i>	15
CRANIAL NERVE AND VISION ABNORMALITIES	15
<i>Vision Abnormalities</i>	15
<i>Other Cranial Neuropathies</i>	16
CONGENITAL ABNORMALITIES	16
<i>Evaluation of Known or Suspected Congenital Abnormalities</i>	16
CEREBROSPINAL FLUID (CSF) ABNORMALITIES	17
<i>Evaluation of Known or Suspected CSF Abnormalities</i>	17
PROCEDURAL EVALUATIONS	18
<i>Preoperative/Procedural Evaluation</i>	18
<i>Postoperative/Procedural Evaluation</i>	18
PRIOR IMAGING	18
<i>Further Evaluation of Indeterminate Findings on Prior Imaging</i>	18
OTHER INDICATIONS	18
MR PERFUSION IMAGING	19
MRI BRAIN WITH IAC	19
GENETICS AND RARE DISEASES	20
COMBINATION STUDIES	21
<i>Brain MRI/Brain MRA</i>	22
<i>Brain MRI/Brain MRA/Neck MRA</i>	22
<i>Brain MRI/Cervical Spine MRI</i>	23
<i>Brain MRI/Cervical Spine MRI/Thoracic Spine MRI (any combination)</i>	23
<i>Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)</i>	23
<i>Brain/Cervical/Thoracic/Lumbar/Abdomen MRI</i>	24
<i>Brain MRI and Face/Sinus MRI</i>	24
<i>Brain MRI and Orbit MRI</i>	24
<i>Chest CT (or MRI) and Brain/Abdomen/Pelvis MRI</i>	25
<i>Sinus/Chest/Abdomen and Pelvis CT and Brain MRI</i>	25
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	25
CODING AND STANDARDS	25
CODING	25
<i>CPT Codes</i>	25
APPLICABLE LINES OF BUSINESS	26
BACKGROUND	26
CONTRAINDICATIONS AND PREFERRED STUDIES	26
HEADACHE AND MIGRAINE	26
DROP METASTASES	27
PULSATILE TINNITUS	27
LEPTOMENINGEAL CARCINOMATOSIS	27
BRAIN MRI/MRA	28
VERTIGO	28
MACROCEPHALY	28
ANOSMIA	28
TEMPORAL ARTERITIS	29
GALACTORRHEA AND HYPERPROLACTINEMIA	29
CENTRAL VENOUS THROMBOSIS	31
NON-ANEURYSMAL VASCULAR MALFORMATIONS	31
STROKE/TIA	31
<i>Table 1: Gait and Brain Imaging</i>	32
NEUROLOGICAL DEFICITS	33
DEFINITIONS	33

POLICY HISTORY	34
<i>Summary</i>	34
LEGAL AND COMPLIANCE	36
GUIDELINE APPROVAL.....	36
<i>Committee</i>	36
DISCLAIMER.....	37
REFERENCES.....	38

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

Brain MR/MRA are not approvable simultaneously unless they meet the criteria described below in the Indications for **Brain MR/Brain MRA** combination studies section. If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.
- (*Unless approvable in the **combination section** as noted in the guidelines)

Purpose

Brain (head) MRI is the procedure of choice for most brain disorders. It provides clear images of the brainstem and posterior brain, which are difficult to view on a CT scan. It is also useful for the diagnosis of demyelinating disorders (such as multiple sclerosis (MS) that cause destruction of the myelin sheath of the nerve). The evaluation of blood flow and the flow of cerebrospinal fluid (CSF) is possible with this non-invasive procedure.

INDICATIONS

Headache ^(1,2)

Evaluation of Headache

- Chronic headache with a change in character/pattern (e.g., more frequent, increased severity, or duration) ⁽³⁾

- Cluster headaches or other trigeminal-autonomic cephalgias, i.e., paroxysmal hemicrania, hemicrania continua, short-lasting unilateral neuralgiform headache attacks (SUNCT/SUNA) imaging is indicated once to eliminate secondary causes ^(3,4)
- Acute headache, sudden onset:
 - With a personal or family history (brother, sister, parent, or child) of brain aneurysm or AVM (arteriovenous malformation) **OR**
 - < 48 hours of “worst headache in my life” or “thunderclap” headache (Sudden onset new headache reaching maximum intensity within 2-3 minutes, lasting more than 5 minutes).
 - Prior history of stroke or intracranial bleed
 - Known coagulopathy or anticoagulation.
- New onset of headache with any of the following ^(3,5,6):
 - Acute, new, or fluctuating neurologic deficits, such as sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes or with signs of increased intracranial pressure (papilledema). (See **background**)
 - History of cancer or significantly immunocompromised
 - Fever
 - Subacute head trauma
 - Pregnancy or puerperium ^(7,8)
 - Age ≥ 50 ^(3,5,9,10)
 - Severe unilateral headache with radiation to or from the neck, associated with suspicion of carotid or vertebral artery dissection
 - Related to activity or event (sexual activity, exertion, Valsalva, position), new or progressively worsening ^(3,10,11,12)
 - Persistent or progressively worsening during a course of physician-directed treatment ^(3,13)

Note: Neuroimaging warranted for atypical/complex migraine aura, but not for a typical migraine aura ⁽³⁾ (see **background**)

Special Considerations in the Pediatric Population with Persistent Headache ^(14,15,16)

- Occipital location
- Age < 6 years
- Symptoms indicative of increased intracranial pressure, such as recurring headaches after waking with or without associated nausea/vomiting

- Documented absence of family history of headache
- Severe headache in a child with an underlying disease that predisposes to intracranial pathology (e.g., immune deficiency, sickle cell disease, neurofibromatosis, history of neoplasm, coagulopathy, hypertension, congenital heart disease)

Neurological Symptoms or Deficits ^(17,18,19,20,21,22)

Acute, new, or fluctuating neurologic symptoms or deficits such as, sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes (see **background**)

Stroke and Vascular Disease

Evaluation of Known or Suspected Stroke ^(23,24,25)

- Known or suspected stroke with any acute, new, or fluctuating symptoms or deficits such as sensory deficits, limb weakness, speech difficulties, visual loss, lack of coordination, or mental status changes (see **background**)
- Suspected stroke with a personal or first-degree family history (brother, sister, parent, or child) of aneurysm or known coagulopathy or on anticoagulation.
- Symptoms of transient ischemic attack (TIA) (episodic neurologic symptoms such as sensory deficits, limb weakness, speech difficulties, visual loss, lack of coordination, or mental status changes)
- Screening for silent cerebral infarcts in early school age children and adults with HbSS sickle cell disease or HbS β 0 thalassemia ⁽²⁶⁾
- Evaluation of neurological signs or symptoms in sickle cell disease ^(26,27)
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity >200 ^(26,28)

Evaluation of Known or Suspected Vascular Disease

- Evaluation of suspected acute subarachnoid hemorrhage (SAH)
- Suspected central venous thrombosis - see **background** ^(29,30)
- Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms.
- Follow-up for known hemorrhage, hematoma, or vascular abnormalities

Note: MRI is the study of choice for detecting cavernous malformations (CCM) and other low flow vascular malformations (see **background**). Follow-up imaging of known CCM should be

done only to guide treatment decisions or to investigate new symptoms. First-degree relatives of patients with more than one family member with a CCM should have a screening MRI as well as genetic counseling ^(31,32,33)

Head Trauma

Evaluation of Known or Suspected Trauma ^(34,35,36)

For evaluation of known or suspected trauma

- Known or suspected trauma or injury to the head with documentation of one or more of the following acute, new, or fluctuating:
 - Focal neurologic findings
 - Motor changes
 - Mental status changes
 - Amnesia
 - Vomiting
 - Seizures
 - Headache
 - Signs of increased intracranial pressure
- Known coagulopathy or on anticoagulation.
- Known or suspected skull fracture by physical exam and/or prior imaging
- Post concussive syndrome if persistent or disabling symptoms and MRI has not been performed.
- Subacute or chronic traumatic brain injury with new cognitive and/or neurologic deficit

Brain Tumor, Mass, or Metastasis

Evaluation of Suspected Tumor/Mass/Cyst ^(3,37)

- Suspected brain tumor with any acute, new, or fluctuating neurologic symptoms or deficits such as sensory deficits, limb weakness, abnormal reflexes (pathological, asymmetric, hyperreflexia), speech difficulties, visual loss, lack of coordination, or mental status changes (see **background**)
- Lesion with atypical features for further evaluation or follow up.
- Suspected Pituitary Tumors ^(38,39,40,41,42,43)
 - Neurologic findings (e.g., visual field deficit suggesting compression of the optic chiasm, diplopia, gaze palsy)
 - Suspected hypofunctioning pituitary gland based on hormonal testing.

- Hypopituitarism
- Growth hormone deficiency
- Hypogonadotropic hypogonadism [low sex hormones and gonadotropins (FSH/LH)] ⁽⁴⁴⁾
 - Total testosterone persistently < 150 with low or normal LH/FSH i.e., severe secondary hypogonadism **OR**
 - Total testosterone levels persistently borderline around the lower limits of normal range (200-400 ng/dL) with low or normal LH/FSH; **AND**
 - ◆ Neurological signs or symptoms; **OR**
 - ◆ Other pituitary hormonal abnormalities; **OR**
 - ◆ Low free testosterone and consideration and addressment of reversible functional causes of gonadotropin suppression (e.g., obesity, opioid use, diabetes, steroid use, or comorbid illness)
- Suspected hyperfunctioning pituitary gland based on hormonal testing.
 - Central hyperthyroidism (high TSH)
 - Cushing syndrome suspected (high ACTH (>5) with cortisol suppression on low or high dose dexamethasone suppression test) ^(45,46,47)
 - Acromegaly/gigantism (high GH/IGF-1)
 - Elevated prolactin ^(48,49)
 - ≥ 250 ng/mL **OR**
 - After evaluation for another cause (e.g., pregnancy, hypothyroidism, renal insufficiency, medication- see **background**)
 - ◆ ≥ 100 ng/mL **OR**
 - ◆ Persistently elevated **OR**
 - ◆ Neuroendocrine signs or symptoms (i.e., headache, galactorrhea, abnormal menses, infertility, or bitemporal hemianopsia) **OR**
 - ◆ Abnormal pituitary hormones (low testosterone/estrogen/progesterone **AND** low or normal LH/FSH)
- Central Diabetes Insipidus (low ADH)
- Precocious puberty in a child (male < 9; female < 8), with hormonal studies suggesting a central cause ⁽⁵⁰⁾
- Pituitary apoplexy with sudden onset of neurological and hormonal symptoms
- Histiocytic Neoplasms for screening and/or with neurological signs or symptoms ^(51,52)
 - Erdheim-Chester Disease
 - Langerhans Cell Histiocytosis
 - Rosai-Dorfman Disease

Evaluation of Known Brain Lesion/Cyst

- Follow-up of known pituitary adenoma
 - New neuroendocrine signs or symptoms
 - Functioning adenoma - to assess response to treatment and 1-year follow-up after drug holiday ^(38,39,40,53)
 - Asymptomatic Macroadenoma ($\geq 10\text{mm}$) follow-up every 6-18 months, post-surgical follow-up every 1-2 years after surgery ⁽⁵⁴⁾
 - Asymptomatic, non-functioning Microadenoma $< 10\text{mm}$ repeat in one year; if stable, repeat every 2-3 years ⁽⁵⁴⁾
- Follow-up of known pineal cyst ($\geq 5\text{mm}$) if there are atypical features or symptoms (e.g., headaches, gaze paresis, ataxia, papilledema, nausea/vomiting) ⁽⁵⁵⁾
- Follow up of known Rathke cleft cyst ⁽⁵⁶⁾
 - If no symptoms, MRI at 1/3/5 years to stability
 - With new neurological symptoms or atypical imaging features
 - Post treatment, yearly for 5 years.
- Follow-up of known arachnoid cyst ^(57,58)
 - In patients < 4 years old, serial imaging is warranted.
 - In patients > 4 years old, repeat imaging only if newly symptomatic, i.e., headaches, increased intracranial pressure, hydrocephalus, local mass effect, seizures, visual/endocrine dysfunction.
- Midline dermoid cysts/sinuses with concern for intracranial extension ^(59,60,61)
- Histiocytic Neoplasms to assess treatment response and surveillance of known brain lesions ^(51,52)
 - Erdheim-Chester Disease
 - Langerhans Cell Histiocytosis
 - Rosai-Dorfman Disease

Brain MRI for Known Cancer

Brain MRI is appropriate for **any malignancy when there are signs or symptoms of brain metastases** (e.g., headache, sensory deficits, memory problems). There does not need to be a neuro deficit on exam or other workup done first for a patient with cancer.

Initial Staging

Brain MRI is appropriate during the **initial diagnostic workup** for the following cancer types:

- Kidney cancer⁽⁶²⁾
- Lung cancer (NSCLC and SCLC)^(63,64)
- Melanoma
 - Primary mucosal tumor of the head and neck – any stage⁽⁶⁵⁾
 - Stage III or IV for any primary site⁽⁶⁶⁾
- Poorly differentiated neuroendocrine cancer⁽⁶⁷⁾
- Gestational trophoblastic neoplasia with pulmonary metastases⁽⁶⁸⁾
- Leukemia with suspicion of CNS involvement^(69,70,71)
- Breast cancer stage IV⁽⁷²⁾

Restaging

Brain MRI is appropriate every 2-3 cycles of chemotherapy **during active treatment** for the following diseases:

- B Cell lymphomas (if CNS lymphoma present or concern for CNS lymphoma)⁽⁷³⁾
- Breast cancer, stage IV or any stage if suspected development of brain metastases⁽⁷²⁾
- Cutaneous melanoma, stage III or IV or any stage if suspected development of brain metastases⁽⁶⁶⁾
- Non-small cell lung cancer⁽⁶³⁾
 - All stages – initial staging and end of treatment
 - Stage IV – every 2-3 cycles of treatment
- Small cell lung cancer⁽⁶⁴⁾
- Neuroendocrine carcinoma of the cervix⁽⁷⁴⁾
 - All stages – initial staging
 - Stage IV – every 2-3 cycles of treatment
- Adult and pediatric CNS tumors⁽⁷⁵⁾

Surveillance

Brain MRI is appropriate during **surveillance** in the following diseases:

- B Cell lymphomas (if history of CNS lymphoma or concern for CNS lymphoma) every 6 months for 2 years then as clinically indicated⁽⁷³⁾
- Breast cancer⁽⁷²⁾
 - Stage IV every 3-6 months

- All other stages if suspected development of brain metastases
- Cutaneous melanoma ⁽⁶⁶⁾
 - Stage III, IV every 3 months for 2 years, then every 6-12 months indefinitely
 - All other stages if suspected development of brain metastases
- Non-small cell lung cancer ⁽⁶³⁾
 - Stage IV every 3 months
 - All other stages if suspected development of brain metastases
- Small cell lung cancer ⁽⁶⁴⁾
 - Limited stage every 2-6 months for 1-2 years then every 6-12 months indefinitely
 - Extensive stage every 2 months for 1 year, every 3-4 months for years 2 and 3, every 6 months during years 4 and 5, then annually
- Neuroendocrine carcinoma of the cervix ⁽⁷⁴⁾
 - If suspected development of brain metastases
- Adult and pediatric CNS tumors ⁽⁷⁵⁾
 - For histologies not specifically detailed below, every 3-6 months for 3-5 years then at least annually.
 - High grade glioma/Glioblastoma – 2-8 weeks after radiation therapy, then every 2-4 months for 3 years, then every 3-6 months indefinitely
 - Ependymoma – every 3-4 months for 1 year, every 4-6 months for 1 year, every 6-12 months for 5-10 years, then as clinically indicated
 - Medulloblastoma – every 3 months for 1 year, every 6-12 months for 5-10 years, then as clinically indicated.
 - Meningioma – Every 2-4 months for 3 years then every 3-6 months indefinitely

Combination Studies for Initial Staging, Active Monitoring, or Evaluation of Suspected Metastases ⁽³⁷⁾

≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine

Seizure Disorders

Evaluation of Known or Suspected Seizure Disorder

(76,77,78,79,80,81,82)

- New onset of an unprovoked seizure
- Newly identified change in seizure activity/pattern
- Known seizure disorder without previous imaging.
- Medically refractory epilepsy

Special considerations in the pediatric population (76,82,83,84)

Imaging is indicated in complex febrile seizures accompanied by any of the following:

- Abnormal neurologic exam.
- Autism, cerebral palsy or developmental delay
- Focal onset
- Post-ictal Todd's paralysis (when a seizure is followed by a brief period of temporary paralysis)
- Recurrent in 24 hours
- Duration > 15 minutes
- Abnormal EEG

Note imaging is not indicated for:

- Simple febrile seizures that have none of the above characteristics.
- Benign epilepsy syndromes/idiopathic focal or generalized epilepsy with typical features such as: Childhood absence epilepsy (JAE),(BECTS) Benign epilepsy with centrotemporal spikes also known as Benign Rolandic Epilepsy (BRE), Juvenile absence epilepsy (JAE), Juvenile myoclonic epilepsy (JME), benign epilepsy childhood with centrotemporal spikes (BECCT)

Multiple Sclerosis

Evaluation of Suspected Multiple Sclerosis (85,86)

- For evaluation of patient with neurologic symptoms or deficits suspicious for MS with
 - A clinically isolated syndrome (optic neuritis, transverse myelitis, or brain stem syndrome); **OR**
 - Recurrent episodes of variable neurological signs or symptoms not attributable to another cause

- To demonstrate dissemination in time for diagnosis (every 6-12 months)

Evaluation of Known Multiple Sclerosis ^(86,87)

- To establish a new baseline (no recent imaging, postpartum, or 3-6 months after switching disease modifying therapy)
- Prior to starting or switching disease-modifying therapy
- 6-month repeat scan in patients with MRI disease activity that is not associated with new clinical symptoms on a routine follow-up scan (i.e., Radiographically isolated syndrome) ⁽⁸⁸⁾
- Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years.
- New signs or symptoms suggested of an exacerbation or unexpected clinical worsening.
- Progressive Multifocal Leukoencephalopathy (PML) surveillance for patients on natalizumab (Tysabri) ⁽⁸⁹⁾
 - 12 months after the start of treatment in all patients
 - Further surveillance MRI scanning timing is based on risk.
 - Annually, if anti-JCV antibody negative,
 - Every 3-4 months, if high risk of PML occurrence:
 - seropositive for JC virus and have been treated with natalizumab for ≥18 months **OR**
 - high anti-JC virus antibody index values (>0.9) **OR**
 - previously treated with immunosuppressive therapies
 - Brain MRI every 3–4 months for up to 12 months, in high-risk patients who switch from natalizumab to other therapeutics.

Note: In the pediatric population, use a similar scan frequency for disease and therapeutic monitoring. Increase frequency of imaging (e.g., every 6 months) in children with highly active disease or in situations where imaging will change management.

Infectious or Inflammatory Disease

Evaluation of Known or Suspected Infection or Inflammatory Disease

- Suspected intracranial abscess or brain infection with acute altered mental status or with positive lab findings (such as elevated WBCs) OR follow-up assessment during or after treatment completed.

- Meningitis with positive signs and symptoms (such as fever, headache, mental status changes, stiff neck) **OR** with positive lab findings (such as elevated white blood cells or abnormal lumbar puncture fluid exam) ^(90,91)
- Suspected encephalitis with headache and altered mental status or follow-up as clinically warranted.
- Endocarditis with suspected septic emboli
- Suspected Giant Cell (temporal arteritis) in a patient ≥ 50 with temporal headache, abrupt visual changes, jaw claudication, temporal artery tenderness, constitutional symptoms or elevated ESR; ^(92,93,94,95) **AND**
 - Negative initial work-up (color Doppler ultrasonography or biopsy); **OR**
 - Atypical features, failure to response to treatment or concern for intracranial involvement

Note: Protocol should include high-resolution contrast-enhanced imaging the temporal artery

- Vasculitis
 - Central Nervous System (CNS) involvement in patients with known or suspected vasculitis or autoimmune disease with abnormal inflammatory markers or autoimmune antibodies
 - Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(29,96,97)

Note: Vessel wall MRI (ordered as Brain MRI) can also be performed in the evaluation of vasculitides ⁽⁹⁸⁾

- Immunocompromised patient (e.g., transplant recipients, HIV with CD4<200, primary immunodeficiency syndromes, hematologic malignancies) with focal neurologic symptoms, headaches, behavioral, cognitive or personality changes
- Progressive Multifocal Leukoencephalopathy (PML) ^(99,100,101)
 - Suspected based on clinical symptoms and/or JC virus status in an immunocompromised patient.
 - Follow up of known PML as clinically indicated.
- Neurosarcoidosis ^(102,103)
 - Initial Evaluation:
 - Suspected based on neurological sign/symptoms and lab work (ACE, CSF analysis) **OR**
 - Known history of sarcoidosis with neurological signs or symptoms
 - Follow-up of known neurosarcoidosis:
 - To assess treatment response
 - Worsening signs or symptoms

Cognitive Impairment

Evaluation of Cognitive Impairment ^(104,105,106,107)

- Mental status score of either MMSE or MoCA of less than 26 or other similar mental status instruments*/formal neuropsychological testing showing at least mild cognitive impairment **AND** a completed basic metabolic workup (such as thyroid function testing, liver function testing, complete blood count, electrolytes, and B12)
- *Other examples include Mini-Cog, Memory Impairment Screen, Saint Louis University Mental Status Examination (SLUMS), Brief Alzheimer's Screen (BAS), Blessed Dementia Scale (BDS), Clinical Dementia Rating (CDR) ^(108,109)

Treatment of Alzheimer's disease with anti-amyloid- β monoclonal antibodies ^(110,111)

Baseline and surveillance imaging as per FDA labeling

Movement Disorders ^(21,112,113,114,115)

Evaluation of Movement Disorders

- For evaluation of acute onset of a movement disorder with concern for stroke or hemorrhage
- For evaluation of suspected Parkinson's with atypical feature or unresponsive to levodopa
- **Note:** Atypical parkinsonian syndromes include progressive supranuclear palsy (PSP), multiple system atrophy (MSA), corticobasal degeneration (CBD), and dementia with Lewy bodies.
- For evaluation of new non-Parkinson neurological symptoms in known Parkinson's disease complicating the evaluation of the current condition
- For the evaluation of other movement disorder to exclude a structural lesion (i.e., suspected Huntington disease, chorea, hemiballismus, atypical dystonia)

Note: MRI not indicated in essential tremor, Tourette' syndrome, or isolated focal dystonia (e.g., blepharospasm, cervical dystonia, laryngeal dystonia, oromandibular dystonia, writer's dystonia) ^(114,116)

Cranial Nerve and Vision Abnormalities

Vision Abnormalities

For evaluation of cranial nerve and visual abnormalities

- Optic neuritis
- Abnormal eye findings on physical or neurologic examination (papilledema, pathologic nystagmus, optic atrophy, ocular nerve palsies, new onset anisocoria, visual field deficit, etc.) **Note:** See [background](#)
- Binocular diplopia with concern for intracranial pathology after comprehensive eye evaluation ^(117,118)
- Childhood strabismus with development delay or abnormal fundoscopic exam to rule out intracranial abnormalities ⁽¹¹⁹⁾
- Horner's syndrome with symptoms localizing the lesion to the central nervous system ⁽¹²⁰⁾

Other Cranial Neuropathies

- Trigeminal neuralgia or neuropathy ^(3,121,122,123)
- Occipital Neuralgia to exclude a structural lesion, notably in atypical cases ⁽¹²⁴⁾
- Bell's Palsy- if atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset ^(125,126)
- Hemifacial spasm ^(121,127)
- Other objective cranial nerve palsy (CN IX-XII) ^(121,128)
- Bulbar symptoms, i.e., difficulty in chewing, weakness of the facial muscles, dysarthria, palatal weakness, dysphagia, and dysphonia and/or signs, i.e., atrophy and fasciculations of the tongue and absent gag reflex ⁽¹²¹⁾
- Pseudobulbar symptoms, i.e., dysphagia, dysarthria, facial weakness, sudden, stereotyped emotional outbursts that are not reflective of mood and/or signs, i.e., spastic tongue and exaggerated gag/jaw jerk ⁽¹²⁹⁾

Congenital Abnormalities

Evaluation of Known or Suspected Congenital Abnormalities

- Known or suspected congenital abnormality with any acute, new, or fluctuating neurologic, motor, or mental status changes
- Evaluation of macrocephaly in an infant/child <18 with previously abnormal US, abnormal neurodevelopmental examination, signs of increased ICP or closed anterior fontanelle ⁽¹³⁰⁾
- Evaluation of microcephaly in an infant/child < 18 ⁽¹³¹⁾
- Evaluation of craniosynostosis and other skull deformities. CT is preferred imaging to assess bony structures; MRI imaging is preferred to assess intracranial soft tissue ^(132,133)

- Evaluation of the corticomedullary junction in Achondroplasia ⁽¹³⁴⁾
- Cerebral palsy if etiology has not been established in the neonatal period, there is change in the expected clinical or developmental profile or concern for progressive neurological disorder ⁽¹³⁵⁾
- Prior treatment **OR** treatment planned for congenital abnormality.

Note: For evaluation of known or suspected hydrocephalus please see section on CSF abnormalities.

Cerebrospinal Fluid (CSF) Abnormalities

Evaluation of Known or Suspected CSF Abnormalities

- Evaluation of suspected hydrocephalus with any acute, new, or fluctuating neurologic, motor, or mental status changes
- Known hydrocephalus†
- For initial evaluation of a suspected Arnold Chiari malformation ⁽¹³⁶⁾ †
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms ⁽¹³⁷⁾
- Initial evaluation for a known syrinx or syringomyelia†
- Known or suspected normal pressure hydrocephalus (NPH) ⁽¹³⁸⁾
 - With symptoms of gait difficulty, cognitive disturbance, and urinary incontinence
- Follow-up shunt evaluation ⁽¹³⁹⁾
 - Post operativity if indicated based on underlying disease or pre-operative radiographic findings and/or
 - 6-12 months after placement and/or
 - With neurologic symptoms that suggest shunt malfunction
- Evaluation of known or suspected cerebrospinal fluid (CSF) leakage ⁽¹⁴⁰⁾
- Cisternography for intermittent and complex CSF rhinorrhea/otorrhea. CSF fluid should always be confirmed with laboratory testing (Beta-2 transferrin assay) ^(140,141)
- Suspected spontaneous intra-cranial hypotension with distinct postural headache (other symptoms include nausea, vomiting, dizziness, tinnitus, diplopia neck pain or imbalance) ^(3,142)
- CSF flow study for evaluation and management of CSF flow disorders ^(143,144)

†Often congenital, but can present later in life; or less commonly acquired secondary to tumor, stroke, trauma, infection, etc.

Procedural Evaluations

Preoperative/Procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure

Postoperative/Procedural Evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Prior Imaging

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Other Indications

- Vertigo associated with any of the following ^(20,145,146)
 - Signs or symptoms suggestive of a CNS lesion (ataxia, visual loss, double vision, weakness, or a change in sensation)
 - Progressive unilateral hearing loss or tinnitus
 - Risk factors for cerebrovascular disease with concern for stroke.
 - After full neurologic examination and vestibular testing with concern for central vertigo (i.e., skew deviation, vertical nystagmus, head thrust test, videonystagmography (VNG) / electronystagmography (ENG))
- Diagnosis of central sleep apnea on polysomnogram
 - Children > 1 year ⁽¹⁴⁷⁾
 - Adults in the absence of heart failure, chronic opioid use, high altitude, or treatment emergent central sleep apnea **AND** concern for a central neurological cause (Chiari malformation, tumor, infectious/inflammatory disease) **OR** with an abnormal neurological exam ⁽¹⁴⁸⁾

- Syncope with clinical concern for seizure or associated neurological signs or symptoms ^(149,150)
- Cyclical vomiting syndrome or abdominal migraine with any localizing neurological symptoms ^(151,152,153)
- Soft tissue mass of the head with nondiagnostic initial evaluation (ultrasound and/or radiograph) ^(154,155,156)
- Psychological changes with neurological deficits on exam or after completion of a full neurological assessment that suggests a possible neurologic cause ⁽¹⁵⁷⁾
- Child < 18 years with global developmental delay OR a developmental delay with abnormal neurological examination ^(158,159,160)
 - **Note:** MRI is not recommended as a part of routine evaluation in children with autism spectrum disorder and no other neurologic findings.²⁵²
- Unexplained event (BRUE) formerly apparent life-threatening event (ALTE) in infants < 1 year with concern for neurological cause based on history and exam ⁽¹⁶¹⁾
 - **Note:** Imaging is not indicated in low-risk patients
- Bone Marrow Transplant (BMT) ⁽¹⁶²⁾
 - For initial workup of BMT (along with CT Chest, CT Sinus and CT Abdomen and Pelvis).

MR Perfusion Imaging ^(163,164,165,166,167)

- Neurovascular disease
 - Assessment of ischemic penumbra in acute stroke
 - Assessment of cerebrovascular reserve
 - Further evaluation of known vascular abnormality (stenosis, malformation, vasospasm, vasculitis, Moya-Moya)
- Mass lesions
 - Differentiating tumor from tumor mimic
 - Differentiating glioblastoma from brain metastasis
 - Discriminating low- from high-grade gliomas
 - Differentiating recurrent brain tumors from radiation/chemo necrosis
 - Surgical planning

MRI Brain with IAC

(If only images of the IACs is needed w/o Brain imaging see Evolent Clinical Guideline 014 for Sinus, Face, Orbit, Neck and Internal Auditory Canal MRI)

- Unilateral non-pulsatile tinnitus
- Pulsatile tinnitus
- Suspected acoustic neuroma (Schwannoma) or cerebellar pontine angle tumor with any of the following signs and symptoms: unilateral hearing loss by audiometry, headache, disturbed balance or gait, unilateral tinnitus, facial weakness, or altered sense of taste.
- Suspected cholesteatoma
- Suspected glomus tumor
- Asymmetric sensorineural hearing loss on audiogram
- Congenital/childhood sensorineural hearing loss suspected to be due to a structural abnormality (CNVIII, the brain parenchyma, or the membranous labyrinth) ^(17,168,169). CT is the preferred imaging modality for the osseous anatomy and malformations of the inner ear.
- CSF otorrhea (MRI/Nuclear Cisternography for intermittent leaks, CT for active leaks) ⁽¹⁴¹⁾; there should be a high suspicion or confirmatory CSF fluid laboratory testing (Beta-2 transferrin assay)
- Clinical suspicion of acute mastoiditis as a complication of acute otitis media with intracranial complications (i.e., meningeal signs, cranial nerve deficits, focal neurological findings, altered mental status) ⁽¹⁷⁰⁾
- Bell's Palsy for evaluation of the extracranial nerve course -if atypical signs, slow resolution beyond three weeks, no improvement at four months, or facial twitching/spasms prior to onset ⁽¹²¹⁾

Genetics and Rare Diseases

- MEN1 (Multiple Endocrine Neoplasia type 1)- pituitary or sella MRI every 3-5 years, starting at the age of 8-15 years ^{(171) (40)}
- Von Hippel Lindau (VHL) - imaging of the brain and spinal cord for hemangioblastomas every 2 years starting at age 14 ^(40,62,172)
- Li Fraumeni syndrome- annually ^(173,174)
- NF-1- as clinically indicated with neurologic signs and symptoms and for follow-up of known intracranial tumors (no asymptomatic screening)
 - Known optic pathway gliomas should be imaged every 3 months for 1 year, then every 6 months for 2 years, the annually for 3-5 years, then less frequently as per clinical judgment until age 18 ⁽¹⁷⁵⁾
- NF-2- Brain IAC- annually starting at the age of 10 years ⁽¹⁷⁶⁾
- Schwannomatosis - Brain and spine MRI every two to three years beginning at age 12 years.

- Note: diagnosis is met with both genetic testing AND clinical features due to incomplete penetrance
- Sturge Weber Syndrome- once, after age 1 to rule out intracranial involvement; in patients <1 year, only if symptomatic ⁽¹⁷⁷⁾
- Turcot Syndrome - low threshold for MRI for any neurological sign or symptoms of medulloblastoma ⁽¹⁷⁸⁾
- Tuberous Sclerosis – Every 1-3 years, until the age of 25 years ⁽¹⁷⁹⁾
 - Those with asymptomatic subependymal giant cell astrocytoma (SEGA) in childhood should continue to be imaged periodically in adulthood.
 - With large or growing SEGA or SEGA causing ventricular enlargement, more frequent brain MRIs as deemed clinically appropriate.
- Rhabdoid Tumor Predisposition Syndrome- Brain MRI at diagnosis and monthly age 0-6 months if whole body MRI not done; Q2-3 months age 7-18months, Q3months age 19 months-5 years ⁽¹⁸⁰⁾
- Constitutional mismatch repair deficiency syndrome (CMMRD) - Brain MRI every 6 months after diagnosis
- Fabrys disease- annual neurologic assessment with brain MRI/MRA every two to three years beginning at age 18 years ⁽¹⁸¹⁾
- X-linked Adrenoleukodystrophy ⁽¹⁸²⁾
 - Baseline MRI between 12 and 18 months old
 - Second MRI 1 year after baseline
 - MRI every 6 months between 3 and 12 years old
 - Annual MRI after 12 years old
- Heritable retinoblastoma (Pineoblastoma surveillance)
 - Brain MRI at the time of retinoblastoma diagnosis; some centers recommend a brain MRI every 6 months until 5 years old ^(183,184)
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the neuroaxis), patient history, and other available information, including prior imaging.

Note: MRA and CTA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can alternatively be combined with Brain CTA/Neck CTA.

Exception: For approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽¹⁸⁵⁾

Brain MRI/Brain MRA

- Recent ischemic stroke or transient ischemic attack (TIA) ^(186,187)
- Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging ^(188,189,190,191)
 - **Note:** Negative brain CT < 6 hours after headache onset excludes subarachnoid hemorrhage in neurologically intact patients ⁽¹⁹⁰⁾. MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset. ^(188,192)
- Acute, sudden onset of headache with personal history of a vascular abnormality or first-degree family history of aneurysm ^(191,193)
- Headache associated with exercise, exertion, Valsalva or sexual activity ^(4,11,12)
- Suspected venous thrombosis (dural sinus thrombosis) ⁽¹⁸⁷⁾ – Brain MRV see **background**
- Neurological signs or symptoms in sickle cell patients ⁽¹⁹⁴⁾
- High stroke risk in sickle cell patients (2 - 16 years of age) with a transcranial doppler velocity > 200 ⁽²⁶⁾
- Known Moyamoya disease ^(195,196) or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms ^(191,197)
- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies ⁽¹⁹³⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(193,198,199)
- Giant cell arteritis with suspected intracranial involvement ⁽⁹³⁾
- Fabrys disease annual neurologic assessment with brain MRI/MRA every two to three years beginning at age 18 years ⁽¹⁸¹⁾

Brain MRI/Brain MRA/Neck MRA

- Recent ischemic stroke or transient ischemic attack (TIA) ^(186,187)
- Suspected carotid or vertebral artery dissection with focal or lateralizing neurological deficits.

- Pulsatile tinnitus with concern for a suspected arterial vascular and/or intracranial etiology ^(200,201) (**Brain MRI should include IAC**)
- Giant cell arteritis with suspected intracranial and extracranial involvement
- Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽¹⁸⁵⁾

Note: CTA and MRA are generally comparable noninvasive imaging alternatives each with their own advantages and disadvantages. Brain MRI can be combined with Brain CTA/Neck CTA

Brain MRI/Cervical Spine MRI

- Horner's syndrome with symptoms localizing the lesion to the central nervous system ⁽²⁰²⁾

Brain MRI/Cervical Spine MRI/Thoracic Spine MRI (any combination)

- Combination studies for MS: These body regions might be evaluated separately or in combination as guided by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history (e.g., symptom(s), time course, and where in the CNS the likely localization(s) is/are), and other available information, including prior imaging.
 - For evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis) ⁽²⁰³⁾
 - For known MS, prior to the initiation or change of disease modification treatments and assess disease burden (to establish a new baseline) ^(204,205)
 - Follow-up scans, including brain and spine imaging, if patients have known spine disease:
 - 6-12 months after starting/changing treatment.
 - Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years.

Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms ^(143,206,207)

- Oncological Applications (e.g., primary nervous system, metastatic) ⁽²⁰⁸⁾
 - Drop metastasis from brain or spine ⁽²⁰⁹⁾
 - Suspected leptomeningeal carcinomatosis ⁽²¹⁰⁾
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- For evaluation of known Arnold-Chiari Malformation
- Tumor evaluation and monitoring in cancer predisposition syndromes
 - Von Hippel Lindau (VHL) - imaging of the brain and spinal cord for hemangioblastomas every 2 years starting at age 14 ^(40,62,172)
 - Rhabdoid Tumor Predisposition Syndrome- Brain and Spine MRI at diagnosis and monthly age 0-6 months if whole body MRI not done; Q2-3 months age 7-18months, Q3months age 19 months-5 years.
 - NF-2- Brain IAC annually starting at the age of 10 years and spinal imaging at baseline and every 2 to 3 years with more frequent imaging, if warranted, based on sites of tumor involvement ⁽¹⁷⁶⁾
 - Schwannomatosis - Brain and spine MRI every two to three years beginning at age 12 years ⁽²¹¹⁾

Note: diagnosis is met with both genetic testing AND clinical features due to incomplete penetrance

Brain/Cervical/Thoracic/Lumbar/Abdomen MRI

- Von Hippel Lindau (VHL) every 2 years starting at age 15.

Brain MRI and Face/Sinus MRI

- Granulomatosis with polyangiitis (Wegener's granulomatosis) disease ⁽²¹²⁾
- Trigeminal neuralgia or neuropathy with an atypical presentation (for evaluation of the extracranial nerve course) ⁽¹²¹⁾ See **background**
- For approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent intracranial pathology ⁽¹⁸⁵⁾

Brain MRI and Orbit MRI

- Optic neuropathy or unilateral optic disk swelling of unclear etiology to distinguish between a compressive lesion of the optic nerve, optic neuritis, ischemic optic

neuropathy (arteritic or non-arteritic), central retinal vein occlusion or optic nerve infiltrative disorders ^(19,213)

- Bilateral optic disk swelling (papilledema) with visual loss ^(19,214,215,216)
- Optic Neuritis ^(214,215,217)
 - If atypical presentation (bilateral, absence of pain, optic nerve hemorrhages, severe visual impairment, lack of response to steroids, poor recovery or recurrence)
 - If needed to confirm optic neuritis and rule out compressive lesions
- Known or suspected neuromyelitis optica spectrum disorder with severe, recurrent, or bilateral optic neuritis ⁽²⁰³⁾
- Suspected retinoblastoma ^(218,219)

Chest CT (or MRI) and Brain/Abdomen/Pelvis MRI

- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1)
 - Chest/Abdomen/Pelvis annually
 - Brain/Chest/Abdomen/Pelvis every 3 years

Sinus/Chest/Abdomen and Pelvis CT and Brain MRI

- Prior to Bone Marrow Transplantation

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

70551, 70552, 70553, +0698T – Brain MRI

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why and MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Headache and Migraine

MRI for Headache – Generally, magnetic resonance imaging is the preferred imaging technique for evaluating the brain parenchyma, and CT is preferable for evaluating subarachnoid hemorrhage. CT is faster and more readily available than MRI and is often used in urgent clinical situations. Neurologic imaging is warranted in patients with headache disorders along with abnormal neurologic examination results or predisposing factors for brain pathology. Contrast-enhanced MRI is performed for evaluation of inflammatory, infectious, neoplastic, and demyelinating conditions.

Headache timeframes and other characteristics – Headaches can be classified as acute, subacute or chronic. Acute headaches are present from hours to days, subacute from days to weeks and chronic headaches for more than 3 months. Acute severe headaches are more likely to be pathological (e.g., SAH, cerebral venous thrombosis) than non-acute (e.g., migraine, tension-type). Headaches can also be categorized as new onset or chronic/recurrent. Non-acute new onset headaches do not require imaging unless there is a red flag as delineated above. Incidental findings lead to additional medical procedures and expense that do not improve patient well-being. Primary headache syndromes, such as migraine and tension headaches, are often episodic with persistent or progressive headache not responding to treatment requiring further investigation (e.g., new daily persistent headache). Imaging is indicated in chronic headaches if there is a change in the headache frequency (number of headache episodes/month), duration of each episode, severity of the headaches or new characteristics, such as changing aura or associated symptoms.

(1,2,3,4,220,221,222,223,224)

Migraine with aura ^(4,5,225) – The headache phase of a migraine is preceded and/or accompanied by transient neurological symptoms referred to as aura in at least a third of migraine attacks. Migraine with typical aura consists of visual and/or sensory and/or speech/language symptoms, but no motor, brainstem or retinal symptoms and is characterized by gradual development, duration of each symptom no longer than one hour, a mix of positive and negative features and complete reversibility. Atypical or complex aura includes motor, brainstem, monocular visual disturbances, or ocular cranial nerve involvement (hemiplegic migraine, basilar migraine/brainstem aura, retinal migraine, ophthalmoplegic migraine) and secondary causes need to be excluded. Additional features of an aura that raise concern for an underlying vascular etiology include late age of onset, short duration, evolution of the focal symptoms, negative rather than positive visual phenomenon, and history of vascular risk factors.

Individuals presenting with a new migraine with aura (especially an atypical or complex aura) can mimic a transient ischemic attack or an acute stroke. If there is a new neurologic deficit, imaging should be guided by concern for cerebrovascular disease, not that the individual has a headache. ^(9,226)

Drop Metastases

Drop Metastases – Drop metastases are intradural extramedullary spinal metastases that arise from intracranial lesions. Common examples of intracranial neoplasms that result in drop metastases include pineal tumors, ependymomas, medulloblastomas, germinomas, primitive neuroectodermal tumors (PNET), glioblastomas multiform, anaplastic astrocytomas, oligodendrogliomas and less commonly choroid plexus neoplasms and teratomas. ⁽²⁰⁹⁾

Pulsatile Tinnitus

Pulsatile tinnitus- has many etiologies, and the choice of study should be based on accompanying signs and symptoms. For general screening MRI brain with IAC/MRA brain and neck is approvable. If IIH is suspected (typically with headache and vision changes in a younger woman with a high BMI), MRI/MRV brain is indicated. If there is concern for vascular etiology, CTA or MRA brain/neck is indicated. If there is associated hearing loss and neurological signs/symptoms, MRI brain with IAC is indicated. If the temporal bone is suspected to be involved and/or retrotympenic lesion seen on otoscopy, CT temporal bone/IAC is indicated. If there is concurrent concern for bony and a vascular issue, CTA of the head and neck can be used to evaluate both.

Leptomeningeal Carcinomatosis

Leptomeningeal Carcinomatosis ^(210,227,228,229) – Leptomeningeal metastasis is an uncommon and typically late complication of cancer with poor prognosis and limited treatment options. Diagnosis is often challenging with nonspecific presenting symptoms ranging from headache and confusion to focal neurologic deficits such as cranial nerve

palsies. Standard diagnostic evaluation involves a neurologic examination, MRI of the brain and spine with gadolinium, and cytologic evaluation of the cerebral spinal fluid (CSF). Hematologic malignancies (leukemia and lymphoma), primary brain tumors as well as solid malignancies can spread to the leptomeninges. The most common solid tumors giving rise to LM are breast cancer (12 - 35 %), small and non-small cell lung cancer (10-26 %), melanoma (5 -25 %), gastrointestinal malignancies (4-14 %), and cancers of unknown primary (1-7 %).

Brain MRI/MRA

Combination MRI/MRA of the Brain – This is one of the most misused combination studies and other than what is indicated above these examinations should be ordered in sequence, not together. Vascular abnormalities can be visualized on the brain MRI.

Vertigo

MRI and Vertigo – The most common causes of vertigo seen are benign paroxysmal positional vertigo (BPPV), vestibular neuronitis (VN) and Meniere's disease. These peripheral causes of vertigo are benign, and treatment involves reassurance and management of symptoms. Central causes of vertigo, such as cerebrovascular accidents (CVAs), tumors and multiple sclerosis (MS), need to be considered if the individual presents with associated neurological symptoms, such as weakness, diplopia, sensory changes, ataxia, or confusion. Magnetic resonance imaging is appropriate in the evaluation of individuals with vertigo who have neurologic signs and symptoms, progressive unilateral hearing loss or risk factors for cerebrovascular disease. MRI is more appropriate than CT for diagnosing vertigo due to its superiority in visualizing the posterior portion of the brain, where most central nervous system disease that causes vertigo is found. A full neurologic and otologic evaluation including provocative maneuvers, vestibular function testing and audiogram can help evaluate vertigo of unclear etiology and differentiate between central and peripheral vertigo.

Macrocephaly

MRI for Macrocephaly – Consider ultrasound in infants with macrocephaly and a normal neurological examination, no evidence of increased ICP and an open anterior fontanelle. If head US is normal, the infant should be monitored closely. ⁽²³⁰⁾ The anterior fontanelle generally closes between 10 and 24 months of age, with 3% closing between 5-9 months and 11% after 24 months. ⁽²³¹⁾

Anosmia

Anosmia – Nonstructural causes of anosmia include post-viral symptoms, medications (Amitriptyline, Enalapril, Nifedipine, Propranolol, Penicillamine, Sumatriptan, Cisplatin,

Trifluoperazine, Propylthiouracil). These should be considered prior to advanced imaging to look for a structural cause.

Anosmia and dysgeusia have been reported as common early symptoms in individuals with COVID-19, occurring in greater than 80 percent of individuals. For isolated anosmia, imaging is typically not needed once the diagnosis of COVID has been made given the high association. As such, COVID testing should be done prior to imaging. ^(232,233,234)

MRI Orbits, Face, and Neck MRI rather than MRI Brain is the mainstay for directly imaging the olfactory apparatus and sinonasal or anterior cranial fossa tumors that may impair or directly involve the olfactory apparatus.

Temporal Arteritis

Giant cell arteritis (GCA) is an inflammatory disorder that should be considered in individuals over the age of 50 with the following signs or symptoms: new headaches, acute onset of visual disturbances (especially transient monocular visual loss), jaw claudication, constitutional symptoms, tenderness over the temporal artery, and elevated ESR and/or CRP. A diagnosis of polymyalgia rheumatica (PMR) is highly associated. Extra- and intracranial cerebral vasculitis can also be seen but is rarer, and strokes are related to vasculitis of extracranial cerebral arteries causing vertebral or internal carotid arteries stenosis. Gold standard for diagnosis of GCA is temporal artery biopsy. Color Doppler ultrasound (CDUS) can be used as a surrogate for temporal artery biopsy in some cases. High-resolution magnetic resonance imaging (MRI) can visualize the temporal arteries when used with contrast.

Galactorrhea and Hyperprolactinemia

Galactorrhea and MRI – Isolated galactorrhea without elevated prolactin (normoprolactinemic) is usually due to breast pathology, i.e., breast feeding, trauma, ill-fitting undergarments. Consider mammogram, breast ultrasound, and serial dilution of the individual's prolactin sample to correct for possible hook effect. ^(235,236)

Chart 1: Causes of Hyperprolactinemia ⁽⁴⁸⁾

Physiological	<ol style="list-style-type: none"> 1) Coitus 2) Exercise 3) Lactation 4) Pregnancy 5) Sleep 6) Stress
Pathological	<ol style="list-style-type: none"> 1) Hypothalamic-pituitary stalk damage <ol style="list-style-type: none"> a. Granulomas b. Infiltrations

	<ul style="list-style-type: none"> c. Irradiation d. Rathke's cyst e. Trauma: pituitary stalk section, suprasellar surgery f. Tumors: craniopharyngioma, germinoma, hypothalamic metastases, meningioma, suprasellar pituitary mass extension <p>2) Pituitary</p> <ul style="list-style-type: none"> a. Acromegaly b. Idiopathic c. Lymphocytic hypophysitis or parasellar mass d. Macroadenoma (compressive) e. Macroprolactinemia f. Plurihormonal adenoma g. Prolactinoma h. Surgery i. Trauma <p>3) Systematic Disorders</p> <ul style="list-style-type: none"> a. Chest – neurogenic chest wall trauma, surgery, herpes zoster b. Chronic renal failure c. Cirrhosis d. Cranial radiation e. Epileptic seizures f. Polycystic ovarian disease g. Pseudocyesis
Pharmacological	<ul style="list-style-type: none"> 1) Anesthetics 2) Anticonvulsant 3) Antihistamines (H₂) 4) Antihypertensives 5) Cholinergic agonist 6) Drug-induced hypersecretion 7) Catecholamine depletory 8) Dopamine receptor blockers 9) Dopamine synthesis inhibitor

	10) Estrogens: oral contraceptives, oral contraceptive withdrawal
	11) Neuroleptics/antipsychotics

Central Venous Thrombosis

A MR Venogram is indicated for the definite evaluation of a central venous thrombosis/dural sinus thrombosis. The most frequent presentations are isolated headache, intracranial hypertension syndrome (headache, nausea/vomiting, transient visual obscurations, pulsatile tinnitus, CN VI palsy, papilledema), ⁽²³⁷⁾ seizures, focal neurological deficits, and encephalopathy. Risk factors are hypercoagulable states inducing genetic prothrombotic conditions, antiphospholipid syndrome and other acquired prothrombotic diseases (such as cancer), oral contraceptives, pregnancy, puerperium (6-weeks postpartum), infections, and trauma. COVID-19 infection is associated with hypercoagulability, a thromboinflammatory response, and an increased incidence of venous thromboembolic events (VTE) ^(238,239). Since venous thrombosis can cause SAH, infarctions, and hemorrhage, parenchymal imaging with MRI/CT is also appropriate ^(30,240,241).

Non-aneurysmal Vascular Malformations

Non-aneurysmal vascular malformations can be divided in low flow vascular malformations and high flow vascular malformations. Low flow vascular malformations include dural venous anomalies (DVA), cavernomas, and capillary telangiectasias. High flow vascular malformations include AVM and dural arteriovenous fistulas (dAVF). For low flow malformations, MRI is the study of choice. Limited medical literature is available to support vascular imaging (CTA or MRA). CTA plays a limited role in the assessment of cavernoma but may be used to demonstrate a DVA. MRA is not usually helpful in the assessment of cavernoma, capillary telangiectasia, and DVA. Vascular imaging is indicated in high flow vascular malformations ⁽²⁴²⁾.

There is no evidence to support screening of first-degree relatives for AVMs ⁽²⁴³⁾. The risk of having an AVM may be higher than in the general population, but absolute risk is low.

Stroke/TIA

MRI and recent stroke or transient ischemic attack – When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. Both stroke and TIA should have an evaluation for high-risk modifiable factors such as carotid stenosis atrial fibrillation as the cause of ischemic symptoms ⁽²⁴⁴⁾. Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable. ⁽²⁴⁵⁾

Patients with a history of stroke and recent work-up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial

study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.

Table 1: Gait and Brain Imaging

Table 1: Gait and Brain Imaging (246,247,248,249,250,251)

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (i.e., + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	EMG, if there is foot drop, Lumbar spine MRI Pelvis MR appropriate evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI as per GL

Non-neurological causes of gait dysfunction include pain (antalgic), side effects of drugs (analgesic, antihistamines, benzos, psych meds, antihypertensives), visual loss, hearing impairment, orthopedic disorders, rheumatologic disorders, psychogenic, and cardiorespiratory problems (orthostasis) (247,249,250,251).

Neurological Deficits

Examples of abnormal reflexes related to upper motor neuron lesion/central pathology include hyperreflexia, clonus, Hoffman sign and Babinski, snout, palmar grasp, and rooting reflexes.

Visual loss has many possible etiologies, and MRI is only indicated in suspected neurological causes of visual loss based on history and exam. Visual field defects, such as bitemporal hemianopsia, homonymous hemianopsia, or quadrantanopsia, require imaging as well as does suspected optic nerve pathology. Subjective symptoms such as blurred vision or double vision with no clear correlate on neurological examination requires a comprehensive eye evaluation to exclude more common causes, such as cataracts, refractive errors, retinopathy, glaucoma, or macular degeneration. Transient visual loss with history consistent with TIA but normal exam at time of examination also should be imaged. Positive visual phenomena, such as photopsias or scintillations that march across the visual field, suggest migraine whereas negative phenomenon, such as shaded or blurred, is more characteristic of ischemia.

Definitions

MMSE – The Mini Mental State Examination (MMSE) is a tool that can be used to assess mental status systematically and thoroughly. It is an 11-question measure that tests five areas of cognitive function: orientation, registration, attention and calculation, recall, and language. The MMSE has been the most commonly used measure of cognitive function in dementia research, but researchers have recognized that it is relatively insensitive and variable in mildly impaired individuals. The maximum score is 30. A score of 23 or lower is indicative of cognitive impairment. The MMSE takes only 5-10 minutes to administer and is, therefore, practical to use repeatedly and routinely.

MoCA – The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. MoCA differs from the MMSE mainly by including tests of executive function and abstraction, and by putting less weight on orientation to time and place. Ten of the MMSE's 30 points are scored solely on the time-place orientation test, whereas the MoCA assigns it a maximum of six points. The MoCA also puts more weight on recall and attention-calculation performance, while de-emphasizing language skill. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

MRI and developmental delay – Significant developmental delay is defined as significant delay (more than two standard deviations below the mean) in one or more developmental domains: gross/fine motor, speech/language, cognition, social/personal, and activities of daily living. Isolated delay in social/language development is characteristic of autism spectrum disorders or hearing loss. Isolated delay in motor development is characteristic of cerebral palsy (a static encephalopathy) or myopathy. Global developmental delay (GDD) is a subset of developmental delay defined as significant delay (by at least 2 SD's) in two or more developmental categories. Note that the term "GDD" is usually reserved for children <5 years old, whereas in older children >5 years, disability is quantifiable with IQ testing.

Trigeminal Neuralgia (TN) – According to the International Headache Society, TN is defined as “a disorder characterized by recurrent unilateral brief electric shock-like pain, abrupt in onset and termination, limited to the distribution of one or more divisions of the trigeminal nerve and triggered by innocuous stimuli.” ⁽⁴⁾. Atypical features include bilateral, hearing loss, dizziness/vertigo, visual changes, sensory loss, numbness, pain > 2min, pain outside trigeminal nerve distribution and progression ⁽¹²¹⁾.

Occipital Neuralgia – According to the International Headache Society, occipital neuralgia is defined “Unilateral or bilateral paroxysmal, shooting or stabbing pain in the posterior part of the scalp, in the distribution(s) of the greater, lesser and/or third occipital nerves, sometimes accompanied by diminished sensation or dysesthesia in the affected area and commonly associated with tenderness over the involved nerve(s). Pain is eased temporarily by local anesthetic block of the affected nerve(s). Occipital neuralgia must be distinguished from occipital referral of pain arising from the atlantoaxial or upper zygapophyseal joints or from tender trigger points in neck muscles or their insertions.” ⁽¹²¹⁾

Low risk brief resolved unexplained event (BRUE) formerly apparent life-threatening event (ALTE) requires all the following:

- Age > 60 days
- Gestational age ≥ 32 weeks or older and corrected gestational age ≥ 45 weeks
- First brief event
- Event lasting < 1 minute
- No CPR required by the trained medical provider
- No concerning historical features or physical examination findings.

POLICY HISTORY

Summary

Date	Summary
June 2024	<p><u>Changes</u></p> <ul style="list-style-type: none"> • Updated references • Updated background section • Updated combination section • <u>Added</u> <ul style="list-style-type: none"> ○ Genetic syndromes and rare disease section- reorganized indications ○ Note: Vessel wall MRI (ordered as Brain MRI) can also be performed in the evaluation of vasculitides ○ PML suspected or known to the infectious or inflammatory disease section. ○ And updated Brain MRI for Known Cancer sections (initial staging, restaging and surveillance) ○ Vertigo with progressive unilateral hearing loss or tinnitus

	<ul style="list-style-type: none"> ○ Horner's syndrome with symptoms localizing the lesion to the central nervous system (Brain/Cervical MRI Combo) ○ Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms (also to (Brain MRA /MRI combo) ○ Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies (Brain MRA /MRI combo) ○ Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ((Brain MRA /MRI combo)) ○ Giant cell arteritis with suspected intracranial and extracranial involvement (Brain MRA /Neck/ Brain MRI combo)) ● <u>Clarified</u> <ul style="list-style-type: none"> ■ Updated pediatric seizure section. ■ Treatment of Alzheimer's disease with anti-amyloid-β monoclonal antibodies - baseline and surveillance imaging as per FDA labeling ● <u>Deleted</u> <ul style="list-style-type: none"> ○ Aduhelm monitoring ○ MRI Brain with IAC/MRA Head/MRA Neck section
May 2023	<ul style="list-style-type: none"> ● Updated and reformatted references ● Updated background section ● Added: ● Indeterminate imaging section ● Follow up of known Rathke cleft cyst <ul style="list-style-type: none"> ○ If no symptoms, MRI at 1/3/5 years to stability ○ With new neurological symptoms or atypical imaging features ○ Post treatment, yearly for 5 years ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ● Added statement regarding further evaluation of indeterminate findings on prior imaging ● Clarified: ● Abnormal reflexes (<i>pathological, asymmetric, hyperreflexia</i>) ● New onset headache - Related to activity or event (sexual activity, <i>exertion, Valsalva</i>, position), new or progressively worsening ● Post concussive syndrome if persistent or disabling symptoms and <i>MRI</i> has not been performed

	<ul style="list-style-type: none"> • <i>Screening</i> for silent cerebral infarcts in early school age children and adults with <i>HbSS sickle cell disease or HbSβ0 thalassemia</i> • Cushing syndrome <i>suspected (high ACTH (>5) with cortisol suppression on low or high dose dexamethasone suppression test)</i> • Elevated prolactin after evaluation for another cause - neuroendocrine signs or symptoms (i.e., headache, galactorrhea, abnormal menses, infertility, or bitemporal hemianopsia) and/or <i>abnormal pituitary hormones (low testosterone /estrogen/</i> • <i>progesterone AND low or normal LH/FSH)</i> • Total testosterone levels persistently borderline around the lower limits of normal range (200-400 ng/dL) with low or normal LH/FSH; AND Low free testosterone and <i>consideration and addressment</i> of reversible functional causes of gonadotropin suppression (e.g., obesity, opioid use, diabetes, steroid use, or comorbid illness) • Tumor surveillance <i>as per professional society recommendations</i> • Note: In the pediatric population, imaging is not indicated in simple febrile seizures <i>or in idiopathic focal or generalized epilepsy with typical features [BECTS, childhood absence epilepsy (CAE), juvenile absence epilepsy (JAE), and juvenile myoclonic epilepsy (JME)]</i> • 6-month repeat scan in patients with MRI disease activity that is not associated with <i>new clinical symptoms on a routine follow-up scan (i.e., Radiographically isolated syndrome)</i> • Indications for MR Perfusion Imaging section • Brain MRI/Brain MRA - Headache associated with exercise, <i>exertion, Valsalva</i> or sexual activity • Deleted: <ul style="list-style-type: none"> ○ Pediatric seizure indications and combined with adult ○ Anosmia (loss of smell) or dysosmia documented by objective testing that is persistent and of unknown origin (also in combo section)
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Holle D, Obermann M. The role of neuroimaging in the diagnosis of headache disorders. *Ther Adv Neurol Disord*. Nov 2013; 6: 369-74. 10.1177/1756285613489765.
2. Quinones-Hinojosa A, Gulati M, Singh V, Lawton M. Spontaneous intracerebral hemorrhage due to coagulation disorders. *Neurosurg Focus*. Oct 15, 2003; 15: E3. 10.3171/foc.2003.15.4.3.
3. American College of Radiology. ACR Appropriateness Criteria® Headache. 2022; 2023:
4. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. Jan 2018; 38: 1-211. 10.1177/0333102417738202.
5. Micieli A, Kingston W. An Approach to Identifying Headache Patients That Require Neuroimaging. *Front Public Health*. 2019; 7: 52. 10.3389/fpubh.2019.00052.
6. Mitsikostas D D, Ashina M, Craven A, Diener H C, Goadsby P J et al. European Headache Federation consensus on technical investigation for primary headache disorders. *J Headache Pain*. 2016; 17: 5. 10.1186/s10194-016-0596-y.
7. Hamilton K. Secondary Headaches During Pregnancy and the Postpartum Period. *Practical Neurology*. May 2020; 2023:
8. Shobeiri E, Torabinejad B. Brain magnetic resonance imaging findings in postpartum headache. *Neuroradiol J*. Feb 2019; 32: 4-9. 10.1177/1971400918804193.
9. Nahas S. New Guidelines on Headache Imaging. January 8, 2020; 2023:
10. Togha M, Karimitafti M, Ghorbani Z, Farham F, Naderi-Behdani F et al. Characteristics and comorbidities of headache in patients over 50 years of age: a cross-sectional study. *BMC Geriatrics*. 2022/04/10; 22: 313. 10.1186/s12877-022-03027-1.
11. González-Quintanilla V, Madera J, Pascual J. Update on headaches associated with physical exertion. *Cephalalgia*. 2023; 43: true. 10.1177/03331024221146989.
12. Ray J, Hutton E. Imaging in headache disorders. *Australian prescriber*. 2022; 45: 88-92.
13. Kuruvilla D, Lipton R. Appropriate use of neuroimaging in headache. *Curr Pain Headache Rep*. Jun 2015; 19: 17. 10.1007/s11916-015-0490-3.
14. American College of Radiology. ACR Appropriateness Criteria: Headache - Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
15. Trofimova A, Vey B, Mullins M, Wolf D, Kadom N. Imaging of Children with Nontraumatic Headaches. *AJR Am J Roentgenol*. Jan 2018; 210: 8-17. 10.2214/ajr.17.18561.
16. Gofshteyn J, Stephenson D. Diagnosis and Management of Childhood Headache. *Curr Probl Pediatr Adolesc Health Care*. Feb 2016; 46: 36-51. 10.1016/j.cppeds.2015.11.003.
17. Sharma A, Kirsch C F, Aulino J M, Chakraborty S, Choudhri A F et al. ACR Appropriateness Criteria: Hearing Loss and/or Vertigo. *Journal of the American College of Radiology*. 2018; 15: S321 - S331. 10.1016/j.jacr.2018.09.020.
18. ACR. American College of Radiology Appropriateness Criteria: Altered Mental Status, Coma, Delirium and Psychosis. 2024.
19. Kennedy T A, Corey A S, Policeni B, Agarwal V, Burns J et al. ACR Appropriateness Criteria: Orbits, Vision, and Visual Loss. *Journal of the American College of Radiology*. 2018; 15: S116 - S131. 10.1016/j.jacr.2018.03.023.
20. ACR. American College of Radiology Appropriateness Criteria: Dizziness and Ataxia. 2023.

21. Harvey H B, Watson L C, Subramaniam R M, Burns J, Bykowski J et al. ACR Appropriateness Criteria: Movement Disorders and Neurodegenerative Diseases. *Journal of the American College of Radiology*. 2020; 17: S175 - S187. 10.1016/j.jacr.2020.01.042.
22. Wippold F 2. Focal neurologic deficit. *AJNR Am J Neuroradiol*. Nov 2008; 29: 1998-2000.
23. American College of Radiology. ACR Appropriateness Criteria: Cerebrovascular Disease-Child. *Journal of the American College of Radiology*. 2020; 17: S36 - S54. 10.1016/j.jacr.2020.01.036.
24. American College of Radiology. ACR Appropriateness Criteria: Cerebrovascular Diseases - Stroke and Stroke-Related Conditions. 2023.
25. Powers W J, Rabinstein A A, Ackerson T, Adeoye O M, Bambakidis N C et al. 2018 Guidelines for the Early Management of Patients with Acute Ischemic Stroke: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association. *Stroke*. 2018; 49: e46 - e99. 10.1161/STR.0000000000000158.
26. DeBaun M, Jordan L, King A, Schatz J, Vichinsky E et al. American Society of Hematology 2020 guidelines for sickle cell disease: prevention, diagnosis, and treatment of cerebrovascular disease in children and adults. *Blood Adv*. Apr 28, 2020; 4: 1554-1588. 10.1182/bloodadvances.2019001142.
27. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. *Br J Radiol*. Aug 2014; 87: 20130699. 10.1259/bjr.20130699.
28. Sheehan V, Hansbury E, Smeltzer M, Fortner G, McCarville M. Transcranial Doppler velocity and brain MRI/MRA changes in children with sickle cell anemia on chronic transfusions to prevent primary stroke. *Pediatr Blood Cancer*. Sep 2013; 60: 1499-502. 10.1002/pbc.24569.
29. Ledbetter L N, Burns J, Shih R Y, Ajam A A, Brown M D et al. ACR Appropriateness Criteria: Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. *Journal of the American College of Radiology*. 2021; 18: S283 - S304. 10.1016/j.jacr.2021.08.012.
30. Bushnell C, Saposnik G. Evaluation and management of cerebral venous thrombosis. *Continuum (Minneapolis)*. Apr 2014; 20: 335-51. 10.1212/01.CON.0000446105.67173.a8.
31. Akers A, Al-Shahi Salman R, I A A, Dahlem K, Flemming K et al. Synopsis of Guidelines for the Clinical Management of Cerebral Cavernous Malformations: Consensus Recommendations Based on Systematic Literature Review by the Angioma Alliance Scientific Advisory Board Clinical Experts Panel. *Neurosurgery*. May 1, 2017; 80: 665-680. 10.1093/neuros/nyx091.
32. Velz J, Stienen M, Neidert M, Yang Y, Regli L. Routinely Performed Serial Follow-Up Imaging in Asymptomatic Patients with Multiple Cerebral Cavernous Malformations Has No Influence on Surgical Decision Making. *Front Neurol*. 2018; 9: 848. 10.3389/fneur.2018.00848.
33. Zyck S, Gould G. Cavernous Venous Malformation. *StatPearls*. May 9, 2022; 2023:
34. Polinder S, Cnossen M C, Real R G L, Covic A, Gorbunova A et al. A Multidimensional Approach to Post-concussion Symptoms in Mild Traumatic Brain Injury. *Front Neurol*. 2018; 9: 1113. 10.3389/fneur.2018.01113.
35. American College of Radiology. ACR Appropriateness Criteria® Head Trauma. 2020; 2023:
36. Panwar J, Hsu C, Tator C, Mikulis D. Magnetic Resonance Imaging Criteria for Post-Concussion Syndrome: A Study of 127 Post-Concussion Syndrome Patients. *J Neurotrauma*. May 15, 2020; 37: 1190-1196. 10.1089/neu.2019.6809.
37. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Central Nervous System Cancers Version 2.2022. September 29, 2022; 2023:
38. Molitch M. Diagnosis and Treatment of Pituitary Adenomas: A Review. *JAMA*. 2017; 317: 516-524.

39. Burns J, Policeni B, Bykowski J, Dubey P, Germano I et al. ACR Appropriateness Criteria Neuroendocrine Imaging. *Journal of the American College of Radiology*. 2019; 16: S161 - S173. 10.1016/j.jacr.2019.02.017.
40. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed May 2024:
41. Consensus guidelines for the diagnosis and treatment of growth hormone (GH) deficiency in childhood and adolescence: summary statement of the GH Research Society. *GH Research Society. J Clin Endocrinol Metab*. Nov 2000; 85: 3990-3. 10.1210/jcem.85.11.6984.
42. Kannan S, Kennedy L. Diagnosis of acromegaly: state of the art. *Expert Opin Med Diagn*. Sep 2013; 7: 443-53. 10.1517/17530059.2013.820181.
43. Majumdar A, Mangal N. Hyperprolactinemia. *J Hum Reprod Sci*. Jul 2013; 6: 168-75. 10.4103/0974-1208.121400.
44. Bhasin S, Brito J, Cunningham G, Hayes F, Hodis H et al. Testosterone Therapy in Men with Hypogonadism: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. May 1, 2018; 103: 1715-1744. 10.1210/jc.2018-00229.
45. P. D, N.P. V. Dexamethasone Suppression Test. Aug 8, 2022; 2023:
46. L.K. N. Recent Updates on the Diagnosis and Management of Cushings Syndrome. *Endocrinol Metab*. 2018; 33: 139-146.
47. Bonneville J, Potorac I, Petrossians P, Tshibanda L, Beckers A. Pituitary MRI in Cushings disease - an update. *Journal of Neuroendocrinology*. 2022; 34: e13123. <https://doi.org/10.1111/jne.13123>.
48. Melmed S, Casanueva F F, Hoffman A R, Kleinberg D L, Montori V M et al. Diagnosis and treatment of hyperprolactinemia: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2011; 96: 273-88. 10.1210/jc.2010-1692.
49. Vilar L, Vilar C, Lyra R, Freitas M. Pitfalls in the Diagnostic Evaluation of Hyperprolactinemia. *Neuroendocrinology*. 2019; 109: 7-19. 10.1159/000499694.
50. Faizah M, Zuhanis A, Rahmah R, Raja A, Wu L et al. Precocious puberty in children: A review of imaging findings. *Biomed Imaging Interv J*. Jan 2012; 8: e6. 10.2349/bij.8.1.e6.
51. Go R, Jacobsen E, Baiocchi R, Buhtoiarov I, Butler E et al. Histiocytic Neoplasms, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw*. Nov 2021; 19: 1277-1303. 10.6004/jnccn.2021.0053.
52. Goyal G, Young J, Koster M, Tobin W, Vassallo R et al. The Mayo Clinic Histiocytosis Working Group Consensus Statement for the Diagnosis and Evaluation of Adult Patients with Histiocytic Neoplasms: Erdheim-Chester Disease, Langerhans Cell Histiocytosis, and Rosai-Dorfman Disease. *Mayo Clin Proc*. Oct 2019; 94: 2054-2071. 10.1016/j.mayocp.2019.02.023.
53. Petersenn S, Fleseriu M, Casanueva F, Giustina A, Biermasz N et al. Diagnosis and management of prolactin-secreting pituitary adenomas: a Pituitary Society international Consensus Statement. *Nature Reviews Endocrinology*. 2023; 19: 722 - 740. 10.1038/s41574-023-00886-5.
54. Banskota S, Adamson D. Pituitary Adenomas: From Diagnosis to Therapeutics. 2021; 9: 10.3390/biomedicines9050494.
55. Jenkinson M, Mills S, Mallucci C, Santarius T. Management of pineal and colloid cysts. *Practical Neurology*. 2021; 21: true. 10.1136/practneurol-2020-002838.

56. Petersson M, Berinder K, Eden Engström B, Tsatsaris E, Ekman B et al. Natural history and surgical outcome of Rathke's cleft cysts—A study from the Swedish Pituitary Registry. *Clinical Endocrinology*. 2022; 96: 54-61. <https://doi.org/10.1111/cen.14622>.
57. Jafrani R, Raskin J, Kaufman A, Lam S. Intracranial arachnoid cysts: Pediatric neurosurgery update. *Surg Neurol Int*. 2019; 10: 15. 10.4103/sni.sni_320_18.
58. Mustansir F, Bashir S, Darbar A. Management of Arachnoid Cysts: A Comprehensive Review. *Cureus*. Apr 10, 2018; 10: e2458. 10.7759/cureus.2458.
59. Buncke M, Lilly G, Hamilton B, MacArthur C. When is pre-operative imaging required for craniofacial dermoid cysts/sinuses? *A. International journal of pediatric otorhinolaryngology*. 2022; 155: 111090.
60. Orozco-Covarrubias L, Lara-Carpio R, Saez-De-Ocariz M, Duran-McKinster C, Palacios-Lopez C. Dermoid cysts: a report of 75 pediatric patients. *Pediatric dermatology*. 2013; 30: 706-11.
61. Choi J, Bae Y, Lee J, Kang G. Dermoid cysts: Epidemiology and diagnostic approach based on clinical. *Archives of plastic surgery*. 2018; 45: 512-516.
62. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; 2023:
63. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Non-Small Cell Lung Cancer Version 3.2023. National Comprehensive Cancer Network®. 2023.
64. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Small Cell Lung Cancer Version 3.2023. National Comprehensive Cancer Network®. 2023.
65. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Head and Neck Cancers Version 2.2023. National Comprehensive Cancer Network®. 2023.
66. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Melanoma: Cutaneous Version 2.2023. National Comprehensive Cancer Network®. 2023.
67. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Neuroendocrine and Adrenal Tumors Version 1.2024. National Comprehensive Cancer Network®. 2024.
68. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Gestational Trophoblastic Neoplasia Version 1.2024. National Comprehensive Cancer Network®. 2024.
69. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Acute Myeloid Leukemia Version 4.2023. National Comprehensive Cancer Network®. 2023.
70. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Acute Lymphoblastic Leukemia Version 2.2023. National Comprehensive Cancer Network®. 2023.
71. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Pediatric Acute Lymphoblastic Leukemia Version 1.2024. National Comprehensive Cancer Network®. 2024.
72. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Breast Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023.
73. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): B-Cell Lymphomas Version 2.2023. National Comprehensive Cancer Network®. 2023.
74. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Cervical Cancer Version 1.2024. National Comprehensive Cancer Network®. 2024.
75. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Central Nervous System Cancers Version 1.2023. National Comprehensive Cancer Network®. 2023.

76. Hourani R, Nasreddine W, Dirani M, Hmaimess G, Sabbagh S et al. When Should a Brain MRI Be Performed in Children with New-Onset Seizures? Results of a Large Prospective Trial. *American Journal of Neuroradiology*. 2021; 42: 1695-1701. 10.3174/ajnr.A7193.
77. Lee R K, Burns J, Ajam A A, Broder J S, Chakraborty S et al. ACR Appropriateness Criteria: Seizures and Epilepsy. *Journal of the American College of Radiology*. 2020; 17: S293 - S304. 10.1016/j.jacr.2020.01.037.
78. Trofimova A, Milla S S, Ryan M E, Pruthi S, Blount J P et al. ACR Appropriateness Criteria: Seizures-Child. *Journal of the American College of Radiology*. 2021; 18: S199 - S211. 10.1016/j.jacr.2021.02.020.
79. Ho K, Lawn N, Bynevelt M, Lee J, Dunne J. Neuroimaging of first-ever seizure: Contribution of MRI if CT is normal. *Neurol Clin Pract*. Oct 2013; 3: 398-403. 10.1212/CPJ.0b013e3182a78f25.
80. Krumholz A, Wiebe S, Gronseth G, Shinnar S, Levisohn P et al. Practice Parameter: evaluating an apparent unprovoked first seizure in adults (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology and the American Epilepsy Society. *Neurology*. Nov 20, 2007; 69: 1996-2007. 10.1212/01.wnl.0000285084.93652.43.
81. Ramli N, Rahmat K, Lim K, Tan C. Neuroimaging in refractory epilepsy. Current practice and evolving trends. *Eur J Radiol*. Sep 2015; 84: 1791-800. 10.1016/j.ejrad.2015.03.024.
82. Hirtz D, Ashwal S, Berg A, Bettis D, Camfield C et al. Practice parameter: evaluating a first nonfebrile seizure in children: report of the quality standards subcommittee of the American Academy of Neurology, The Child Neurology Society, and The American Epilepsy Society. *Neurology*. Sep 12, 2000; 55: 616-23. 10.1212/wnl.55.5.616.
83. American College of Radiology. ACR Appropriateness Criteria® Seizures and Epilepsy. 2019; 2023:
84. Bernasconi A, Cendes F, Theodore W, Gill R, Koepp M et al. Recommendations for the use of structural magnetic resonance imaging in the care of patients with epilepsy: A consensus report from the International League Against Epilepsy Neuroimaging Task Force. *Epilepsia*. Jun 2019; 60: 1054-1068. 10.1111/epi.15612.
85. Thompson A J, Banwell B L, Barkhof F, Carroll W M, Coetzee T et al. Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. *Lancet Neurol*. 2018; 17: 162-173. 10.1016/s1474-4422(17)30470-2.
86. Wattjes M P, Ciccarelli O, Reich D S, Banwell B, de Stefano N et al. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients with Multiple Sclerosis. *The Lancet. Neurology*. 2021; 20: 653-670.
87. Rae-Grant A, Day G S, Marrie R A, Rabinstein A, Cree B A C et al. Practice guideline recommendations summary: Disease-modifying therapies for adults with multiple sclerosis: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*. 2018; 90: 777-788. 10.1212/wnl.0000000000005347.
88. Amato M, De Stefano N, Inglese M, Morena E, Ristori G et al. Secondary Prevention in Radiologically Isolated Syndromes and Prodromal Stages of Multiple Sclerosis. *Frontiers in Neurology*. 2022-March-14; 13: 10.3389/fneur.2022.787160.
89. McGuigan C, Craner M, Guadagno J, Kapoor R, Mazibrada G et al. Stratification and monitoring of natalizumab-associated progressive multifocal leukoencephalopathy risk: recommendations from an expert group. *J Neurol Neurosurg Psychiatry*. Feb 2016; 87: 117-25. 10.1136/jnnp-2015-311100.
90. Saberi A, Roudbary S, Ghayeghran A, Kazemi S, Hosseinienezhad M. Diagnosis of Meningitis Caused by Pathogenic Microorganisms Using Magnetic Resonance Imaging: A Systematic Review. *BCN*. 2018; 9: 73 - 86. 10.29252/nirp.bcn.9.2.73.

91. Oliveira C, Morriss M, Mistrot J, Cantey J, Doern C. Brain magnetic resonance imaging of infants with bacterial meningitis. *J Pediatr*. Jul 2014; 165: 134-9. 10.1016/j.jpeds.2014.02.061.
92. D'Souza N, Morgan M, Almarzouqi S, Lee A. Magnetic resonance imaging findings in giant cell arteritis. *Eye (Lond)*. May 2016; 30: 758-62. 10.1038/eye.2016.19.
93. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Care Res*. 2021; 73: 1071 - 1087. <https://doi.org/10.1002/acr.24632>.
94. Yip A, Jernberg E T, Bardi M, Geiger J, Lohne F et al. Magnetic resonance imaging compared to ultrasonography in giant cell arteritis: a cross-sectional study. *Arthritis Res Ther*. 2020; 22: 247. 10.1186/s13075-020-02335-4.
95. Diamantopoulos A, Haugeberg G, Hetland H, Soldal D, Bie R. Diagnostic value of color Doppler ultrasonography of temporal arteries and large vessels in giant cell arteritis: a consecutive case series. *Arthritis Care Res (Hoboken)*. Jan 2014; 66: 113-9. 10.1002/acr.22178.
96. Agarwal S, Sebastian L J D, Gaikwad S, Srivastava M V P, Sharma M C et al. The role of susceptibility-weighted imaging and contrast-enhanced MRI in the diagnosis of primary CNS vasculitis: a large case series. *Scientific Reports*. 2024; 14: true. 10.1038/s41598-024-55222-2.
97. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis. *StatPearls*. October 12, 2022; 2023:
98. Edjlali M, Qiao Y, Boulouis G, Menjot N, Saba L et al. Vessel wall MR imaging for the detection of intracranial inflammatory. *Cardiovascular diagnosis and therapy*. 2020; 10: 1108-1119.
99. Kartau M, Sipilä J O, Auvinen E, Palomäki M, Verkkoniemi-Ahola A. Progressive Multifocal Leukoencephalopathy: Current Insights. *Degenerative neurological and neuromuscular disease*. 2019; 9: 109-121.
100. Pjanic M, Aleckovic-Halilovic M, Basic-Jukic N. JC Virus in Kidney Transplant Population: Are We Cautious Enough? *Journal of clinical medicine*. 2024; 13:
101. Pavlovic D, Patera A, Nyberg F, Gerber M, Liu M. Progressive multifocal leukoencephalopathy: current treatment options and future. *Therapeutic advances in neurological disorders*. 2015; 8: 255-73.
102. Voortman M, Drent M, Baughman R. Management of neurosarcoidosis: a clinical challenge. *Curr Opin Neurol*. Jun 2019; 32: 475-483. 10.1097/wco.0000000000000684.
103. Fritz D, van de Beek D, Brouwer M. Clinical features, treatment and outcome in neurosarcoidosis: systematic review and meta-analysis. *BMC Neurol*. Nov 15, 2016; 16: 220. 10.1186/s12883-016-0741-x.
104. Harvey P. Clinical applications of neuropsychological assessment. *Dialogues Clin Neurosci*. Mar 2012; 14: 91-9. 10.31887/DCNS.2012.14.1/pharvey.
105. Health Quality Ontario. The appropriate use of neuroimaging in the diagnostic work-up of dementia: an evidence-based analysis. *Ont Health Technol Assess Ser*. 2014; 14: 1-64.
106. Narayanan L, Murray A. What can imaging tell us about cognitive impairment and dementia? *World J Radiol*. Mar 28, 2016; 8: 240-54. 10.4329/wjr.v8.i3.240.
107. McCollum L, Karlawish J. Cognitive Impairment Evaluation and Management. *The Medical clinics of North America*. 2020; 104: 807-825.
108. Carpenter C, Bassett E, Fischer G, Shirshekan J, Galvin J. Four sensitive screening tools to detect cognitive dysfunction in geriatric emergency department patients: brief Alzheimer's Screen,

Short Blessed Test, Ottawa 3DY, and the caregiver-completed AD8. *Acad Emerg Med*. Apr 2011; 18: 374-84. 10.1111/j.1553-2712.2011.01040.x.

109. McDougall G. A review of screening instruments for assessing cognition and mental status in older adults. *Nurse Pract*. Nov 1990; 15: 18-28.

110. US Food & Drug Administration. Reference ID: 5105416 Full Prescribing Information - Leqembi (lecanemab-imrb). 2023.

111. Wu W, Ji Y, Wang Z, Wu X, Li J et al. The FDA-approved anti-amyloid- β monoclonal antibodies for the treatment of. *European journal of medical research*. 2023; 28: 544.

112. McFarland N. Diagnostic Approach to Atypical Parkinsonian Syndromes. *Continuum (Minneapolis)*. Aug 2016; 22: 1117-42. 10.1212/con.0000000000000348.

113. Pyatigorskaya N, Gallea C, Garcia-Lorenzo D, Vidailhet M, Lehericy S. A review of the use of magnetic resonance imaging in Parkinsons disease. *Ther Adv Neurol Disord*. 2014; 7: 206-20. 10.1177/1756285613511507.

114. Sharifi S, Nederveen A, Booij J, van Rootselaar A. Neuroimaging essentials in essential tremor: a systematic review. *Neuroimage Clin*. 2014; 5: 217-31. 10.1016/j.nicl.2014.05.003.

115. Albanese A, Asmus F, Bhatia K, Elia A, Elibol B et al. EFNS guidelines on diagnosis and treatment of primary dystonias. *Eur J Neurol*. Jan 2011; 18: 5-18. 10.1111/j.1468-1331.2010.03042.x.

116. Comella CL, National Organization for Rare Disorders. *Cervical Dystonia*. 2019; 2023:

117. Iliescu D, Timaru C, Alexe N, Gosav E, De Simone A et al. Management of diplopia. *Rom J Ophthalmol*. Jul-Sep 2017; 61: 166-170. 10.22336/rjo.2017.31.

118. American Association for Pediatric Ophthalmology and Strabismus. Five things physicians and patients should question: Don't routinely order neuro-imaging for all patients with double vision. May 29, 2019; 2023:

119. Yoon L, Kim H, Kwak M, Park K, Bae M et al. Utility of Magnetic Resonance Imaging (MRI) in Children with Strabismus. *J Child Neurol*. Sep 2019; 34: 574-581. 10.1177/0883073819846807.

120. Sadaka A, Schockman S, Golnik K. Evaluation of Horner Syndrome in the MRI Era. *Journal of Neuro-Ophthalmology*. 2017; 37:

121. American College of Radiology. ACR Appropriateness Criteria® Cranial Neuropathy. 2022; 2023:

122. Bendtsen L, Zakrzewska J, Abbott J, Braschinsky M, Di Stefano G et al. European Academy of Neurology guideline on trigeminal neuralgia. *Eur J Neurol*. Jun 2019; 26: 831-849. 10.1111/ene.13950.

123. Cruccu G, Finnerup N, Jensen T, Scholz J, Sindou M et al. Trigeminal neuralgia: New classification and diagnostic grading for practice and research. *Neurology*. Jul 12, 2016; 87: 220-8. 10.1212/wnl.0000000000002840.

124. Choi I, Jeon S. Neuralgias of the Head: Occipital Neuralgia. *J Korean Med Sci*. Apr 2016; 31: 479-88. 10.3346/jkms.2016.31.4.479.

125. Warner M, Hutchison J, Varacallo M. Bell Palsy. Statpearls [Internet]. Treasure Island (FL): StatPearls Publishing. Updated 2023 Aug 17.

126. Hohman M, Hadlock T. Etiology, diagnosis, and management of facial palsy: 2000 patients at a facial. *The Laryngoscope*. 2014; 124: E283-93.

127. Mumtaz S, Jensen M. Facial neuropathy with imaging enhancement of the facial nerve: a case report. *Future Neurol*. Nov 1, 2014; 9: 571-576. 10.2217/fnl.14.55.

128. Yedavalli V, Patil A, Shah P. Amyotrophic Lateral Sclerosis and its Mimics/Variants: A Comprehensive Review. *J Clin Imaging Sci*. 2018; 8: 53. 10.4103/jcis.JCIS_40_18.
129. King R, Reiss J. The epidemiology and pathophysiology of pseudobulbar affect and its association with neurodegeneration. *Degener Neurol Neuromuscul Dis*. 2013; 3: 23-31. 10.2147/dnnd.S34160.
130. Tan A, Mankad K, Gonçalves F, Talenti G, Alexia E. Macrocephaly: Solving the Diagnostic Dilemma. *Top Magn Reson Imaging*. Aug 2018; 27: 197-217. 10.1097/rmr.000000000000170.
131. Hanzlik E, Gigante J. Microcephaly. 2017; 4: 10.3390/children4060047.
132. Kim H, Roh H, Lee I. Craniosynostosis: Updates in Radiologic Diagnosis. *Journal of Korean Neurosurgical Society*. 2016; 59: 10.3340/jkns.2016.59.3.219.
133. Rossi A, Argyropoulou M, Zlatareva D, Boulouis G, Pizzini F et al. European recommendations on practices in pediatric neuroradiology: consensus document from the European Society of Neuroradiology (ESNR), European Society of Paediatric Radiology (ESPR) and European Union of Medical Specialists Division of Neuroradiology (UEMS). *Pediatric Radiology*. 2023; 53: 159 - 168. 10.1007/s00247-022-05479-4.
134. Kubota T, Adachi M, Kitaoka T, Hasegawa K, Ohata Y et al. Clinical Practice Guidelines for Achondroplasia. *Clin Pediatr Endocrinol*. 2020; 29: 25-42. 10.1297/cpe.29.25.
135. Cerebral palsy in under 25s: assessment and management. January 25, 2017; 2023:
136. National Organization for Rare Disorders. Chiari Malformations. 2014; 2023:
137. Whitson W, Lane J, Bauer D, Durham S. A prospective natural history study of nonoperatively managed Chiari I malformation: does follow-up MRI surveillance alter surgical decision making? *J Neurosurg Pediatr*. Aug 2015; 16: 159-66. 10.3171/2014.12.Peds14301.
138. Damasceno B. Neuroimaging in normal pressure hydrocephalus. *Dement Neuropsychol*. Oct-Dec 2015; 9: 350-355. 10.1590/1980-57642015dn94000350.
139. Khalatbari H, Parisi M. Management of Hydrocephalus in Children: Anatomic Imaging Appearances of CSF Shunts and Their Complications. *American Journal of Roentgenology*. 2020; 216: 187 - 199. 10.2214/AJR.20.22888.
140. Severson M, Strecker-McGraw M. Cerebrospinal Fluid Leak. *StatPearls*. August 8, 2022; 2023:
141. Hiremath S, Gautam A, Sasindran V, Therakathu J, Benjamin G. Cerebrospinal fluid rhinorrhea and otorrhea: A multimodality imaging approach. *Diagn Interv Imaging*. Jan 2019; 100: 3-15. 10.1016/j.diii.2018.05.003.
142. Deline C, Schievink WI, National Organization for Rare Disorders. Spontaneous Intracranial Hypotension. September 1, 2020; 2023:
143. Mohammad S, Osman N, Ahmed K. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights Imaging*. Jan 28, 2019; 10: 3. 10.1186/s13244-019-0686-x.
144. BR G, Sharma P K, Polaka Y, S P, Natarajan P. The Role of Phase-Contrast MRI in Diagnosing Cerebrospinal Fluid Flow. *Cureus*. 2024; 16: e57114.
145. Newman-Toker D E, Kerber K A, Hsieh Y, Pula J H, Omron R et al. HINTS outperforms ABCD2 to screen for stroke in acute continuous vertigo and. *Academic emergency medicine: official journal of the Society for Academic*. 2013; 20: 986-96.
146. Ohle R, Montpellier R, Marchadier V, Wharton A, McIsaac S et al. Can Emergency Physicians Accurately Rule Out a Central Cause of Vertigo Using the. *Academic emergency medicine: official journal of the Society for Academic*. 2020; 27: 887-896.

147. Felix O, Amaddeo A, Olmo Arroyo J, Zerah M, Puget S et al. Central sleep apnea in children: experience at a single center. *Sleep Med.* Sep 2016; 25: 24-28. 10.1016/j.sleep.2016.07.016.
148. Regn D D, Davis A H, Smith W D, Blasser C J, Ford C M. Central Sleep Apnea in Adults: Diagnosis and Treatment. *Federal practitioner: for the health care professionals of the VA, DoD, and PHS.* 2023; 40: 78-86.
149. Brignole M, Moya A, de Lange F, Deharo J, Elliott P et al. 2018 ESC Guidelines for the diagnosis and management of syncope. *Eur Heart J.* 2018; 39: 1883 - 1948. 10.1093/eurheartj/ehy037.
150. Hatharasinghe A, Etebar K, Wolsky R, Akhondi H, Ayutyanont N. An Assessment of the Diagnostic Value in Syncope Workup: A Retrospective Study. *HCA healthcare journal of medicine.* 2021; 2: 423-431.
151. Raucci U, Borrelli O, Di Nardo G, Tambucci R, Pavone P et al. Cyclic Vomiting Syndrome in Children. *Frontiers in Neurology.* 2020; 11:
152. Venkatesan T, Levinthal D J, Tarbell S E, Jaradeh S S, Hasler W L et al. Guidelines on management of cyclic vomiting syndrome in adults by the American Neurogastroenterology and Motility Society and the Cyclic Vomiting Syndrome Association. *Neurogastroenterol Motil.* 2019; 31 Suppl 2: e13604. 10.1111/nmo.13604.
153. Angus-Leppan H, Saatci D, Sutcliffe A, Guilloff R. Abdominal migraine. *Bmj.* Feb 19, 2018; 360: k179. 10.1136/bmj. k179.
154. Garner H, Wessell D, Lenchik L, Ahlawat S, Baker J et al. ACR Appropriateness Criteria Soft Tissue Masses: 2022 Update. *Journal of the American College of Radiology.* 2023; 20: S234 - S245. 10.1016/j.jacr.2023.02.009.
155. Zhang J, Li Y, Zhao Y, Qiao J. CT and MRI of superficial solid tumors. *Quant Imaging Med Surg.* Mar 2018; 8: 232-251. 10.21037/qims.2018.03.03.
156. Kim H, An J, Woo J, Yoon R. Superficially Palpable Masses of the Scalp and Face: A Pictorial Essay. *Journal of the Korean Society of Radiology.* 2019; 80: 283-293.
157. American College of Radiology. ACR Appropriateness Criteria® Acute Mental Status Change, Delirium, and New Onset Psychosis. 2018; 2023:
158. Ali A S, Syed N P, Murthy G S, Nori M, Abkari A et al. Magnetic resonance imaging (MRI) evaluation of developmental delay in pediatric patients. *J Clin Diagn Res.* 2015; 9: Tc21-4. 10.7860/jcdr/2015/11921.5478.
159. Randhawa H, Bagale S, Umap R, Randhawa J. Brain Magnetic Resonance Imaging-Based Evaluation of Pediatric Patients With. *Cureus.* 2022; 14: e24051.
160. Momen A, Jelodar G, Dehdashti H. Brain magnetic resonance imaging findings in developmentally delayed children. *Int J Pediatr.* 2011; 2011: 386984. 10.1155/2011/386984.
161. Tieder J, Bonkowsky J, Etzel R, Franklin W, Gremse D et al. Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants: Executive Summary. *Pediatrics.* May 2016; 137: 10.1542/peds.2016-0591.
162. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation.* 2014; 20: 1852 - 1856. 10.1016/j.bbmt.2014.06.029.
163. Arevalo-Perez J, Peck K, Young R, Holodny A, Karimi S. Dynamic Contrast-Enhanced Perfusion MRI and Diffusion-Weighted Imaging in Grading of Gliomas. *J Neuroimaging.* Sep-Oct 2015; 25: 792-8. 10.1111/jon.12239.

164. Metaweh N, Azab A, El Basmy A, Mashhour K, El Mahdy W. Contrast-Enhanced Perfusion MR Imaging to Differentiate Between Recurrent/Residual Brain Neoplasms and Radiation Necrosis. *Asian Pac J Cancer Prev*. Apr 25, 2018; 19: 941-948. 10.22034/apjcp.2018.19.4.941.
165. Radiology A C o. ACR Appropriateness Criteria® ACR-ASNR-SPR Practice Parameter for the Performance of Intracranial Magnetic Resonance Perfusion Imaging. 2022; 2023: Resolution 24.
166. Wang L, Wei L, Wang J, Li N, Gao Y et al. Evaluation of perfusion MRI value for tumor progression assessment after glioma radiotherapy: A systematic review and meta-analysis. *Medicine (Baltimore)*. Dec 24, 2020; 99: e23766. 10.1097/md.00000000000023766.
167. Suh C, Kim H, Jung S, Choi C, Kim S. Perfusion MRI as a diagnostic biomarker for differentiating glioma from brain metastasis: a systematic review and meta-analysis. *Eur Radiol*. Sep 2018; 28: 3819-3831. 10.1007/s00330-018-5335-0.
168. O'Brien W, D'Arco F, Onofri V, Koch B. Nonsyndromic Congenital Causes of Sensorineural Hearing Loss in Children: An Illustrative Review. *American Journal of Roentgenology*. 2021; 216: 1048 - 1055. 10.2214/AJR.20.23160.
169. Joshi V, Navlekar S, Kishore G, Reddy K, Kumar E. CT and MR imaging of the inner ear and brain in children with congenital sensorineural hearing loss. *Radiographics*. May-Jun 2012; 32: 683-98. 10.1148/rg.323115073.
170. Platzek I, Kitzler H, Gudziol V, Laniado M, Hahn G. Magnetic resonance imaging in acute mastoiditis. *Acta Radiol Short Rep*. Feb 2014; 3: 2047981614523415. 10.1177/2047981614523415.
171. Thompson R, Landry C. Multiple endocrine neoplasia 1: a broad overview. *Therapeutic Advances in Chronic Disease*. 2021; 12: true. 10.1177/20406223211035288.
172. Rednam S, Erez A, Druker H, Janeway K, Kamihara J et al. Von Hippel-Lindau and Hereditary Pheochromocytoma/Paraganglioma Syndromes: Clinical Features, Genetics, and Surveillance Recommendations in Childhood. *Clin Cancer Res*. Jun 15, 2017; 23: e68-e75. 10.1158/1078-0432.Ccr-17-0547.
173. Kumar P, Gill R, Phelps A, Tulpule A, Matthay K. Surveillance Screening in Li-Fraumeni Syndrome: Raising Awareness of False Positives. *Cureus*. Apr 24, 2018; 10: e2527. 10.7759/cureus.2527.
174. Schneider K, Zelle K, Nichols K, et al. Li-Fraumeni Syndrome. *GeneReviews* [Internet]. 2019; <https://www.ncbi.nlm.nih.gov/books/NBK1311/>.
175. de Blank P M K, Fisher M J, Liu G T, Gutmann D H, Listernick R et al. Optic Pathway Gliomas in Neurofibromatosis Type 1: An Update: Surveillance. *Journal of neuro-ophthalmology: the official journal of the North American*. 2017; 37 Suppl 1: S23-S32.
176. Evans D, Salvador H, Chang V, Erez A, Voss S et al. Cancer and Central Nervous System Tumor Surveillance in Pediatric Neurofibromatosis 2 and Related Disorders. *Clin Cancer Res*. Jun 15, 2017; 23: e54-e61. 10.1158/1078-0432.Ccr-17-0590.
177. Yeom S, Comi A. Updates on Sturge-Weber Syndrome. *Stroke*. 2022; 53: 3769 - 3779. 10.1161/STROKEAHA.122.038585.
178. Khattab A, Monga D. Turcot Syndrome. *StatPearls* [Internet]. 2023.
179. Northrup H, Aronow M, Bebin E, Bissler J, Darling T et al. Updated International Tuberous Sclerosis Complex Diagnostic Criteria and Surveillance and Management Recommendations. *Pediatric Neurology*. 2021; 123: 50 - 66. 10.1016/j.pediatrneurol.2021.07.011.
180. Nemes K, Bens S, Bourdeaut F, et al. Rhabdoid Tumor Predisposition Syndrome. *GeneReviews* [Internet]. 2022.

181. Mehta A, Hughes D A. Fabry Disease. [Accessed 24 May 2024]. GeneReviews (®). 1993.
182. Mallack E, Turk B, Yan H, Price C, Demetres M et al. MRI surveillance of boys with X-linked adrenoleukodystrophy identified by newborn screening: Meta-analysis and consensus guidelines. *J Inherit Metab Dis*. May 2021; 44: 728-739. 10.1002/jimd.12356.
183. Kamihara J, Bourdeaut F, Foulkes W, Molenaar J, Mossé Y et al. Retinoblastoma and Neuroblastoma Predisposition and Surveillance. *Clin Cancer Res*. Jul 1, 2017; 23: e98-e106. 10.1158/1078-0432.Ccr-17-0652.
184. Grasparil A, Gottumukkala R, Greer M, Gee M. Whole-Body MRI Surveillance of Cancer Predisposition Syndromes: Current Best Practice Guidelines for Use, Performance, and Interpretation. *American Journal of Roentgenology*. 2020/10/01; 215: 1002-1011. 10.2214/AJR.19.22399.
185. Lawson G. Controversy: Sedation of children for magnetic resonance imaging. *Arch Dis Child*. Feb 2000; 82: 150-3. 10.1136/adc.82.2.150.
186. Kleindorfer D, Towfighi A, Chaturvedi S, Cockroft K , Gutierrez J et al. 2021 Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack: A Guideline from the American Heart Association/American Stroke Association. *Stroke*. 2021; 52: e364-e467. 10.1161/STR.0000000000000375.
187. Pannell J, Corey A, Shih R , Austin M, Chu S et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. *J Am Coll Radiol*. 2023.
188. International Headache Society. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia*. 2018; 38: 1-211. 10.1177/0333102417738202.
189. Hayes L, Palasis S, Bartel T, Booth T, Iyer R et al. ACR Appropriateness Criteria® Headache-Child. *J Am Coll Radiol*. 2018; 15: S78-S90. 10.1016/j.jacr.2018.03.017.
190. Chen C, Fuh J. Evaluating thunderclap headache. *Curr Opin Neurol*. Jun 1, 2021; 34: 356-362. 10.1097/wco.0000000000000917.
191. Utukuri P, Shih R, Ajam A, Callahan K, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *J Am Coll Radiol*. 2023; 20: S70-S93. 10.1016/j.jacr.2023.02.018.
192. Marcolini E, Hine J. Approach to the Diagnosis and Management of Subarachnoid Hemorrhage. *West J Emerg Med*. 2019; 20: 203-211. 10.5811/westjem.2019.1.37352.
193. Ledbetter L, Burns J, Shih R, Ajam A, Brown M et al. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. *J Am Coll Radiol*. 2021; 18: S283-S304. <https://doi.org/10.1016/j.jacr.2021.08.012>.
194. Thust S, Burke C, Siddiqui A. Neuroimaging findings in sickle cell disease. *Br J Radiol*. 2014; 87: 20130699. 10.1259/bjr.20130699.
195. Robertson R, Palasis S, Rivkin M, Pruthi S, Bartel T et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. *J Am Coll Radiol*. 2020; 17: S36-S54. 10.1016/j.jacr.2020.01.036.
196. Gonzalez N, Amin-Hanjani S, Bang O, Coffey C, Du R et al. Adult Moyamoya Disease and Syndrome: Current Perspectives and Future Directions: A Scientific Statement from the American Heart Association/American Stroke Association. *Stroke*. 2023; 54: e465-e479. 10.1161/STR.0000000000000443.
197. Burton T, Bushnell C. Reversible Cerebral Vasoconstriction Syndrome. *Stroke*. 2019; 50: 2253-2258. 10.1161/STROKEAHA.119.024416.

198. Zuccoli G, Pipitone N, Haldipur A, Brown Jr R D, Hunder G. Imaging findings in primary central nervous system vasculitis. *Clinical and experimental rheumatology*. 2011; 29: S104-9.
199. Godasi R, Pang G, Chauhan S, Bollu P. Primary Central Nervous System Vasculitis [Updated 2023]. StatPearls Publishing. 2023.
200. Hofmann E, Behr R, Neumann-Haefelin T, Schwager K. Pulsatile tinnitus: imaging and differential diagnosis. *Dtsch Arztebl Int*. Jun 2013; 110: 451-8. 10.3238/arztebl.2013.0451.
201. Pegge S, Steens S, Kunst H, Meijer F. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*. 2017; 5: 5. 10.1007/s40134-017-0199-7.
202. Davagnanam I, Fraser C L, Miskiel K, Daniel C S, Plant G T. Adult Horner's syndrome: a combined clinical, pharmacological, and imaging algorithm. *Eye (London, England)*. 2013; 27: 291-8. 10.1038/eye.2012.281.
203. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. international consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology*. Jul 14, 2015; 85: 177-89. 10.1212/wnl.0000000000001729.
204. Wattjes M, Ciccarelli O, Reich D, Banwell B, de Stefano N et al. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. *Lancet Neurol*. Aug 2021; 20: 653-670. 10.1016/s1474-4422(21)00095-8.
205. Kaunzner U, Gauthier S. MRI in the assessment and monitoring of multiple sclerosis: an update on best practice. *Ther Adv Neurol Disord*. Jun 2017; 10: 247-261. 10.1177/1756285617708911.
206. Radic J, Cochrane D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. Sep 2018; 23: 383-387. 10.1093/pch/pxy012.
207. Hatgaonkar A, Mahajan S, Hatgaonkar K, Bandre G. MRI Insights in Chiari Malformation Type 1 and Variations With. *Cureus*. 2024; 16: e55676.
208. Shah L, Salzman K. Imaging of spinal metastatic disease. *Int J Surg Oncol*. 2011; 2011: 769753. 10.1155/2011/769753.
209. Ahmed A. MRI features of disseminated drop metastases. *S Afr Med J*. Jul 2008; 98: 522-3.
210. Wang N, Bertalan M, Brastianos P. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. Jan 1, 2018; 124: 21-35. 10.1002/cncr.30911.
211. Dhamija R, Plotkin S, Gomes A, et al. LZTR1- and SMARCB1-Related Schwannomatosis. *Gene Reviews [Internet]*. 2024.
212. Pakalniskis M, Berg A, Policeni B, Gentry L, Sato Y et al. The Many Faces of Granulomatosis with Polyangiitis: A Review of the Head and Neck Imaging Manifestations. *AJR Am J Roentgenol*. Dec 2015; 205: W619-29. 10.2214/ajr.14.13864.
213. Behbehani R. Clinical approach to optic neuropathies. *Clin Ophthalmol*. Sep 2007; 1: 233-46.
214. Phuljhele S, Kedar S, Saxena R. Approach to optic neuritis: An update. *Indian J Ophthalmol*. Sep 2021; 69: 2266-2276. 10.4103/ijo.IJO_3415_20.
215. Spillers N, Luther P, Talbot N, Kidder E, Doyle C et al. A Comparative Review of Typical and Atypical Optic Neuritis: Advancements in. *Cureus*. 2024; 16: e56094.
216. Margolin E. The swollen optic nerve: an approach to diagnosis and management. *Pract Neurol*. Aug 2019; 19: 302-309. 10.1136/practneurol-2018-002057.
217. Kaur K, Gurnani B, Devy N. Atypical optic neuritis - a case with a new surprise every visit. *GMS Ophthalmol Cases*. 2020; 10: Doc11. 10.3205/oc000138.

218. de Graaf P, Göricke S, Rodjan F, Galluzzi P, Maeder P et al. Guidelines for imaging retinoblastoma: imaging principles and MRI standardization. *Pediatr Radiol.* Jan 2012; 42: 2-14. 10.1007/s00247-011-2201-5.
219. Razek A, Elkhamary S. MRI of retinoblastoma. *Br J Radiol.* Sep 2011; 84: 775-84. 10.1259/bjr/32022497.
220. Schaefer P, Miller J, Singhal A, Thrall J, Lee S. Headache: when is neurologic imaging indicated? *J Am Coll Radiol.* Aug 2007; 4: 566-9. 10.1016/j.jacr.2006.10.001.
221. Wilbrink L, Ferrari M, Kruit M, Haan J. Neuroimaging in trigeminal autonomic cephalgias: when, how, and of what? *Curr Opin Neurol.* Jun 2009; 22: 247-53. 10.1097/wco.0b013e32832b4bb3.
222. Jang Y, Cho E, Choi H, Kim S, Park H. Diagnostic Neuroimaging in Headache Patients: A Systematic Review and Meta-Analysis. *Psychiatry Investig.* Jun 2019; 16: 407-417. 10.30773/pi.2019.04.11.
223. Spierings E. Acute, subacute, and chronic headache. *Otolaryngol Clin North Am.* Dec 2003; 36: 1095-107, vi. 10.1016/s0030-6665(03)00128-2.
224. Tyagi A. New daily persistent headache. *Ann Indian Acad Neurol.* Aug 2012; 15: S62-5. 10.4103/0972-2327.100011.
225. Hadjikhani N, Vincent M. Neuroimaging clues of migraine aura. *J Headache Pain.* Apr 3, 2019; 20: 32. 10.1186/s10194-019-0983-2.
226. Whitehead M, Cardenas A, Corey A, Policeni B, Burns J et al. ACR Appropriateness Criteria® Headache. *J Am Coll Radiol.* Nov 2019; 16: S364-s377. 10.1016/j.jacr.2019.05.030.
227. Andersen B, Miranda C, Hatzoglou V, DeAngelis L, Miller A. Leptomeningeal metastases in glioma: The Memorial Sloan Kettering Cancer Center experience. *Neurology.* May 21, 2019; 92: e2483-e2491. 10.1212/wnl.00000000000007529.
228. Clarke J, Perez H, Jacks L, Panageas K, Deangelis L. Leptomeningeal metastases in the MRI era. *Neurology.* May 4, 2010; 74: 1449-54. 10.1212/WNL.0b013e3181dc1a69.
229. Maillie L, Salgado L, Lazarev S. A systematic review of craniospinal irradiation for leptomeningeal disease: past, present, and future. *Clin Transl Oncol.* Oct 2021; 23: 2109-2119. 10.1007/s12094-021-02615-8.
230. Smith R, Leonidas J, Maytal J. The value of head ultrasound in infants with macrocephaly. *Pediatr Radiol.* Mar 1998; 28: 143-6. 10.1007/s002470050315.
231. Pindrik J, Ye X, Ji B, Pendleton C, Ahn E. Anterior fontanelle closure and size in full-term children based on head computed tomography. *Clin Pediatr (Phila).* Oct 2014; 53: 1149-57. 10.1177/0009922814538492.
232. Geyer M, Nilssen E. Evidence-based management of a patient with anosmia. *Clin Otolaryngol.* Oct 2008; 33: 466-9. 10.1111/j.1749-4486.2008.01819.x.
233. Lechien J, Chiesa-Estomba C, De Siati D, Horoi M, Le Bon S et al. Olfactory and gustatory dysfunctions as a clinical presentation of mild-to-moderate forms of the coronavirus disease (COVID-19): a multicenter European study. *Eur Arch Otorhinolaryngol.* Aug 2020; 277: 2251-2261. 10.1007/s00405-020-05965-1.
234. Saniasiaya J, Islam M, Abdullah B. Prevalence of Olfactory Dysfunction in Coronavirus Disease 2019 (COVID-19): A Meta-analysis of 27,492 Patients. *Laryngoscope.* Apr 2021; 131: 865-878. 10.1002/lary.29286.
235. Atluri S, Sarathi V, Goel A, Boppana R, Shivaprasad C. Etiological Profile of Galactorrhoea. *Indian J Endocrinol Metab.* Jul-Aug 2018; 22: 489-493. 10.4103/ijem.IJEM_89_18.

236. Huang W, Molitch M. Evaluation and management of galactorrhea. *Am Fam Physician*. Jun 1, 2012; 85: 1073-80.
237. Jensen R, Radojicic A, Yri H. The diagnosis and management of idiopathic intracranial hypertension and the associated headache. *Ther Adv Neurol Disord*. Jul 2016; 9: 317-26. 10.1177/1756285616635987.
238. Connors J, Levy J. Thromboinflammation and the hypercoagulability of COVID-19. *J Thromb Haemost*. Jul 2020; 18: 1559-1561. 10.1111/jth.14849.
239. Tu T, Goh C, Tan Y, Leow A, Pang Y et al. Cerebral Venous Thrombosis in Patients with COVID-19 Infection: A Case Series and Systematic Review. *J Stroke Cerebrovasc Dis*. Dec 2020; 29: 105379. 10.1016/j.jstrokecerebrovasdis.2020.105379.
240. Coutinho J. Cerebral venous thrombosis. *J Thromb Haemost*. Jun 2015; 13 Suppl 1: S238-44. 10.1111/jth.12945.
241. Ferro J, Canhão P, Aguiar de Sousa D. Cerebral venous thrombosis. *Presse Med*. Dec 2016; 45: e429-e450. 10.1016/j.lpm.2016.10.007.
242. Lee M, Kim M. Image findings in brain developmental venous anomalies. *J Cerebrovasc Endovasc Neurosurg*. Mar 2012; 14: 37-43. 10.7461/jcen.2012.14.1.37.
243. van Beijnum J, van der Worp H, Algra A, Vandertop W, van den Berg R et al. Prevalence of brain arteriovenous malformations in first-degree relatives of patients with a brain arteriovenous malformation. *Stroke*. 2014; 45: 3231-5. 10.1161/STROKEAHA.114.005442.
244. Kernan W, Ovbiagele B, Black H, Bravata D, Chimowitz M et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45: 2160-236. 10.1161/STR.0000000000000024.
245. Wintermark M, Sanelli P, Albers G, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.
246. Chhetri S, Gow D, Shaunak S, Varma A. Clinical assessment of the sensory ataxias; diagnostic algorithm with illustrative cases. *Pract Neurol*. Aug 2014; 14: 242-51. 10.1136/practneurol-2013-000764.
247. Foster H, Drummond P, Jandial S, Clinch J, Wood M. Evaluation of gait disorders in children. *BMJ Best Practice*. February 23, 2021; 2023:
248. Stanford Medicine. Gait Abnormalities. 2023:
249. Haynes K, Wimberly R, VanPelt J, Jo C, Riccio A. Toe Walking: A Neurological Perspective After Referral from Pediatric Orthopaedic Surgeons. *J Pediatr Orthop*. Mar 2018; 38: 152-156. 10.1097/bpo.0000000000001115.
250. Marshall F. Approach to the elderly patient with gait disturbance. *Neurol Clin Pract*. Jun 2012; 2: 103-111. 10.1212/CPJ.0b013e31825a7823.
251. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly: A clinical guide. *Wien Klin Wochenschr*. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.

EVOLENT CLINICAL GUIDELINE 013 FOR FUNCTIONAL BRAIN MRI

Guideline or Policy Number: Evolent_CG_013	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2007 - 2025 Evolent. All rights Reserved.		
Original Date: June 2007	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
<i>fMRI</i>	2
INDICATIONS FOR FUNCTIONAL BRAIN MRI.....	2
PRE-OPERATIVE/PROCEDURAL EVALUATION	2
POST-OPERATIVE/PROCEDURAL EVALUATION	2
LEGISLATIVE LANGUAGE	3
STATE OF WASHINGTON	3
<i>WSHCA 20150116A</i>	3
CODING AND STANDARDS	3
CODING	3
<i>CPT Codes</i>	3
APPLICABLE LINES OF BUSINESS.....	3
BACKGROUND	4
TASK VS. RESTING STATE FMRI	4
FMRI AS AN ALTERNATIVE TO INVASIVE WADA TEST AND DIRECT ELECTRICAL STIMULATION	4
FMRI AND BRAIN TUMORS.....	4
FMRI AND SEIZURES	4
<i>Brain fMRI</i>	4
CONTRAINDICATION AND PREFERRED STUDIES.....	5
POLICY HISTORY	5
<i>Summary</i>	5
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL	6
<i>Committee</i>	6
DISCLAIMER.....	6
REFERENCES.....	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

fMRI

Functional MRI (fMRI) of the brain is a non-invasive imaging technique, to image the brain activity of a patient prior to undergoing brain surgery for tumors or epilepsy. fMRI images capture blood oxygen levels in parts of the brain that are responsible for perception, cognition, and movement allowing neurosurgeons to operate with less possibility of harming areas that are critical to the patient's quality of life. fMRI is primarily used for presurgical planning, operative risk assessment and therapeutic follow-up.

See Legislative Language section for legislation for the State of Washington.

INDICATIONS FOR FUNCTIONAL BRAIN MRI ^(1,2)

Pre-Operative/Procedural Evaluation ⁽¹⁾

fMRI may have a significant role in the mapping of a lesion in relation to eloquent cortex (i.e., language, motor, sensory and visual centers) to determine the appropriateness of surgical intervention in the following:

- Focal brain lesion (i.e., tumor or vascular malformation) for presurgical planning ^(3,4,5,6)
- Pre-operative evaluation for epilepsy surgery ^(7,8)
- Brain tumor for radiation treatment planning ^(9,10)

Post-Operative/Procedural Evaluation

Therapeutic follow-up: A documented medical reason must clearly explain the medical necessity for follow up (i.e., evaluation of post-treatment eloquent cortex).

LEGISLATIVE LANGUAGE

State of Washington ⁽¹¹⁾

WSHCA 20150116A

Number and Coverage Topic:

20150116A – **Functional Neuroimaging for Primary Degenerative Dementia or Mild Cognitive Impairment***

HTCC Coverage Determination:

Functional neuroimaging for primary degenerative dementia or mild cognitive impairment is **not covered**.

HTCC Reimbursement Determination:

Limitations of Coverage: N/A

Non-covered Indicators:

Functional imaging technologies including: fludeoxyglucose (FDG) Positron Emission Tomography (PET), (11)C-dihydrotetrabenazine (C-DTBZ) PET, Single Photon Emission Computed Tomography (SPECT), Functional Magnetic Resonance Imaging (fMRI) for the diagnosis of primary degenerative dementia or mild cognitive impairment.

* Beta-amyloid PET imaging is outside the scope of this coverage determination.

CODING AND STANDARDS

Coding

CPT Codes

70554, 70555

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Task vs. Resting State fMRI

During resting-state fMRI (rs-fMRI), unlike task-based functional MRI, the individual is not required ^(12,13,14) to perform any specific task. This is beneficial for patients who have difficulty performing tasks, such as pediatric and certain neurologic or psychiatric patients. This technique has been well-utilized in research, and its clinical use is increasing considerably, especially in presurgical planning (e.g., mapping epileptic foci) and neuropsychiatric diseases.

For the above indications, non-tasked based fMRI such as resting state fMRI can also be performed.

fMRI as an Alternative to Invasive Wada Test and Direct Electrical Stimulation

fMRI is considered an alternative to the Wada test and direct electrical stimulation as it is a non-invasive method for location of vital brain areas. The Wada test is used for the pre-operative evaluations of patients with brain tumors and seizures to determine which side of the brain is responsible for vital cognitive functions (e.g., speech and memory) and can assess the surgical risk of damaging vital areas of the brain. The Wada test is invasive, involving an angiography procedure to guide a catheter to the internal carotid where a barbiturate is injected, putting one hemisphere of the brain to sleep. Direct electrical stimulation mapping is invasive requiring the placement of electrodes in the brain. The electrodes are used to stimulate multiple cortical sites in the planned area of resection to allow the surgeons to identify and mark which areas can be safely resected. ^(15,16)

fMRI and Brain Tumors

Due to its non-invasiveness, its relatively high spatial resolution, and its pre-operative results, fMRI is used before surgery in the evaluation of patients with brain tumors. fMRI may have a significant role in mapping lesions that are located in close proximity to vital areas of brain function (language, sensory motor, and visual). It can determine the precise spatial relationship between the lesion and adjacent functionally essential parenchyma, allowing removal of as much pathological tissue as possible during resection of brain tumors without compromising essential brain functions. fMRI provides an alternative to other invasive tests, such as the Wada test and direct electrical stimulation. ⁽¹⁷⁾

fMRI and Seizures

Brain fMRI

Brain surgery is often the treatment for patients with refractory epilepsy, especially patients with a single seizure focus. fMRI can be used to image and localize abnormal brain function

in patients with seizures and help determine brain functions (language, sensory motor, and visual) of areas bordering the lesion, resulting in better outcomes with less neurologic deficit.⁽¹⁸⁾

fMRI is increasingly being used to evaluate candidates for surgical treatment of intractable epilepsy (Phase 1 evaluation) and can aid in surgical decision-making. It can 1) help to improve functional outcome by enabling surgery that spares functional cortex, 2) guide surgical intervention by revealing when reorganization of function has occurred, and 3) show when abnormal cortex is also functionally active, and hence that surgery may not be the best option.^(19,20)

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Updated background and references • Contraindications and preferred studies section added to the background • Added legislative language for Washington
May 2023	<ul style="list-style-type: none"> • Updated background and references • Added - to determine the appropriateness of surgical intervention • Background section regarding non-task-based fMRI • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology, American Society of Neuroradiology, Society for Pediatric Radiology. ACR–ASNR–SPR practice parameter for the performance of functional magnetic resonance imaging (fMRI) of the brain. American College of Radiology. 2022; <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/fMR-Brain.pdf>.
2. Kumar V, Heiba I M, Prabhu S S, Chen M M, Colen R R et al. The role of resting-state functional MRI for clinical preoperative language mapping. *Cancer Imaging*. 2020; 20: 47. 10.1186/s40644-020-00327-w.
3. Jiao Y, Lin F, Wu J, Li H, Chen X et al. Brain Arteriovenous Malformations Located in Language Area: Surgical Outcomes and Risk Factors for Postoperative Language Deficits. *World Neurosurg*. 2017; 105: 478-491. 10.1016/j.wneu.2017.05.159.
4. Lakhani D, Sabsevit D, Chaichana K, Quiñones-Hinojosa A, Middlebrooks E. Current State of Functional MRI in the Presurgical Planning of Brain Tumors. *Radiology. Imaging cancer*. 2023; 5: e230078. 10.1148/rycan.230078.
5. Silva M, See A, Essayed W, Golby A, Tie Y. Challenges and techniques for presurgical brain mapping with functional MRI. *Neuroimage Clin*. 2018; 17: 794-803. 10.1016/j.nicl.2017.12.008.
6. Vysotski S, Madura C, Swan B, Holdsworth R, Lin Y et al. Preoperative FMRI Associated with Decreased Mortality and Morbidity in Brain Tumor Patients. *Interdiscip Neurosurg*. 2018; 13: 40-45. 10.1016/j.inat.2018.02.001.
7. Benjamin C F A, Dhingra I, Li A X, Blumenfeld H, Alkawadri R et al. Presurgical language fMRI: Technical practices in epilepsy surgical planning. *Hum Brain Mapp*. 2018; 39: 4032-4042. 10.1002/hbm.24229.
8. Yoganathan K, Malek N, Torzillo E, Paranathala M, Greene J. Neurological update: structural and functional imaging in epilepsy surgery. *Journal of neurology*. 2023; 270: 2798-2808. 10.1007/s00415-023-11619-z.
9. Kovács A, Tóth L, Glavák C, Liposits G, Hadjiev J et al. Integrating functional MRI information into conventional 3D radiotherapy planning of CNS tumors. Is it worth it? *J Neurooncol*. 2011; 105: 629-37. 10.1007/s11060-011-0633-2.
10. Wang M, Ma H, Wang X, Guo Y, Xia X et al. Integration of BOLD-fMRI and DTI into radiation treatment planning for high-grade gliomas located near the primary motor cortexes and corticospinal tracts. *Radiat Oncol*. Mar 8 2015; 10: 64. 10.1186/s13014-015-0364-1.
11. Washington State Health Care Authority. WSHCA Health Technology Assessment 20150116A Functional Neuroimaging for Primary Degenerative Dementia or Mild Cognitive Impairment. 2015; <https://www.hca.wa.gov/about-hca/programs-and-initiatives/health-technology-assessment/functional-neuroimaging-primary-degenerative-dementia-or-mild-cognitive-impairment>.
12. Karambelkar J, Gandhi A, Trunz L, Talekar K, Faro S. National medicare trends in the utilization of fMRI. *Neuroscience Informatics*. 2022; 2: 100031.
13. Lee M, Smyser C, Shimony J. Resting-state fMRI: a review of methods and clinical applications. *AJNR Am J Neuroradiol*. 2013; 34: 1866-72. 10.3174/ajnr.A3263.
14. Lv H, Wang Z, Tong E, Williams L, Zaharchuk G et al. Resting-State Functional MRI: Everything That Nonexperts Have Always Wanted to Know. *AJNR Am J Neuroradiol*. 2018; 39: 1390-1399. 10.3174/ajnr.A5527.
15. Binder J. Functional MRI is a valid noninvasive alternative to Wada testing. *Epilepsy Behav*. 2011; 20: 214-22. 10.1016/j.yebeh.2010.08.004.

16. Massot-Tarrús A, Mirsattari S. Roles of fMRI and Wada tests in the presurgical evaluation of language functions in temporal lobe epilepsy. *Frontiers in neurology*. 2022; 13: 884730. 10.3389/fneur.2022.884730.
17. Petrella J, Shah L, Harris K, Friedman A, George T et al. Preoperative functional MR imaging localization of language and motor areas: effect on therapeutic decision making in patients with potentially resectable brain tumors. *Radiology*. Sep 2006; 240: 793-802. 10.1148/radiol.2403051153.
18. Janecek J K, Swanson S J, Sabsevitz D S, Hammeke T A, Raghavan M et al. Language lateralization by fMRI and Wada testing in 229 patients with epilepsy: rates and predictors of discordance. *Epilepsia*. 2013; 54: 314-22. 10.1111/epi.12068.
19. Liégeois F, Cross J H, Gadian D G, Connelly A. Role of fMRI in the decision-making process: epilepsy surgery for children. *J Magn Reson Imaging*. 2006; 23: 933-40. 10.1002/jmri.20586.
20. Vakharia V, Duncan J, Witt J, Elger C, Staba R. Getting the best outcomes from epilepsy surgery. *Annals of Neurology*. 2018; 83: 676-690. <https://doi.org/10.1002/ana.25205>.

EVOLENT CLINICAL GUIDELINE 020 FOR CHEST (THORAX) CT

Guideline or Policy Number: Evolent_CG_020	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS FOR CHEST CT	3
SCREENING FOR LUNG CANCER.....	3
FOLLOW-UP OF LUNG NODULES	3
<i>Lung Nodules with no history of malignancy</i>	<i>3</i>
<i>Follow-up of Lung Nodule seen on Screening LDCT.....</i>	<i>4</i>
INFECTION AND INFLAMMATION	4
<i>Infection Follow-up Imaging</i>	<i>4</i>
<i>Interstitial Lung Disease</i>	<i>5</i>
<i>Sarcoidosis</i>	<i>5</i>
<i>Granulomatosis with Polyangiitis (Wegener's Granulomatosis).....</i>	<i>5</i>
<i>Tuberculosis (TB)</i>	<i>6</i>
<i>Covid-19 (Coronavirus)</i>	<i>6</i>
CHRONIC COUGH	6
THORACIC AORTIC DISEASE	6
<i>Suspected Thoracic Aortic Aneurysm (TAA).....</i>	<i>6</i>
<i>Thoracic Aortic Syndromes</i>	<i>7</i>
<i>Follow-Up of Known Thoracic Aortic Aneurysm.....</i>	<i>8</i>
<i>Postoperative Follow-up of Aortic Repair</i>	<i>8</i>
NON-AORTIC VASCULAR DISEASE.....	8
CONGENITAL MALFORMATION	9
TRANSPLANTS.....	9
<i>Pre-transplant</i>	<i>9</i>
<i>Post-transplant</i>	<i>9</i>
CHEST WALL PAIN AND INJURIES	9
OTHER INDICATIONS.....	9
SUSPECTED MALIGNANCY	10
KNOWN MALIGNANCY	10
<i>Initial Staging</i>	<i>10</i>
<i>Restaging</i>	<i>10</i>

<i>Surveillance</i>	11
PREOPERATIVE/PROCEDURAL EVALUATION.....	13
POSTOPERATIVE/PROCEDURAL EVALUATION.....	13
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	13
GENETIC SYNDROMES AND RARE DISEASES.....	13
COMBINATION STUDIES	14
<i>Chest/Abdomen and Pelvis CT</i>	14
<i>Chest CT/Abdomen and Pelvis CT and PET</i>	14
<i>Chest CT and Brain/Abdomen/Pelvis MRI</i>	14
<i>Chest CT and PET</i>	14
<i>Chest CTA (or MRA) and Chest CT (or MRI)</i>	14
<i>Neck/Abdomen/Pelvis MRI and Chest CT</i>	14
<i>Neck/Chest CT</i>	14
<i>Sinus CT/Chest CT</i>	15
<i>Sinus/Chest/Abdomen/Pelvis CT and Brain MRI</i>	15
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	15
CODING AND STANDARDS	15
CODING	15
<i>CPT Codes</i>	15
<i>Chest CT Coding Standards</i>	15
APPLICABLE LINES OF BUSINESS.....	15
BACKGROUND	16
FEVER OF UNKNOWN ORIGIN	16
SUSPECTED PARANEOPLASTIC SYNDROMES WITH NO ESTABLISHED CANCER DIAGNOSIS: LABORATORY EVALUATION AND IMAGING	16
TABLE 1: LUNG-RADS ASSESSMENT CATEGORIES.....	17
TABLE 2: 2017 FLEISCHNER SOCIETY GUIDELINES FOR MANAGEMENT OF INCIDENTAL DETECTED PULMONARY NODULES	18
<i>Fleischner Table</i>	18
CONTRAINDICATIONS AND PREFERRED STUDIES.....	18
POLICY HISTORY	19
<i>Summary</i>	19
LEGAL AND COMPLIANCE	19
GUIDELINE APPROVAL	19
<i>Committee</i>	19
DISCLAIMER.....	19
REFERENCES	21

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Chest Computed Tomography (CT) generates images of the organs and structures in the chest (thorax) with the use of radiation.

INDICATIONS FOR CHEST CT

Screening for Lung Cancer

- The use of low-dose, non-contrast spiral (helical) multi-detector CT imaging as an annual screening technique for lung cancer is considered medically necessary **ONLY** when used to screen for lung cancer for certain high-risk **asymptomatic** individuals when **ALL** of the following criteria are met:⁽¹⁾
 - Individual is between 50-80 years of age*; **AND**
 - There is at least a 20 pack-year history of cigarette** smoking

*May approve for individuals over the age limit if the individual is a candidate for and willing to undergo curative treatment upon diagnosis

** Only personal cigarette smoking history as above places an individual at high risk; secondhand smoke exposure and other forms of smoking (such as pipe, cigar, marijuana, vaping) do **NOT** factor into current recommendations for LDCT Screening.

- Screening should be discontinued once a person develops a health problem that limits the willingness or ability to have curative intent treatment.^(2,3)

Follow-Up of Lung Nodules

Lung Nodules with no history of malignancy⁽⁴⁾

- Incidental pulmonary nodule on x-ray:

- Immediate follow up with Chest CT if the nodule is indeterminate as per the radiology report (i.e. not typical of granulomatous disease)
- Incidental pulmonary nodules on non-chest CT (such as a neck, shoulder or abdomen CT):
 - Nodules > 8 mm or those with very suspicious features need a dedicated Chest CT as early as possible
 - Nodules ≤ 8 mm should follow the Fleischner table (**Table 2**) to determine when a dedicated Chest CT is needed
- Follow-up of pulmonary nodules detected on a non-screening (regular) **Chest CT** is as per **Fleischner** table (see **Table 2**) when **ALL** of the following criteria are met:
 - Individual is ≥ 35 years old
 - If age is < 35, non-malignant causes are more likely and infection should be excluded. Once infection is excluded if the nodule is unable to followed with chest x-ray and explanation given as to how management would change, coverage can be considered on a case-by-case basis
 - No personal history of cancer
 - If there is a prior history of cancer, follow-up imaging can be done as soon as 3 months
 - No immunocompromise
 - If the patient is immunocompromised, follow-up imaging can be done as soon as 1 month if there is suspicion of fulminant infection
 - Patient does not qualify for screening with LDCT nor was the nodule was not identified on LDCT (uses **Lung-Rads criteria** rather than the Fleischner table)

NOTE: If multiple nodules, the largest and type is used for decision

Follow-up of Lung Nodule seen on Screening LDCT

- Follow-up of pulmonary nodule identified on screening **LDCT** (for patients at high risk for lung cancer) as per **Lung-Rads** criteria ^(5,6) (see **Table 1** - typically ordered as a LDCT)

NOTE: If multiple nodules, the largest and type is used for decision

Infection and Inflammation

Infection Follow-up Imaging

- Abscess, empyema, or pleural effusions on chest x-ray ⁽⁷⁾

- For evaluation of non-resolving pneumonia or inflammatory disease documented by **at least two** imaging studies:
 - Unimproved with 4 weeks of antibiotic treatment; **OR**
 - Unresolved at 8 weeks ⁽⁸⁾

Interstitial Lung Disease

- For evaluation of suspected ILD after initial chest x-ray excludes a more acute disease (such as pneumonia) in the following situations: ⁽⁹⁾
 - Based on restrictive pattern pulmonary function test
 - In patients with known collagen vascular disease in whom ILD is suspected
 - For biopsy guidance when ILD is suspected ⁽¹⁰⁾
 - With signs or symptoms unresponsive to treatment such as:
 - Shortness of breath
 - Persistent dyspnea
 - Persistent cough
- For reassessment of known ILD
 - annually **AND**
 - for clinical progression of disease

NOTE: Chest CT for evaluation of ILD is typically performed with a high-resolution protocol (HRCT)

Sarcoidosis ⁽¹¹⁾

- For suspected sarcoidosis after initial workup including Chest x-ray
- For known sarcoidosis when there are **EITHER** symptoms of progression (including normal CXR with unexplained dyspnea or cough) **OR** progression on Chest x-ray

Granulomatosis with Polyangiitis (Wegener's Granulomatosis)

- For evaluation of suspected Granulomatosis with Polyangiitis (Wegener's Granulomatosis) after initial workup including labs and chest x-ray suggest the diagnosis
- For follow up of lesions after treatment ⁽¹²⁾

Tuberculosis (TB) ^(13,14)

- Known or suspected tuberculosis and initial chest x-ray completed

Covid-19 (Coronavirus)

- Known acute COVID **AND** worsening respiratory status **AND** indeterminate chest x-ray
- Known long (chronic) COVID **AND EITHER** ⁽¹⁵⁾:
 - Restricted diffusion on Pulmonary Function Test **OR**
 - Low oxygen saturation and prior Chest X-ray **OR**
 - Known fibrosis with persistent symptoms

Chronic Cough ⁽¹⁶⁾

- Symptoms > 8 weeks and chest x-ray completed and **EITHER**
 - Clinical concern for bronchiectasis **OR**
 - After evaluation for other causes and failed treatment for those diagnosed with:
 - Asthma
 - Gastroesophageal Reflux Disease
 - Discontinuation of ACE inhibitors
 - Postnasal drip

Thoracic Aortic Disease ^(17,18,19,20,21)

Suspected Thoracic Aortic Aneurysm (TAA)

- **Asymptomatic** suspected thoracic aortic aneurysm
 - Based on other imaging such as echocardiogram or chest x-ray
 - Screening in individuals with a personal history of bicuspid aortic valve when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient:⁽²⁰⁾
 - Baseline study at diagnosis
 - Every 3 years thereafter
 - Screening in individuals at elevated risk due to family history as below when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient:⁽²⁰⁾

- First-degree relatives of individuals with a known thoracic aortic aneurysm (defined as > 50% above normal) or dissection
- First and second-degree relatives of individuals with familial thoracic aortic aneurysm and dissection (FTAAD)/nonsyndromic heritable thoracic aortic disease (NS-TAD)
- First degree relatives of individuals with a known bicuspid aortic valve
- **Symptomatic** known or suspected thoracic aortic aneurysm
 - Signs and Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Asymmetric blood pressure between limbs
 - Acute chest or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve) ^(20,22)
- Suspected vascular cause of dysphagia or expiratory wheezing with other imaging that is suggestive or inconclusive.

Thoracic Aortic Syndromes

- For **suspected** acute aortic syndrome (AAS) such as aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer:
 - Other imaging (such as echocardiogram) is suggestive of AAS **OR**
 - Individual is either:
 - **High risk** and **one** sign/symptom **OR** non-high risk and **two** or more signs/symptoms of AAS:
 - **High risk** conditions:
 - ◇ Marfan's syndrome or other connective tissue disease, family history of aortic disease, known aortic valve disease, recent aortic manipulation and/or known thoracic aortic aneurysm
 - **Signs and symptoms** concerning for AAS:
 - ◇ Chest, back or abdominal pain described as abrupt onset, severe in intensity and/or ripping or tearing in quality
 - ◇ Pulse deficit or systolic blood pressure differential
 - ◇ Focal neurologic deficit with pain
 - ◇ New heart murmur with pain

◇ Hypotension or shock

- For follow-up of **known** aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer: frequency for follow up is as clinically indicated

Follow-Up of Known Thoracic Aortic Aneurysm

- Baseline study at diagnosis then every 6-24 months
 - If there is a change in clinical status or cardiac exam, then imaging sooner than 6 months is indicated

Postoperative Follow-up of Aortic Repair

- Follow-up thoracic endovascular aortic repair (TEVAR) ⁽²⁰⁾:
 - Baseline post-EVAR at 1 month post-EVAR
 - Annually thereafter if stable
 - More frequent imaging (as clinically indicated) may be needed if there are complications or abnormal findings on surveillance imaging
- Follow up open repair at the following intervals:
 - Baseline follow-up study at one year post-operatively
 - Every 5 years thereafter
 - If abnormal findings are seen on any surveillance imaging study, imaging is then done annually

Non-Aortic Vascular Disease

- Superior Vena Cava (SVC) syndrome ⁽²³⁾
 - SVC syndrome is a clinical diagnosis and may be suspected when there are signs of venous congestion in the upper body (such as shortness of breath, distended neck veins and facial/upper extremity edema)
- Thoracic outlet syndrome
- Suspected pulmonary hypertension when other testing (echocardiogram or right heart catheterization) is suggestive of the diagnosis ⁽²⁴⁾

NOTE: Chest CT is **NOT** approvable for Pulmonary Embolism (PE) see Evolent_CG_022-1 Chest CTA

Congenital Malformation

- Thoracic malformation on chest x-ray ⁽¹⁹⁾
- Congenital Heart Disease with pulmonary hypertension ⁽²⁵⁾
- Malformations (such as pectus excavatum, pectus carinatum, scoliosis) in patients with cardiorespiratory symptoms for whom treatment is being considered

Transplants

Pre-transplant

- Prior to solid organ transplantation (donor or recipient)
- For workup prior to Bone Marrow Transplant (BMT)

Post-transplant ⁽²⁶⁾

- Routine surveillance of prior lung transplantation
- Concern for complication at any time following lung transplantation (CXR not required)

Chest Wall Pain and Injuries

- Non-traumatic chest wall pain with normal chest x-ray and or rib x-ray with **EITHER**:⁽²⁷⁾
 - Suspicion of malignancy **OR**
 - Signs and symptoms of infection, such as: fever, elevated inflammatory markers, known infection at other sites **OR**
 - History of chest radiation or chest surgery
- Suspected chest wall injuries (including musculotendinous, costochondral cartilage, sternoclavicular joint, and manubriosternal joint injuries), when imaging will potentially alter management

Other Indications

- Pneumothorax on chest x-ray when imaging findings will change management
- Hemoptysis after x-ray completed ⁽²⁸⁾
- Vocal cord paralysis on endoscopic exam
- Phrenic nerve paralysis on diaphragm fluoroscopy (fluoroscopic) sniff test

Suspected Malignancy

- Non-lung Parenchymal ⁽²⁹⁾
 - Mass or lesion, including lymphadenopathy, after inconclusive initial imaging:
 - can allow one follow-up to ensure stability
 - additional follow-up may be approved if changing on repeat imaging
- Chest Wall
 - Mass or lesion after inconclusive initial imaging when MRI is contraindicated or cannot be performed
- For further evaluation of the following:
 - Weight loss of $\geq 5\%$ over 12 months **AND** signs and symptoms consistent with a source in the chest (such as a smoker with a cough) after initial Chest X-ray
 - Weight loss of $\geq 5\%$ over 12 months when initial evaluation with Chest X-ray, age-appropriate cancer screening (such as colonoscopy and mammography), labs (including CBC, CMP, HbA1C, TSH, stool hemoccult, ESR/CRP, HIV, Hepatitis C) fail to identify a cause **AND** there is documented further decline in weight
 - Gestational trophoblastic disease when hCG fails to decline appropriately following surgery
 - Suspected paraneoplastic syndrome (including dermatomyositis) when appropriate workup has been done and there is a suspicion of malignancy
 - Thymoma screening in Myasthenia Gravis patients ⁽³⁰⁾

Known Malignancy

Initial Staging ^(31,32,33,34)

- Chest CT is appropriate for initial staging of the majority of malignancies when either biopsy proven or suspected based on prior imaging

Restaging

- Chest CT is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the majority of cancers **except** the following:
 - Bladder cancer (non-muscle invasive)
 - Breast cancer (stage I-III)
 - Colon cancer (stage I)
 - Prostate cancer (non-metastatic)

- The above excluded malignancies would require initial evaluation (such as Chest x-ray) with findings concerning for chest pathology
- Chest CT is indicated **in addition to PET** while on active treatment every 2-3 cycles of chemo or immunotherapy for the following: Ewing Sarcoma, Osteosarcoma, Hodgkin Lymphoma, Pediatric Aggressive Mature B-Cell Lymphomas, Pediatric Hodgkin Lymphoma, Soft Tissue Sarcoma (if receiving systemic chemotherapy)

Surveillance

Chest CT is indicated during surveillance for the following malignancies at the intervals defined below:

- Adrenocortical Carcinoma: every 3-12 months for 5 years then as clinically indicated
- Anal Carcinoma: every 3-6 months for 1-2 years, then every 6-12 months for an additional year
- Biliary Tract Cancers (Ampullary Adenocarcinoma, Cholangiocarcinomas and Gallbladder): every 3-6 months for 2 years then every 6-12 months for up to 5 years then as clinically indicated
- Bone Tumors and Sarcomas (Chondrosarcoma, Chordoma, Giant Cell Tumor of Bone, Ewing Sarcoma, Soft Tissue Sarcoma, Osteosarcoma)
 - Every 3-6 months for 5 years, then annually for and additional 5 years then as clinically indicated
- Bladder Cancer (Muscle Invasive only): every 3-6 months for 2 years, then annually for up to 5 years then as clinically indicated
- Colon Cancer (Stage II or higher): every 6-12 months for 5 years, then as clinically indicated
- Esophageal and Esophagogastric Junction Cancers: every 3-6 months for 2 years, then annually for up to 5 years
- Gastric Cancer: every 6 months for 2 years, then annually up to 5 years
- Hepatocellular Carcinoma: every 3-6 months for 2 years, then every 6 months indefinitely
- Lymphoma (Follicular, Diffuse Large B-Cell, Burkitt, Hodgkin, Marginal Zone, T-Cell) and Hairy Cell Leukemia:
 - Every 3-6 months for 2 years, then annually
- Melanoma (stage II or higher): every 3-12 months for 2 years then every 6-12 months for 3 years, then as clinically indicated
- Merkel Cell Carcinoma every 3-6 months for 3 years, then every 6-12 months indefinitely
- Mesothelioma (Pleural and Peritoneal): every 3-6 months for 5 years then annually until 10 years, then as clinically indicated

- Neuroblastoma: every 3 months for 1 year, then every 6-12 months for 2 years, then as clinically indicated
- Neuroendocrine Tumors: every 3-6 months for 5 years then every 6-12 months for 5 years, then as clinically indicated
- Non-Small Cell Lung Cancer: every 3 months for 3 years, then every 6 months for 2 years, then annually
- Occult Primary Tumors: every 3-6 months for 2 years, then every 6-12 months for 3 years then annually
- Ovarian cancer: every 3-6 months for 2 years then every 6-12 months for 3 years, then as clinically indicated
- Pancreatic cancer: every 3-6 months for 2 years, then every 6-12 months as clinically indicated
- Penile cancer: Every 3-6 months for 2 years, then every 6-12 months for an additional 3 years, then as clinically indicated
- Prostate Cancer (observation): as clinically indicated for rising PSA or symptoms suggestive of progression
- Renal Cell Carcinoma:
 - Stage I - annually for 5 years, then as clinically indicated
 - Stage II and higher - every 3-6 months for 3 years, then annually for 2 years, then as clinically indicated
- Rectal Cancer:
 - Stage II, III - every 6-12 months for 5 years, then as clinically indicated
 - Stage IV - every 3-6 months for 2 years, every 6-12 months for a total of 5 years
- Small Bowel Adenocarcinoma: every 6-12 months for 5 years
- Small Cell Lung Cancer: every 2 months for the first year, every 3-4 months for years 2 and 3 then every 6 months during years 4 and 5 then annually
- Testicular cancer (Stage IIA and higher): every 3 months for 1 year, then every 6 months for 1 year then annually for 2 years
- Thymoma and Thymic Carcinoma: every 3-6 months for 2 years, then annually for up to 5 years then as clinically indicated
- Urothelial Carcinoma of the Prostate, Primary Carcinoma of the Urethra): high risk patients only: every 3-6 months for 2 years then annually
- Uveal Melanoma: every 6-12 months for 10 years then as clinically indicated
- Wilm's Tumor: every 3 months for 2 years then every 6 months for 2 years

NOTE: For any patient with stage IV cancer (any type) that is either in remission or on a treatment break, chest CT is indicated every 3-6 months

When a cancer is not listed above, Chest CT is not routinely a part of surveillance for that cancer in an asymptomatic patient. There would need to be a sign or symptom of recurrence to consider Chest CT.

When the timeframe above for routine surveillance has elapsed, there would need to be a sign or symptom of recurrence to consider Chest CT.

Preoperative/procedural evaluation

- Pre-operative evaluation for a planned surgery or procedure
- Pre-operative evaluation for Electromagnetic Navigation Bronchoscopy ⁽³⁵⁾ (this is a non-diagnostic CT)

Postoperative/procedural evaluation

- Post-surgical follow-up when records document medical reason requiring additional imaging

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- Cystic Fibrosis - chest CT every 2 years and as needed to assess for bronchiectasis
- Multiple Endocrine Neoplasia type 1 (MEN1) annually ^(36,37)
- Hereditary Paraganglioma-Pheochromocytoma (PGL/PCC) Syndrome (SDHx mutations) every 2 years when whole body MRI (CPT 76498) is not available
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Chest/Abdomen and Pelvis CT

- As numerous disease processes, including but not limited to malignancy, may affect the chest, abdomen and pelvis, this combination is indicated when the guideline criteria for **BOTH** Chest CT and Abdomen and Pelvis CT have been met.

Chest CT/Abdomen and Pelvis CT and PET

- CT of the original sites of disease is indicated **in addition to PET** while on active treatment every 2-3 cycles of chemo or immunotherapy for the following: Hodgkin Lymphoma, Pediatric Aggressive Mature B-Cell Lymphomas, Pediatric Hodgkin Lymphoma

Chest CT and Brain/Abdomen/Pelvis MRI

- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1)
 - Chest/Abdomen/Pelvis annually
 - Brain/Chest/Abdomen/Pelvis every 3 years

Chest CT and PET

- Chest CT is indicated **in addition to PET** while on active treatment every 2-3 cycles of chemo or immunotherapy for the following: Ewing Sarcoma, Osteosarcoma, Soft Tissue Sarcoma (if receiving systemic chemotherapy)

Chest CTA (or MRA) and Chest CT (or MRI)

- When needed for clarification of vascular invasion from tumor

Neck/Abdomen/Pelvis MRI and Chest CT

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **not** available ⁽³⁸⁾ (see Unlisted Studies Evolent_CG_063) ⁽³⁹⁾

Neck/Chest CT

- Vocal cord paralysis on endoscopic exam and concern for recurrent laryngeal nerve lesion

- Phrenic nerve paralysis on diaphragm fluoroscopy (fluoroscopic sniff test)

Sinus CT/Chest CT

- Granulomatosis with polyangiitis (Wegener's granulomatosis) disease (GPA)

Sinus/Chest/Abdomen/Pelvis CT and Brain MRI

- Prior to Bone Marrow Transplant

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Brain, Neck, Chest, Abdomen, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

71250, 71260, 71270, 71271, +0722T

Chest CT Coding Standards

This Chest CT Guideline covers CPT codes 71250 (CT chest without contrast), CT chest with contrast (71260), CT chest without and with contrast (71270). When 71271 is listed in billable codes, this guideline also covers Low dose CT scan (LDCT) for lung cancer screening.

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid

<input type="checkbox"/>	Medicare Advantage
--------------------------	--------------------

BACKGROUND

Fever of Unknown Origin

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test.⁶¹ Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For SIADH (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.

For hypercalcemia (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen and pelvis imaging as appropriate.

For Cushing syndrome (hypokalemia, normal-high midnight serum ACTH NOT suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test DOES suppress ACTH, pituitary MRI is reasonable.

For hypoglycemia, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-peptide and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrant CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrant chest and abdominal imaging.

When a paraneoplastic neurologic syndrome is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Table 1: Lung-RADS Assessment Categories

*This table is reproduced without alteration or edit in accordance with provisions in a Creative Commons License. The full document and license information can be found here: [Lung Rads | American College of Radiology \(acr.org\)](https://www.acr.org/clinical/clinical-guidance/lung-rads)


		Lung-RADS® v2022		Release Date: November 2022
Lung-RADS	Category Descriptor	Findings	Management	
0	Incomplete Estimated Population Prevalence: ~1%	Prior chest CT examination being located for comparison (see note 9) Part or all of lungs cannot be evaluated Findings suggestive of an inflammatory or infectious process (see note 10)	Comparison to prior chest CT; Additional lung cancer screening CT imaging needed; 1-3 month LDCT	
1	Negative Estimated Population Prevalence: 39%	No lung nodules OR Nodule with benign features: • Complete, central, popcorn, or concentric ring calcifications OR • Fat-containing	12-month screening LDCT	
2	Benign - Based on imaging features or indolent behavior Estimated Population Prevalence: 45%	Juxtapleural nodule: • < 10 mm (524 mm ³) mean diameter at baseline or new AND • Solid; smooth margins; and oval, lentiform, or triangular shape Solid nodule: • < 6 mm (< 113 mm ³) at baseline OR • New < 4 mm (< 34 mm ³) Part solid nodule: • < 6 mm total mean diameter (< 113 mm ³) at baseline Non solid nodule (GGN): • < 30 mm (< 14,137 mm ³) at baseline, new, or growing OR • ≥ 30 mm (≥ 14,137 mm ³) stable or slowly growing (see note 7) Airway nodule, subsegmental - at baseline, new, or stable (see note 11) Category 3 lesion that is stable or decreased in size at 6-month follow-up CT OR Category 4B lesion proven to be benign in etiology following appropriate diagnostic workup		
3	Probably Benign - Based on imaging features or behavior Estimated Population Prevalence: 9%	Solid nodule: • ≥ 6 to < 8 mm (≥ 113 to < 268 mm ³) at baseline OR • New 4 mm to < 6 mm (34 to < 113 mm ³) Part solid nodule: • ≥ 6 mm total mean diameter (≥ 113 mm ³) with solid component < 6 mm (< 113 mm ³) at baseline OR • New < 6 mm total mean diameter (< 113 mm ³) Non solid nodule (GGN): • ≥ 30 mm (≥ 14,137 mm ³) at baseline or new Atypical pulmonary cyst: (see note 12) • Growing cystic component (mean diameter) of a thick-walled cyst Category 4A lesion that is stable or decreased in size at 3-month follow-up CT (excluding airway nodules)		6-month LDCT
4A	Suspicious Estimated Population Prevalence: 4%	Solid nodule: • ≥ 8 to < 15 mm (≥ 268 to < 1,767 mm ³) at baseline OR • Growing < 8 mm (< 268 mm ³) OR • New 6 to < 8 mm (113 to < 268 mm ³) Part solid nodule: • ≥ 6 mm total mean diameter (≥ 113 mm ³) with solid component ≥ 6 mm to < 8 mm (≥ 113 to < 268 mm ³) at baseline OR • New or growing < 4 mm (< 34 mm ³) solid component Airway nodule, segmental or more proximal - at baseline (see note 11) Atypical pulmonary cyst: (see note 12) • Thick-walled cyst OR • Multilocular cyst at baseline OR • Thin- or thick-walled cyst that becomes multilocular		3-month LDCT; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm ³) solid nodule or solid component
4B	Very Suspicious Estimated Population Prevalence: 2%	Airway nodule, segmental or more proximal - stable or growing (see note 11) Solid nodule: • ≥ 15 mm (≥ 1,767 mm ³) at baseline OR • New or growing ≥ 8 mm (≥ 268 mm ³) Part solid nodule: • Solid component ≥ 8 mm (≥ 268 mm ³) at baseline OR • New or growing ≥ 4 mm (≥ 34 mm ³) solid component Atypical pulmonary cyst: (see note 12) • Thick-walled cyst with growing wall thickness/nodularity OR • Growing multilocular cyst (mean diameter) OR • Multilocular cyst with increased loculation or new/increased opacity (nodular, ground glass, or consolidation) Slow growing solid or part solid nodule that demonstrates growth over multiple screening exams (see note 8)		Referral for further clinical evaluation Diagnostic chest CT with or without contrast; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm ³) solid nodule or solid component; tissue sampling; and/or referral for further clinical evaluation Management depends on clinical evaluation, patient preference, and the probability of malignancy (see note 13)
4X	Estimated Population Prevalence: < 1%	Category 3 or 4 nodules with additional features or imaging findings that increase suspicion for lung cancer (see note 14)		
S	Significant or Potentially Significant Estimated Population Prevalence: 10%	Modifier: May add to category 0-4 for clinically significant or potentially clinically significant findings unrelated to lung cancer (see note 15)		As appropriate to the specific finding

Table 2: 2017 Fleischner Society Guidelines for Management of Incidental Detected Pulmonary Nodules ⁽⁴⁰⁾
Fleischner Table

*This table is reproduced without alteration or edit.

Fleischner Society 2017 Guidelines for Management of Incidentally Detected Pulmonary Nodules in Adults				
A: Solid Nodules*				
Nodule Type	Size			Comments
	<6 mm (<100 mm ³)	6–8 mm (100–250 mm ³)	>8 mm (>250 mm ³)	
Single				
Low risk†	No routine follow-up	CT at 6–12 months, then consider CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Nodules <6 mm do not require routine follow-up in low-risk patients (recommendation 1A).
High risk†	Optional CT at 12 months	CT at 6–12 months, then CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up (recommendation 1A).
Multiple				
Low risk†	No routine follow-up	CT at 3–6 months, then consider CT at 18–24 months	CT at 3–6 months, then consider CT at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).
High risk†	Optional CT at 12 months	CT at 3–6 months, then at 18–24 months	CT at 3–6 months, then at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).
B: Subsolid Nodules*				
Nodule Type	Size			Comments
	<6 mm (<100 mm ³)	≥6 mm (>100 mm ³)		
Single				
Ground glass	No routine follow-up	CT at 6–12 months to confirm persistence, then CT every 2 years until 5 years		In certain suspicious nodules < 6 mm, consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection. (Recommendations 3A and 4A).
Part solid	No routine follow-up	CT at 3–6 months to confirm persistence. If unchanged and solid component remains <6 mm, annual CT should be performed for 5 years.		In practice, part-solid nodules cannot be defined as such until ≥6 mm, and nodules <6 mm do not usually require follow-up. Persistent part-solid nodules with solid components ≥6 mm should be considered highly suspicious (recommendations 4A–4C).
Multiple				
	CT at 3–6 months. If stable, consider CT at 2 and 4 years.	CT at 3–6 months. Subsequent management based on the most suspicious nodule(s).		Multiple <6 mm pure ground-glass nodules are usually benign, but consider follow-up in selected patients at high risk at 2 and 4 years (recommendation 5A).

Note.—These recommendations do not apply to lung cancer screening, patients with immunosuppression, or patients with known primary cancer.

* Dimensions are average of long and short axes, rounded to the nearest millimeter.

† Consider all relevant risk factors (see Risk Factors).

†There are multiple factors that may place an individual in the high-risk category such as smoking history and nodule characteristics. The designation of high risk may be assigned by the treating provider.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Revised the purpose section • Lung Cancer screening is consistent with Cancer society • Lung nodules sections was clarified for size and follow up studies • Infection and inflammation section added to incorporate indications within the GL that were alone and added in sarcoidosis • Reorganized the malignancy section to follow the Abdomen GLs; for known malignancy Initial staging was broad, Restaging gave the situations not reasonable, and surveillance was each was identified with timelines for acceptable studies • Genetic Syndromes and Rare Diseases was added/adjusted • Combination Studies were expanded upon to coincide with other guidelines/combination studies
May 2023	<ul style="list-style-type: none"> • Added FUO, weight loss and paraneoplastic information to background • Updated Covid information in the background • Clarified details on nodules seen on other imaging such as non- chest CT or non CXR • Added transplant imaging • Clarified non cigarette smoking for LDCT • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent



uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Final Recommendation Statement Lung Cancer: Screening. March 9, 2021.
2. NCCN Clinical Practice Guidelines in Oncology: Lung Cancer Screening v2.2024. J Natl Compr Canc Netw. 2024.
3. Wolf A, Oeffinger K, Shih T, Walter L, Church T et al. Screening for lung cancer: 2023 guideline update from the American Cancer Society. CA Cancer J Clin. 2024; 74: 50 - 81. <https://doi.org/10.3322/caac.21811>.
4. Bueno J, Landeras L, Chung J. Updated Fleischner Society Guidelines for Managing Incidental Pulmonary Nodules: Common Questions and Challenging Scenarios. Radiographics. Sep-Oct 2018; 38: 1337-1350. 10.1148/rg.2018180017.
5. McKee B, Regis S, McKee A, Flacke S, Wald C. Performance of ACR Lung-RADS in a clinical CT lung screening program. J Am Coll Radiol. Mar 2015; 12: 273-6. 10.1016/j.jacr.2014.08.004.
6. Pinsky P, Gierada D, Black W, Munden R, Nath H et al. Performance of Lung-RADS in the National Lung Screening Trial: a retrospective assessment. Ann Intern Med. Apr 7, 2015; 162: 485-91. 10.7326/m14-2086.
7. Zaki H, Albaroudi B, Shaban E, Shaban A, Elgassim M et al. Advancement in pleura effusion diagnosis: a systematic review and meta-analysis of point-of-care ultrasound versus radiographic thoracic imaging. The Ultrasound Journal. 2024; 16: true. 10.1186/s13089-023-00356-z.
8. Little B, Gilman M, Humphrey K, Alkasab T, Gibbons F et al. Outcome of recommendations for radiographic follow-up of pneumonia on outpatient chest radiography. AJR Am J Roentgenol. Jan 2014; 202: 54-9. 10.2214/ajr.13.10888.
9. American College of Radiology. ACR Appropriateness Criteria® Diffuse Lung Disease. American College of Radiology. 2021; <https://acsearch.acr.org/docs/3157911/Narrative/>.
10. ACR-STR. ACR-STR Practice Parameter for the Performance of High-Resolution Computed Tomography (HRCT) of the Lungs in Adults. American College of Radiology. 2020.
11. Bokhari S, Zulfikar H, Mansur A. Sarcoidosis. [Updated 2023 Jun 25]. StatPearls [Internet]. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK430687/>.
12. Lassandro G, Picchi S G, Corvino A, Massimo C, Tamburrini S et al. Noninfectious Granulomatous Lung Disease: Radiological Findings and Differential Diagnosis. Journal of Personalized Medicine. 2024; 14: 10.3390/jpm14020134.
13. American College of Radiology. ACR Appropriateness Criteria® Imaging of Possible Tuberculosis. 2016.
14. Ko Y, Lee H, Park Y, Hong S, Shin J et al. Correlation of microbiological yield with radiographic activity on chest computed tomography in cases of suspected pulmonary tuberculosis. PLoS One. 2018; 13: e0201748. 10.1371/journal.pone.0201748.
15. Rubin G, Ryerson C, Haramati L, Sverzellati N, Kanne J et al. The Role of Chest Imaging in Patient Management during the COVID-19 Pandemic: A Multinational Consensus Statement from the Fleischner Society. Radiology. Jul 2020; 296: 172-180. 10.1148/radiol.2020201365.
16. Turner R, Bothamley G. Chronic cough and a normal chest X-ray - a simple systematic approach to exclude common causes before referral to secondary care: a retrospective cohort study. NPJ Prim Care Respir Med. Mar 3, 2016; 26: 15081. 10.1038/npjpcrm.2015.81.
17. Borger M A, Fedak P W M, Stephens E H, Gleason T G, Girdauskas E et al. The American Association for Thoracic Surgery consensus guidelines on bicuspid aortic valve-related aortopathy: Full online-only version. J Thorac Cardiovasc Surg. 2018; 156: e41-e74. 10.1016/j.jtcvs.2018.02.115.

18. Erbel R, Aboyans V, Boileau C, Bossone E, Bartolomeo R D. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014; 35: 2873-926. 10.1093/eurheartj/ehu281.
19. Ferreira Tda A, Chagas I, Ramos R, Souza E. Congenital thoracic malformations in pediatric patients: two decades of experience. *J Bras Pneumol*. Mar-Apr 2015; 41: 196-9. 10.1590/s1806-37132015000004374.
20. Isselbacher E, Preventza O, Hamilton Black III J, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Journal of the American College of Cardiology*. 2022; 80: e223 - e393. <https://doi.org/10.1016/j.jacc.2022.08.004>.
21. Mariscalco G, Debiec R, Elefteriades J, Samani N, Murphy G. Systematic Review of Studies That Have Evaluated Screening Tests in Relatives of Patients Affected by Nonsyndromic Thoracic Aortic Disease. *Journal of the American Heart Association*. 2018; 7: true. 10.1161/JAHA.118.009302.
22. Murillo H, Molvin L, Chin A S, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings. *Radiographics: a review publication of the Radiological Society of North*. 2021; 41: 425-446.
23. Seligson M, Surowiec S. Superior Vena Cava Syndrome. [Updated 2022 Sep 26]. *StatPearls [Internet]*. 2022; Accessed: May 2024. <https://www.ncbi.nlm.nih.gov/books/NBK441981/>.
24. Chen R, Liao H, Deng Z, He Z, Zheng Z et al. Efficacy of computed tomography in diagnosing pulmonary hypertension: A systematic review and meta-analysis. *Front Cardiovasc Med*. 2022; 9: 966257. 10.3389/fcvm.2022.966257.
25. Pascall E, Tulloh R. Pulmonary hypertension in congenital heart disease. *Future Cardiol*. Jul 2018; 14: 343-353. 10.2217/fca-2017-0065.
26. Kim S J, Azour L, Hutchinson B D, Shirsat H, Zhou F et al. Imaging Course of Lung Transplantation: From Patient Selection to Postoperative Complications. *RadioGraphics*. 2021; 41: 1043-1063. 10.1148/rg.2021200173.
27. American College of Radiology. ACR Appropriateness Criteria: Nontraumatic Chest Wall Pain. *Journal of the American College of Radiology*. 2021; 18: S394 - S405. 10.1016/j.jacr.2021.08.004.
28. American College of Radiology. ACR Appropriateness Criteria® Hemoptysis. 2019; 2022:
29. Mansour J, Raptis D, Bhalla S, Heeger A, Abbott G et al. Diagnostic and Imaging Approaches to Chest Wall Lesions. *RadioGraphics*. 2022; 42: 359 - 378. 10.1148/rg.210095.
30. Kumar R. Myasthenia gravis and thymic neoplasms: A brief review. *World J Clin Cases*. Dec 16, 2015; 3: 980-3. 10.12998/wjcc.v3.i12.980.
31. Diessner J, Anders L, Herbert S, Kiesel M, Bley T et al. Evaluation of different imaging modalities for axillary lymph node staging in breast cancer patients to provide a personalized and optimized therapy algorithm. *Journal of Cancer Research and Clinical Oncology*. 2023; 149: 3457 - 3467. 10.1007/s00432-022-04221-9.
32. Erasmus L, Strange T, Agrawal R, Strange C, Ahuja J et al. Lung Cancer Staging: Imaging and Potential Pitfalls. 2023; 13: 10.3390/diagnostics13213359.
33. Feng S, Yang S. The new 8th TNM staging system of lung cancer and its potential imaging. *Diagnostic and interventional radiology (Ankara, Turkey)*. 2019; 25: 270-279.

34. Schmidlin E, Gill R. New frontiers in esophageal radiology. *Annals of translational medicine*. 2021; 9: 904.
35. Fu Y, Yuan X, Pan W, Lu Y, Zeng D. Comparative analysis of the efficacy and safety of electromagnetic navigation bronchoscopy combined with x-ray or radial endobronchial ultrasound biopsy in the diagnosis of small peripheral pulmonary nodules. *Thorac Cancer*. 2023; 14: 1348 - 1354. <https://doi.org/10.1111/1759-7714.14879>.
36. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic v3.2024. National Comprehensive Cancer Network®. 2024.
37. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed May 2024:
38. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. [Updated 2023 Sep 21]. *GeneReviews®* [Internet]. 2023.
39. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; Accessed May 2024.
40. MacMahon H, Naidich D P, Goo J M, Lee K S, Leung A N C et al. Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleischner Society 2017. *Radiology*. 2017; 284: 228-243. 10.1148/radiol.2017161659.

EVOLENT CLINICAL GUIDELINE 020-1 FOR LOW DOSE CT FOR LUNG CANCER SCREENING

Guideline or Policy Number: Evolent_CG_020-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2015 - 2025 Evolent. All rights Reserved.		
Original Date: January 2015	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS	2
FOR ANNUAL SCREENING	2
Group 1 - High Risk for Lung Cancer	2
Group 2 - Personal History of Lung Cancer	3
Nodule on initial LDCT (Follow-up low dose CT is approvable)	3
Table 1: Lung-RADS®	4
CODING AND STANDARDS	5
CODING	5
CPT Codes	5
APPLICABLE LINES OF BUSINESS	5
POLICY HISTORY	5
Summary	5
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL	5
Committee	5
DISCLAIMER	5
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Low Dose Computed Tomography (LDCT) generates images of the lungs (chest) and is used to screen for and detect lung cancer in high-risk patients and/or patients with a history of lung cancer. This study uses low doses of radiation (100-120 kVp and 40-60 mAs) and is primarily used to evaluate the lung parenchyma. When evaluation of structures such as lymph nodes or the mediastinum is needed, a standard dose CT with IV contrast may be more appropriate. ⁽¹⁾

INDICATIONS

For Annual Screening

The use of low-dose, non-contrast spiral (helical) multi-detector CT imaging as a screening technique for lung cancer is considered **medically necessary ONLY** when used to screen for lung cancer for certain high-risk, **asymptomatic** individuals, i.e., no acute lung-related symptoms, when **ALL** of the following criteria are met

Screening should be discontinued once a person develops a health problem that limits the willingness or ability to have curative intent treatment. ^(2,3)

Group 1 - High Risk for Lung Cancer

- Individual is between 50-80 years of age*; **AND**
- There is at least a 20 pack-year history of cigarette** smoking

*May approve for individuals over the age limit if the individual is a candidate for and willing to undergo curative treatment upon diagnosis.

** Only personal cigarette smoking history as above places an individual at high risk; secondhand smoke exposure and other forms of smoking (such as pipe, cigar, marijuana, vaping) do **NOT** factor into current recommendations for LDCT Screening.

Group 2 - Personal History of Lung Cancer

Low Dose CT is indicated for surveillance of non-small cell lung cancer as follows:

- Annually starting 3 years after the end of treatment if stage I-II and no history of radiation
- Annually starting 6 years after end of treatment if EITHER stage I-II with history of radiation OR stage III or IV


NOTE: While on treatment, and for the first 2-3 years after completion of treatment, surveillance is with Chest CT rather than LDCT. When radiation was used for treatment, chest CT is needed for longer (5 years) before LDCT is appropriate. LDCT is not used for surveillance of small cell lung cancer ⁽⁴⁾ (see Chest CT Evolent_CG_020)

Nodule on initial LDCT (Follow-up low dose CT is approvable) ⁽²⁾

- Table 1 shows the follow-up interval at which LDCT can be approved to reduce radiation dose ⁽⁵⁾
 - If multiple nodules, the largest and type is used for decision

Table 1: Lung-RADS®⁽⁵⁾

*This table is reproduced without alteration or edit in accordance with provisions in a Creative Commons License. The full document and license information can be found here: [Lung Rads | American College of Radiology \(acr.org\)](https://www.acr.org/clinical/clinical-guidance/lung-rads)

		Lung-RADS® v2022		Release Date: November 2022
Lung-RADS	Category Descriptor	Findings	Management	
0	Incomplete Estimated Population Prevalence: ~1%	Prior chest CT examination being located for comparison (see note 9) Part or all of lungs cannot be evaluated Findings suggestive of an inflammatory or infectious process (see note 10)	Comparison to prior chest CT; Additional lung cancer screening CT imaging needed; 1-3 month LDCT	
1	Negative Estimated Population Prevalence: 39%	No lung nodules OR Nodule with benign features: <ul style="list-style-type: none"> Complete, central, popcorn, or concentric ring calcifications OR Fat-containing 	12-month screening LDCT	
2	Benign - Based on imaging features or indolent behavior Estimated Population Prevalence: 45%	Juxtapleural nodule: <ul style="list-style-type: none"> < 10 mm (524 mm³) mean diameter at baseline or new AND Solid; smooth margins; and oval, lentiform, or triangular shape 		
		Solid nodule: <ul style="list-style-type: none"> < 6 mm (< 113 mm³) at baseline OR New < 4 mm (< 34 mm³) 		
		Part solid nodule: <ul style="list-style-type: none"> < 6 mm total mean diameter (< 113 mm³) at baseline 		
3	Probably Benign - Based on imaging features or behavior Estimated Population Prevalence: 9%	Non solid nodule (GGN): <ul style="list-style-type: none"> < 30 mm (< 14,137 mm³) at baseline, new, or growing OR ≥ 30 mm (≥ 14,137 mm³) stable or slowly growing (see note 7) 	6-month LDCT	
		Airway nodule, subsegmental - at baseline, new, or stable (see note 11)		
		Category 3 lesion that is stable or decreased in size at 6-month follow-up CT OR Category 4B lesion proven to be benign in etiology following appropriate diagnostic workup		
		Solid nodule: <ul style="list-style-type: none"> ≥ 6 to < 8 mm (≥ 113 to < 268 mm³) at baseline OR New 4 mm to < 6 mm (34 to < 113 mm³) 		
4A	Suspicious Estimated Population Prevalence: 4%	Part solid nodule: <ul style="list-style-type: none"> ≥ 6 mm total mean diameter (≥ 113 mm³) with solid component < 6 mm (< 113 mm³) at baseline OR New < 6 mm total mean diameter (< 113 mm³) 	3-month LDCT; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm ³) solid nodule or solid component	
		Non solid nodule (GGN): <ul style="list-style-type: none"> ≥ 30 mm (≥ 14,137 mm³) at baseline or new 		
		Atypical pulmonary cyst: (see note 12) <ul style="list-style-type: none"> Growing cystic component (mean diameter) of a thick-walled cyst 		
		Category 4A lesion that is stable or decreased in size at 3-month follow-up CT (excluding airway nodules)		
4B	Very Suspicious Estimated Population Prevalence: 2%	Solid nodule: <ul style="list-style-type: none"> ≥ 8 to < 15 mm (≥ 268 to < 1,767 mm³) at baseline OR Growing < 8 mm (< 268 mm³) OR New 6 to < 8 mm (113 to < 268 mm³) 	Referral for further clinical evaluation Diagnostic chest CT with or without contrast; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm ³) solid nodule or solid component; tissue sampling; and/or referral for further clinical evaluation Management depends on clinical evaluation, patient preference, and the probability of malignancy (see note 13)	
		Part solid nodule: <ul style="list-style-type: none"> Solid component ≥ 8 mm (≥ 268 mm³) at baseline OR New or growing ≥ 4 mm (≥ 34 mm³) solid component 		
		Atypical pulmonary cyst: (see note 12) <ul style="list-style-type: none"> Thick-walled cyst OR Multilocular cyst at baseline OR Thin- or thick-walled cyst that becomes multilocular 		
		Airway nodule, segmental or more proximal - stable or growing (see note 11)		
4X	Estimated Population Prevalence: < 1%	Category 3 or 4 nodules with additional features or imaging findings that increase suspicion for lung cancer (see note 14)		
S	Significant or Potentially Significant Estimated Population Prevalence: 10%	Modifier: May add to category 0-4 for clinically significant or potentially clinically significant findings unrelated to lung cancer (see note 15)	As appropriate to the specific finding	



CODING AND STANDARDS

Coding

CPT Codes

71271

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none">Smoking was re-worded.Updated Lung Rads Table
January 2024	<ul style="list-style-type: none">Removed language about former smoker from indications and background in GL to align with the American Cancer Society recommendations

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs



may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Non-Small Cell Lung Cancer Version 3.2024. National Comprehensive Cancer Network®. 2024; 2024: Accessed: May 1, 2024. https://www.nccn.org/professionals/physician_gls/pdf/nscl.pdf.
2. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Lung Cancer Screening Version 2.2024. National Comprehensive Cancer Network®. 2023; https://www.nccn.org/professionals/physician_gls/pdf/lung_screening.pdf.
3. Wolf A, Oeffinger K, Shih T, Walter L, Church T et al. Screening for lung cancer: 2023 guideline update from the American Cancer Society. CA Cancer J Clin. 2024; 74: 50 - 81. <https://doi.org/10.3322/caac.21811>.
4. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Small Cell Lung Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024; Accessed: May 1, 2024. https://www.nccn.org/professionals/physician_gls/pdf/sclc.pdf.
5. ACR. American College of Radiology Lung-RADS System. American College of Radiology. 2022; Accessed: May 2024. <https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Lung-Rads>.



EVOLENT CLINICAL GUIDELINE 022-1 FOR CHEST CTA

Guideline or Policy Number: Evolent_CG_022-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS	3
KNOWN OR SUSPECTED PULMONARY EMBOLISM (PE)	3
THORACIC AORTIC DISEASE	4
<i>Suspected Thoracic Aortic Aneurysm (TAA)</i>	4
<i>Thoracic Aortic Syndromes</i>	4
<i>Follow-Up of Known Thoracic Aortic Aneurysm</i>	5
<i>Postoperative Follow-up of Aortic Repair</i>	5
VASCULAR DISEASE	6
CONGENITAL MALFORMATIONS	6
EVALUATION OF TUMOR	6
PRE-OPERATIVE/PROCEDURAL EVALUATION	6
POST-OPERATIVE/PROCEDURAL EVALUATION	7
GENETIC SYNDROMES AND RARE DISEASES	7
COMBINATION STUDIES	8
<i>Abdominal Aorta CT Angiography with Lower Extremity Runoff and Chest CTA</i>	8
<i>Brain/Neck/Chest/Abdomen and Pelvis CTA</i>	8
<i>Chest/Abdomen CTA</i>	8
<i>Chest and Abdomen or Abdomen and Pelvis CTA</i>	9
<i>Chest CTA and Chest CT (or MRI)</i>	9
<i>Neck/Chest/Abdomen and Pelvis CTA</i>	9
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	9
CODING AND STANDARDS	10
CODING	10
<i>CPT Codes</i>	10
APPLICABLE LINES OF BUSINESS	10
BACKGROUND	10
CONTRAINDICATIONS AND PREFERRED STUDIES	10
CLINICAL ASSESSMENT OF PULMONARY EMBOLISM	10



Wells Score.....	10
Revised Geneva Score.....	11
POLICY HISTORY	11
Summary	11
LEGAL AND COMPLIANCE	12
GUIDELINE APPROVAL.....	12
Committee	12
DISCLAIMER.....	12
REFERENCES.....	13

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography angiography (CTA) generates images of the blood vessels (arteries and/or veins) in the chest that can be evaluated for evidence of stenosis, occlusion, embolism, dissection and/or aneurysms. Chest CTA (non-coronary) is used to evaluate the arteries outside the heart in the chest (thorax). CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function.

NOTE: Authorization for CT Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

INDICATIONS

Known or Suspected Pulmonary Embolism (PE) (1,2,3,4,5,6)

- Suspected pulmonary embolism:
 - High risk for PE based on shock or hypotension, OR a validated pre-test high probability score (such as **Well's** >6, **Modified Geneva** score >11),
 - (D-dimer is **NOT** needed for high-risk patients; can approve high-risk even with normal D dimer)
 - Intermediate and Low risk require elevated D-dimer
- Follow up of known pulmonary embolism with either symptoms (such as dyspnea, fatigue, lightheadedness and/or edema) that recur OR are persistent at 3 months following initial diagnosis (Follow-up imaging in asymptomatic patients to determine if embolus has resolved or to determine cessation of anticoagulation is not indicated as imaging changes may persist))

Thoracic Aortic Disease ^(7,8,9,10,11,12)

Suspected Thoracic Aortic Aneurysm (TAA)

- **Asymptomatic** suspected thoracic aortic aneurysm
 - Based on other imaging such as echocardiogram or chest x-ray
 - Screening in individuals with a personal history of bicuspid aortic valve when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient ⁽¹²⁾:
 - Baseline study at diagnosis
 - Every 3 years thereafter
 - Screening in individuals at elevated risk due to family history as below when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient ⁽¹²⁾:
 - First-degree relatives of individuals with a known thoracic aortic aneurysm (defined as > 50% above normal) or dissection
 - First and second-degree relatives of individuals with familial thoracic aortic aneurysm and dissection (FTAAD)/nonsyndromic heritable thoracic aortic disease (NS-TAD)
 - First degree relatives of individuals with a known bicuspid aortic valve
 - See **Genetic Syndromes and Rare Diseases** section for additional indications for screening.
- **Symptomatic** known or suspected thoracic aortic aneurysm ^(9,12)
 - Signs and Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Asymmetric blood pressure between limbs
 - Acute chest or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve)
- Suspected vascular cause of dysphagia or expiratory wheezing with other imaging that is suggestive or inconclusive.

Thoracic Aortic Syndromes

- For **suspected** acute aortic syndrome (AAS) such as aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer:
 - Other imaging (such as echocardiogram) is suggestive of AAS **OR**
 - Individual is either:

- **high risk** and **one** sign/symptom **OR** non-high risk and **two** or more signs/symptoms of AAS:
 - **High risk** conditions:
 - ◆ Marfan's syndrome or other connective tissue disease, family history of aortic disease, known aortic valve disease, recent aortic manipulation and/or known thoracic aortic aneurysm
 - **Signs and symptoms** concerning for AAS:
 - ◆ Chest, back or abdominal pain described as abrupt onset, severe in intensity and/or ripping or tearing in quality
 - ◆ Pulse deficit or systolic blood pressure differential
 - ◆ Focal neurologic deficit with pain
 - ◆ New heart murmur with pain
 - ◆ Hypotension or shock
- For follow-up of **known** aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer: frequency for follow up is as clinically indicated.

Follow-Up of Known Thoracic Aortic Aneurysm

- Baseline study at diagnosis then every 6-24 months
 - If there is a change in clinical status or cardiac exam, then imaging sooner than 6 months is indicated.

Postoperative Follow-up of Aortic Repair ⁽¹²⁾

- Follow-up thoracic endovascular aortic repair (TEVAR):
 - Baseline post-EVAR at 1-month post-EVAR
 - Annually thereafter if stable
 - more frequent imaging (as clinically indicated) may be needed if there are complications or abnormal findings on surveillance imaging.
- Follow up open repair at the following intervals:
 - Baseline follow-up study at one year post-operatively
 - Every 5 years thereafter
 - If abnormal findings are seen on any surveillance imaging study, imaging is then done annually.

Vascular Disease (13,14,15,16,17)

- Superior vena cava (SVC) syndrome
- Subclavian Steal Syndrome after positive or inconclusive ultrasound
- Thoracic Outlet Syndrome
- Suspected pulmonary hypertension when other testing (echocardiogram or right heart catheterization) is suggestive of the diagnosis

Congenital Malformations (18,19,20,21)

- Thoracic malformation on other imaging (chest x-ray, echocardiogram, gastrointestinal study, or inconclusive CT)
- Congenital heart disease with pulmonary hypertension or extra-cardiac vascular anomalies
- Suspected coarctation of the aorta (clinical sign is a disparity in the pulsations and blood pressures in the legs and arms)
- Pulmonary sequestration
 - **NOTE:** Chest MRA preferred if pediatrics or repeat imaging

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor

Pre-operative/procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure (including prior to planned ablation for atrial fibrillation)
- Evaluation of interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of vascular anatomy prior to solid organ transplantation
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Evaluation prior to Transcatheter Aortic Valve Replacement

Post-operative/procedural Evaluation ^(22,23)

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in abdomen and pelvis
 - Suspected complications of IVC filter

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):^(24,25)
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:^(26,27)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Marfan Syndrome:⁽²⁸⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root ascending aorta are not adequately visualized on TTE ^(12,29)
- Loeys-Dietz:⁽³⁰⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Williams Syndrome:⁽³¹⁾
 - When there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Turner Syndrome
 - Screening with no known vascular abnormality at the following intervals:
 - At diagnosis
 - Every 5 years until age 18
 - Every 10 years in adults

- Prior to pregnancy/pregnancy planning
 - Annually if any one of the following are present: coarctation of the aorta, aortic dilation, bicuspid aortic valve, hypertension
- Takayasu's Arteritis:⁽³²⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Abdominal Aorta CT Angiography with Lower Extremity Runoff and Chest CTA

- To evaluate for an embolic source of lower extremity vascular disease when other imaging such as echocardiography suggests a cardiac source of the embolism.
- Williams Syndrome: When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)⁽³¹⁾

Brain/Neck/Chest/Abdomen and Pelvis CTA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis^(24,25)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found^(26,27)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found⁽³⁰⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽³³⁾

Chest/Abdomen CTA

- Evaluation of extensive vascular disease involving the chest and abdominal cavities when pelvic imaging is not needed
- Significant post-traumatic or post-procedural vascular complications when pelvic imaging is not needed

Chest and Abdomen or Abdomen and Pelvis CTA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR)⁽³⁴⁾
- Marfan syndrome:^{(28) (12,29)}
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e. advanced imaging is needed to monitor the thoracic aorta)^(12,29)
- Williams Syndrome⁽³¹⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection⁽³⁵⁾
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Chest CTA and Chest CT (or MRI)

- When needed for clarification of vascular invasion from tumor

Neck/Chest/Abdomen and Pelvis CTA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated⁽³²⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

71275

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Clinical Assessment of Pulmonary Embolism

Wells Score ⁽⁴⁾

Criteria	Score
Clinical Symptoms of DVT (deep vein thrombosis)	3.0
Other diagnosis (less likely than pulmonary embolism)	3.0
Heart rate > 100 bpm	1.5
Surgery in previous 4 weeks or Immobilization (\geq 3 days)	1.5
Previous DVT/PE (pulmonary embolism)	1.5

Hemoptysis	1.0
Malignancy	1.0

Probability based on total score: > 6.0 = high, 2.0 - 6.0 = moderate, < 2.0 = Low

Revised Geneva Score ⁽⁴⁾

Criteria	Score
Age \geq 65 years	1
Previous DVT (deep vein thrombosis) or PE (pulmonary embolism)	3
Recent surgery or fracture (within 1 month)	2
Active malignant condition	2
Unilateral lower limb pain	2
Hemoptysis	2
Heart rate 75-94 bpm	3
Heart rate \geq 95 bpm	5
Unilateral edema of lower limb and pain on deep palpation	4

Probability based on total score: 0-3 = low probability, 4-10 = intermediate probability, \geq 11 = high probability

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> Updated references Added Genetics and Rare Diseases, Evaluation of Tumor, Contraindications and Preferred Studies sections. Reorganized section Thoracic Aortic Disease
April 2023	<ul style="list-style-type: none"> Simplified PE indications to high risk, no need for d dimer, all else requires d dimer (added Pretest probability tables and removed other details from background) Clarified and updated follow up after repair of TAA.

	<ul style="list-style-type: none"> • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline. • Added statement regarding further evaluation of indeterminate findings on prior imaging
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology. ACR Appropriateness Criteria® Suspected Pulmonary Embolism. 2022; 2022:
2. Duffett L, Castellucci L, Forgie M. Pulmonary embolism: update on management and controversies. *BMJ*. 2020; 370: true. 10.1136/bmj.m2177.
3. Moore A, Wachsmann J, Chamarthy M, Panjikaran L, Tanabe Y. Imaging of acute pulmonary embolism: an update. *Cardiovasc Diagn Ther*. Jun 2018; 8: 225-243. 10.21037/cdt.2017.12.01.
4. Tak T S U L J Y. Acute Pulmonary Embolism: Contemporary Approach to Diagnosis, Risk-Stratification, and Management. *International Journal of Angiology*. 2019; 28: 100 - 111. 10.1055/s-0039-1692636.
5. Konstantinides S V, Torbicki A, Agnelli G, Danchin N, Fitzmaurice D et al. 2014 ESC guidelines on the diagnosis and management of acute pulmonary embolism. *Eur Heart J*. 2014; 35: 3033-69, 3069a-3069k. 10.1093/eurheartj/ehu283.
6. Rivera-Lebron B, McDaniel M, Ahrar K, Alrifai A, Dudzinski D M et al. Diagnosis, Treatment and Follow Up of Acute Pulmonary Embolism: Consensus. *Clinical and applied thrombosis/hemostasis: official journal of the*. 2019; 25: 1076029619853037.
7. Ferreira Tda A, Chagas I, Ramos R, Souza E. Congenital thoracic malformations in pediatric patients: two decades of experience. *J Bras Pneumol*. Mar-Apr 2015; 41: 196-9. 10.1590/s1806-37132015000004374.
8. Mariscalco G, Debiec R, Elefteriades J, Samani N, Murphy G. Systematic Review of Studies That Have Evaluated Screening Tests in Relatives of Patients Affected by Nonsyndromic Thoracic Aortic Disease. *Journal of the American Heart Association*. 2018; 7: true. 10.1161/JAHA.118.009302.
9. Murillo H, Molvin L, Chin A, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings from Acute to Chronic Longitudinal Progression. *RadioGraphics*. 2021; 41: 425 - 446. 10.1148/rg.2021200138.
10. Erbel R, Aboyans V, Boileau C, Bossone E, Bartolomeo R D et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014; 35: 2873-926. 10.1093/eurheartj/ehu281.
11. Borger M A, Fedak P W M, Stephens E H, Gleason T G, Girdauskas E et al. The American Association for Thoracic Surgery consensus guidelines on bicuspid aortic valve-related aortopathy: Full online-only version. *J Thorac Cardiovasc Surg*. 2018; 156: e41-e74. 10.1016/j.jtcvs.2018.02.115.
12. Isselbacher E M, Preventza O, Hamilton Black J 3, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 146: e334-e482. 10.1161/CIR.0000000000001106.
13. American College of Radiology. ACR Appropriateness Criteria® Thoracic Outlet Syndrome. 2019; 2022:
14. Friedman T, Quencer K, Kishore S, Winokur R, Madoff D. Malignant Venous Obstruction: Superior Vena Cava Syndrome and Beyond. *Semin Intervent Radiol*. Dec 2017; 34: 398-408. 10.1055/s-0037-1608863.
15. Osiro S, Zurada A, Gielecki J, Shoja M, Tubbs R. A review of subclavian steal syndrome with clinical correlation. *Med Sci Monit*. May 2012; 18: Ra57-63. 10.12659/msm.882721.

16. Povlsen S, Povlsen B. Diagnosing Thoracic Outlet Syndrome: Current Approaches and Future Directions. *Diagnostics (Basel)*. Mar 20, 2018; 8: 10.3390/diagnostics8010021.
17. Bonci G, Steigner M L, Hanley M, Braun A R, Desjardins B et al. ACR Appropriateness Criteria Thoracic Aorta Interventional Planning and Follow-Up. *Journal of the American College of Radiology*. 2017; 14: S570 - S583. 10.1016/j.jacr.2017.08.042.
18. Pascall E, Tulloh R. Pulmonary hypertension in congenital heart disease. *Future Cardiol*. Jul 2018; 14: 343-353. 10.2217/fca-2017-0065.
19. Bae S B, Kang E, Choo K S, Lee J, Kim S H et al. Aortic Arch Variants and Anomalies: Embryology, Imaging Findings, and Clinical Considerations. *J Cardiovasc Imaging*. 2022; 30: 231 - 262.
20. Leo I, Sabatino J, Avesani M, Moscatelli S, Bianco F et al. Non-Invasive Imaging Assessment in Patients with Aortic Coarctation: A Contemporary Review. 2024; 13: 10.3390/jcm13010028.
21. Orozco V U H M F. Thoracic Vascular Variants and Anomalies: Imaging Findings, Review of the Embryology, and Clinical Features. *Indian Journal of Radiology and Imaging*. 2022; 32: 568 - 575. 10.1055/s-0042-1757742.
22. Choudhury M. Postoperative management of vascular surgery patients: a brief review. *Clin Surg*. 2017; 2: 1584.
23. Bennett K, Kent K, Schumacher J, Greenberg C, Scarborough J. Targeting the most important complications in vascular surgery. *J Vasc Surg*. Mar 2017; 65: 793-803. 10.1016/j.jvs.2016.08.107.
24. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
25. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
26. Bowen J M, Hernandez M, Johnson D S, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European journal of human genetics: EJHG*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
27. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. *GeneReviews®* [Internet]. 2019.
28. Dietz H. FBN1-Related Marfan Syndrome. [Updated 2022 Feb 17]. *GeneReviews®* [Internet]. 2022.
29. Weinrich J M, Lenz A, Schön G, Behzadi C, Molwitz I et al. Magnetic resonance angiography derived predictors of progressive dilatation and surgery of the aortic root in Marfan syndrome. *PLOS ONE*. 2022; 17: true. <https://doi.org/10.1371/journal.pone.0262826>.
30. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 Mar 1]. *GeneReviews®* [Internet]. 2018.
31. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. *GeneReviews®* [Internet]. 2023.
32. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis & Rheumatology (Hoboken, N.J.)*. 2021; 73: 1349-1365. 10.1002/art.41774.
33. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.

34. Hedgire S, Saboo S, Galizia M, Aghayev A, Bolen M et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic. Journal of the American College of Radiology: JACR. 2023; 20: S501-S512. 10.1016/j.jacr.2023.08.009.
35. Kicska G, Hurwitz Kowick L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. Journal of the American College of Radiology: JACR. 2021; 18: S474-S481. 10.1016/j.jacr.2021.09.004.



EVOLENT CLINICAL GUIDELINE 021 FOR CHEST (THORAX) MRI

Guideline or Policy Number: Evolent_CG_021	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS FOR CHEST MRI	3
CHEST WALL	3
BRACHIAL PLEXOPATHY	3
VASCULAR DISEASE	4
THORACIC AORTIC DISEASE	4
<i>Acute Aortic Syndromes (AAS)</i>	4
CONGENITAL MALFORMATIONS	5
EVALUATION OF TUMOR.....	5
PRE-OPERATIVE/PROCEDURAL EVALUATION	5
POST-OPERATIVE/PROCEDURAL EVALUATION	5
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	6
GENETIC SYNDROMES AND RARE DISEASES.....	6
COMBINATION STUDIES	6
<i>Brain/Chest/Abdomen/Pelvis MRI</i>	6
<i>Chest MRA (or CTA) and Chest MRI</i>	6
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	6
CODING AND STANDARDS	7
CODING	7
<i>CPT Codes</i>	7
APPLICABLE LINES OF BUSINESS.....	7
BACKGROUND	7
CONTRAINDICATIONS AND PREFERRED STUDIES.....	7
POLICY HISTORY	7
<i>Summary</i>	7
LEGAL AND COMPLIANCE	8
GUIDELINE APPROVAL	8
<i>Committee</i>	8



DISCLAIMER.....	8
REFERENCES.....	9

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Chest Magnetic Resonance Imaging (MRI) generates images of the organs and structures within the chest (thorax) without the use of ionizing radiation. Chest MRI images are affected by motion artifact from respiration, thus is generally not used for evaluation of the lung parenchyma.

INDICATIONS FOR CHEST MRI

Chest Wall Pain

Non-traumatic chest wall pain after initial imaging (such as x-ray) has been performed and Chest CT is **contraindicated** or cannot be performed

- History of known or suspected cancer (no prior x-ray needed) ⁽¹⁾
- Signs and symptoms of infection with concern for chest wall involvement, such as: fever, elevated inflammatory markers, known infection at other sites ⁽¹⁾
- Suspected chest wall injuries (including musculotendinous, costochondral cartilage, sternoclavicular joint, and manubriosternal joint injuries) after non-diagnostic or indeterminate prior imaging (such as x-ray or ultrasound) when imaging will potentially alter management

Brachial Plexopathy ^(2,3)

- **Traumatic** Brachial Plexopathy: If mechanism of injury is highly suspicious for brachial plexopathy (such as mid-clavicular fracture, shoulder dislocation, contact injury to the neck (burner or stinger syndrome) or penetrating injury) ⁽⁴⁾

- **Non-traumatic** Brachial Plexopathy (including neurogenic thoracic outlet syndrome) when Electromyography/Nerve Conduction Velocity (EMG/NCV) studies are suggestive of brachial plexopathy

NOTE: Either Neck MRI, Shoulder MRI or Chest MRI may be appropriate depending on the location of the injury/plexopathy. Only **ONE** of these three studies is indicated.

Vascular Disease ⁽⁵⁾

- Superior vena cava (SVC) syndrome ⁽⁶⁾
- Subclavian Steal Syndrome after positive or inconclusive ultrasound when CTA/MRA are contraindicated or cannot be performed ⁽⁷⁾
- Thoracic Outlet Syndrome when CTA/MRA are contraindicated or cannot be performed ⁽⁸⁾
- Pulmonary hypertension when other testing (echocardiogram or right heart catheterization) is suggestive of the diagnosis ^(9,10)

Thoracic Aortic Disease

Acute Aortic Syndromes (AAS)

- For **suspected** acute aortic syndrome (AAS) such as aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer:
 - Other imaging (such as echocardiogram) is suggestive of AAS **OR**
 - Individual is either:
 - **High risk** and **one** sign/symptom **OR non-high risk** and **two** or more signs/symptoms of AAS:
 - **High risk** conditions:
 - ◇ Marfan's syndrome or other connective tissue disease, family history of aortic disease, known aortic valve disease, recent aortic manipulation and/or known thoracic aortic aneurysm
 - **Signs and symptoms** concerning for AAS:
 - ◇ Chest, back or abdominal pain described as abrupt onset, severe in intensity and/or ripping or tearing in quality
 - ◇ Pulse deficit or systolic blood pressure differential
 - ◇ Focal neurologic deficit with pain
 - ◇ New heart murmur with pain
 - ◇ Hypotension or shock

- For follow-up of **known** aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer: frequency for follow up is as clinically indicated ^(11,12)

Congenital Malformations (9,10,13)

- Congenital heart disease with pulmonary hypertension
- Known or suspected pulmonary sequestration
- Congenital non-cardiac non-vascular thoracic malformation on other imaging (such as chest x-ray, echocardiogram, gastrointestinal study or CT) ^(14,15,16)
- Malformations (such as pectus excavatum, pectus carinatum, scoliosis) in patients with cardiorespiratory symptoms for whom treatment is being considered

Evaluation of Tumor

- Mediastinum
 - Thymoma screening in Myasthenia Gravis patients ⁽¹⁷⁾
 - For further evaluation of mediastinal masses on prior imaging
- Chest Wall
 - For further evaluation of chest wall mass after prior indeterminate imaging ^(18,19)
- Other Chest Masses
 - For further evaluation of chest mass when prior imaging suggests MRI as the next step rather than CT

Pre-operative/procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure ⁽¹⁹⁾
- Prior to catheter ablation in patients with atrial fibrillation ⁽²⁰⁾

Post-operative/procedural Evaluation

- Post-surgical follow-up when records document medical reason requiring additional imaging
- After catheter ablation in patients with atrial fibrillation ⁽²⁰⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- Cystic Fibrosis - chest MRI (or CT) every 2 years and as needed to assess for bronchiectasis
- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1⁽²¹⁾) Chest MRI (or CT) annually
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Brain/Chest/Abdomen/Pelvis MRI

- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1) ⁽²¹⁾
 - Chest/Abdomen/Pelvis annually
 - Brain/Chest/Abdomen/Pelvis every 3 years

Chest MRA (or CTA) and Chest MRI

- When needed for clarification of vascular invasion from tumor

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

71550, 71551, 71552, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Magnetic Resonance Imaging (MRI) is a noninvasive imaging technique for detection and evaluation of various disease and conditions in the chest, e.g., congenital anomalies and aneurysms. MRI may be used instead of computed tomography (CT) in patients with allergies to radiographic contrast or with impaired renal function. Also, to decrease radiation exposure, Chest MRI may be used rather than CT when repeated imaging is expected (i.e., surveillance).

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Brachial plexopathy to be consistent with other relevant guidelines

Date	Summary
	<ul style="list-style-type: none"> ● Acute aortic syndromes aligned with other Guidelines and given more detail ● Added section for Genetic Syndromes ● Added Contraindications and Preferred studies section to the Background ● Added Combination Studies section
April 2023	<ul style="list-style-type: none"> ● Updates on mass imaging and chest wall imaging ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ● Added statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Stowell J, Walker C, Chung J, Bang T, Carter B et al. ACR Appropriateness Criteria® Nontraumatic Chest Wall Pain. *Journal of the American College of Radiology*. 2021; 18: S394 - S405. 10.1016/j.jacr.2021.08.004.
2. Belviso I, Palmeri S, Sacco A, Romano V, Corrado B et al. Brachial Plexus Injuries in Sport Medicine: Clinical Evaluation, Diagnostic Approaches, Treatment Options, and Rehabilitative Interventions. 2020; 5: 10.3390/jfmk5020022.
3. Rubin D. Brachial and lumbosacral plexopathies: A review. *Clinical Neurophysiology Practice*. 2020; 5: 173 - 193. <https://doi.org/10.1016/j.cnp.2020.07.005>.
4. Sinn C. Brachial Plexopathy: Differential Diagnosis and Treatment. *PM and R Knowledge Now*. 2022; <https://now.aapmr.org/brachial-plexopathy-differential-diagnosis-and-treatment-2/>.
5. Zurkiya O, Ganguli S, Kalva S, Chung J, Shah L et al. ACR Appropriateness Criteria® Thoracic Outlet Syndrome. *J Am Coll Radiol*. May 2020; 17: S323-s334. 10.1016/j.jacr.2020.01.029.
6. Friedman T, Quencer K, Kishore S, Winokur R, Madoff D. Malignant Venous Obstruction: Superior Vena Cava Syndrome and Beyond. *Semin Intervent Radiol*. Dec 2017; 34: 398-408. 10.1055/s-0037-1608863.
7. Osiro S, Zurada A, Gielecki J, Shoja M, Tubbs R. A review of subclavian steal syndrome with clinical correlation. *Med Sci Monit*. May 2012; 18: Ra57-63. 10.12659/msm.882721.
8. American College of Radiology. ACR Appropriateness Criteria® Thoracic Outlet Syndrome. American College of Radiology. 2019; Accessed: May 2024. <https://acsearch.acr.org/docs/3083061/Narrative/>.
9. Beshay S, Sahay S, Humbert M. Evaluation and management of pulmonary arterial hypertension. *Respiratory medicine*. 2020; 171: 106099.
10. Sharma M, Burns A, Yap T, Prior D. The role of imaging in pulmonary hypertension. *Cardiovascular diagnosis and therapy*. 2021; 11: 859-880.
11. Barman M. Acute aortic dissection. *ESC e-J Cardio Pract*. 2014; 12: 02Jul2014. <https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-12/Acute-aortic-dissection>.
12. American College of Radiology. ACR Appropriateness Criteria® Thoracic Aorta Interventional Planning and Follow-up. 2017.
13. Pascall E, Tulloh R. Pulmonary hypertension in congenital heart disease. *Future Cardiol*. Jul 2018; 14: 343-353. 10.2217/fca-2017-0065.
14. Bae S, Kang E, Choo K, Lee J, Kim S et al. Aortic Arch Variants and Anomalies: Embryology, Imaging Findings, and Clinical Considerations. *J Cardiovasc Imaging*. 2022; 30: 231 - 262.
15. Leo I, Sabatino J, Avesani M, Moscatelli S, Bianco F et al. Non-Invasive Imaging Assessment in Patients with Aortic Coarctation: A Contemporary Review. 2024; 13: 10.3390/jcm13010028.
16. Orozco V U H M F. Thoracic Vascular Variants and Anomalies: Imaging Findings, Review of the Embryology, and Clinical Features. *Indian Journal of Radiology and Imaging*. 2022; 32: 568 - 575. 10.1055/s-0042-1757742.
17. P A T, N M D. The efficiency of chemical-shift MRI for the evaluation of thymoma in patients. *La Clinica terapeutica*. 2022; 173: 572-578.

18. Ackman J B, Chung J H, Walker C M, Bang T J, Carter B W et al. ACR Appropriateness Criteria® Imaging of Mediastinal Masses. Journal of the American College of Radiology. 2021; 18: S37 - S51. 10.1016/j.jacr.2021.01.007.
19. Nguyen E, Bayanati H, Bilawich A, Tijmes F, Lim R et al. Canadian Society of Thoracic Radiology/Canadian Association of Radiologists Clinical Practice Guidance for Non-Vascular Thoracic MRI. Can Assoc Radiol J. Nov 2021; 72: 831-845. 10.1177/0846537121998961.
20. Kolandaivelu A. Role of Cardiac Imaging (CT/MR) Before and After RF Catheter Ablation in Patients with Atrial Fibrillation. J Atr Fibrillation. Aug-Sep 2012; 5: 523. 10.4022/jafib.523.
21. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023.

EVOLENT CLINICAL GUIDELINE 022-2 FOR CHEST MRA

Guideline or Policy Number: Evolent_CG_022-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS	3
SUSPECTED PULMONARY EMBOLISM.....	3
THORACIC AORTIC DISEASE.....	4
<i>Suspected Thoracic Aortic Aneurysm</i>	<i>4</i>
<i>Follow-up of Known Thoracic Aortic Aneurysm</i>	<i>4</i>
<i>Thoracic Aortic Syndromes</i>	<i>5</i>
<i>Post-operative Follow Up of Aortic Repair</i>	<i>5</i>
VASCULAR DISEASE	6
CONGENITAL MALFORMATIONS	6
EVALUATION OF TUMOR.....	6
PRE-OPERATIVE/PROCEDURAL EVALUATION	6
POST-OPERATIVE/PROCEDURAL EVALUATION	6
GENETIC SYNDROMES AND RARE DISEASES.....	7
COMBINATION STUDIES	8
<i>Brain/Neck/Chest/Abdomen/Pelvis MRA</i>	<i>8</i>
<i>Chest/Abdomen/Lower Extremity MRA.....</i>	<i>8</i>
<i>Chest/Abdomen/Pelvis MRA</i>	<i>8</i>
<i>Chest MRA and Chest MRI (or CT).....</i>	<i>9</i>
<i>Chest MRA and Heart MRI (or CT)</i>	<i>9</i>
<i>Neck/Chest/Abdomen/Pelvis MRA.....</i>	<i>9</i>
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	9
CODING AND STANDARDS	9
CODING	9
CPT Codes	9
APPLICABLE LINES OF BUSINESS.....	10
BACKGROUND.....	10
CONTRAINDICATIONS AND PREFERRED STUDIES.....	10

POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL	11
<i>Committee</i>	11
DISCLAIMER.....	11
REFERENCES.....	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance angiography (MRA) generates images of the blood vessels (arteries and/or veins) in the chest that can be evaluated for evidence of stenosis, occlusion, or aneurysms without use of ionizing radiation. Chest MRA (non-coronary) is used to evaluate the blood vessels outside the heart in the chest (thorax).

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

INDICATIONS

Suspected Pulmonary Embolism

- Suspected pulmonary embolism when CTA is **contraindicated** or cannot be performed:
 - High risk for PE based on shock or hypotension, OR a validated pre-test high probability score (such as Well's > 6, Modified Geneva score > 11),
 - (D-dimer is **NOT** needed for high-risk patients; can approve high-risk even with normal D dimer)
 - Intermediate and Low risk require elevated D-dimer
- Follow up of known pulmonary embolism when CTA is contraindicated or cannot be performed **AND** either symptoms (such as dyspnea, fatigue, lightheadedness and/or edema) that recur **OR** are persistent at 3 months following initial diagnosis. (Follow-up imaging in asymptomatic patients to determine if embolus has resolved or to determine cessation of anticoagulation is not indicated as imaging changes may persist)

THORACIC AORTIC DISEASE (1,2,3,4,5)

Suspected Thoracic Aortic Aneurysm

- **Asymptomatic** suspected thoracic aortic aneurysm
 - Based on other imaging such as echocardiogram or chest x-ray
 - Screening in individuals with a personal history of bicuspid aortic valve when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient:
 - Baseline study at diagnosis
 - Every 3 years thereafter
 - Screening in individuals at elevated risk due to family history as below when TTE (Transthoracic Echocardiogram) is inconclusive or insufficient:
 - First-degree relatives of individuals with a known thoracic aortic aneurysm (defined as > 50% above normal) or dissection
 - First and second-degree relatives of individuals with familial thoracic aortic aneurysm and dissection (FTAAD)/nonsyndromic heritable thoracic aortic disease (NS-TAD)
 - First degree relatives of individuals with a known bicuspid aortic valve
 - See **Genetic Syndromes and Rare Diseases** section for additional screening indications
- **Symptomatic** known or suspected thoracic aortic aneurysm
 - Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Acute onset of pain with asymmetric blood pressure between limbs
 - Acute chest or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve)
- Suspected vascular cause of dysphagia or expiratory wheezing with other imaging that is suggestive or inconclusive.

Follow-up of Known Thoracic Aortic Aneurysm

- Baseline imaging at diagnosis then every 6-24 months
 - If there is a change in clinical status or cardiac exam, then imaging sooner than 6 months is indicated.

Thoracic Aortic Syndromes

- For **suspected** acute aortic syndrome (AAS) such as aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer:
 - Other imaging (such as echocardiogram) is suggestive of AAS **OR**
 - Individual is either:
 - **high risk** and **one** sign/symptom **OR** non-high risk and **two** or more signs/symptoms of AAS:
 - **High risk** conditions:
 - ◆ Marfan's syndrome or other connective tissue disease, family history of aortic disease, known aortic valve disease, recent aortic manipulation and/or known thoracic aortic aneurysm
 - **Signs and symptoms** concerning for AAS:
 - ◆ Chest, back or abdominal pain described as abrupt onset, severe in intensity and/or ripping or tearing in quality
 - ◆ Pulse deficit or systolic blood pressure differential
 - ◆ Focal neurologic deficit with pain
 - ◆ New heart murmur with pain
 - ◆ Hypotension or shock
- For follow-up of **known** aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer: frequency for follow up is as clinically indicated.

Post-operative Follow Up of Aortic Repair

- Follow-up thoracic endovascular aortic repair (TEVAR):
 - Baseline post-EVAR at 1 month post-EVAR
 - Annually thereafter if stable
 - more frequent imaging (as clinically indicated) may be needed if there are complications or abnormal findings on surveillance imaging.
- Follow up open repair at the following intervals:
 - Baseline follow-up study at one year post-operatively
 - Every 5 years thereafter
 - If abnormal findings are seen on any surveillance imaging study, imaging is then done annually.

Vascular Disease (6,7,8,9)

- Superior vena cava (SVC) syndrome
- Subclavian Steal Syndrome after positive or inconclusive ultrasound
- Thoracic Outlet Syndrome
- Suspected pulmonary hypertension when other testing (echocardiogram or right heart catheterization) is suggestive of the diagnosis

Congenital Malformations (10,11,12,13)

- Suspected thoracic malformation based on other imaging (such as chest x-ray, echocardiogram, gastrointestinal study or CT)
- Congenital heart disease with pulmonary hypertension or extra-cardiac vascular anomalies
- Suspected coarctation of the aorta (clinical sign is a disparity in the pulsations and blood pressures in the legs and arms)
- Pulmonary sequestration

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor

Pre-operative/procedural Evaluation

- Pre-operative evaluation for a planned surgery or procedure (including prior to planned ablation for atrial fibrillation)
- Evaluation of interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of vascular anatomy prior to solid organ transplantation
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Evaluation prior to Transcatheter Aortic Valve Replacement

Post-operative/procedural Evaluation (14,15)

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that

clearly indicates why additional imaging is needed for the type and area(s) requested.

- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in abdomen and pelvis
- Suspected complications of IVC filters

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):^(16,17)
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:^(18,19)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Marfan Syndrome:⁽²⁰⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root ascending aorta are not adequately visualized on TTE ^(3,21)
- Loeys-Dietz:⁽²²⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Williams Syndrome:⁽²³⁾
 - When there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Turner Syndrome
 - Screening with no known vascular abnormality at the following intervals:
 - At diagnosis
 - Every 5 years until age 18
 - Every 10 years in adults
 - Prior to pregnancy/pregnancy planning
 - Annually if any one of the following are present: coarctation of the aorta, aortic dilation, bicuspid aortic valve, hypertension

- Takayasu's Arteritis:⁽²⁴⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Brain/Neck/Chest/Abdomen/Pelvis MRA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis ^(16,17)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found ^(18,19)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found ⁽²²⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽²⁵⁾

Chest/Abdomen/Lower Extremity MRA

- To evaluate for an embolic source of lower extremity vascular disease. Echocardiography is also often needed, since the heart is the most commonly reported source of lower extremity emboli, accounting for 55 to 87 percent of events.

Chest/Abdomen/Pelvis MRA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) when CTA is contraindicated or cannot be performed ⁽²⁶⁾
- Marfan syndrome:⁽²⁰⁾
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e. advanced imaging is needed to monitor the thoracic aorta) ^(3,21)
- Williams Syndrome ⁽²³⁾

- When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection ⁽²⁷⁾
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Chest MRA and Chest MRI (or CT)

- When needed for clarification of vascular invasion from tumor

Chest MRA and Heart MRI (or CT)

- When medical necessity criteria indications are met for each Chest MRA (see above) and Heart MRI (see Clinical Guideline Evolent_CG_028) or CT (see Clinical Guideline Evolent_CG_025) (such as for certain congenital malformations when evaluation of extra cardiac and cardiac structures are needed)

Neck/Chest/Abdomen/Pelvis MRA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated ⁽²⁴⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

71555

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Updated references • Added Genetics and Rare Diseases, Evaluation of Tumor, and Contraindications and Preferred Studies sections
April 2023	<ul style="list-style-type: none"> • Simplified PE indications and removed other details from background) • Clarified and updated follow up after repair of TAA. • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline. • Added statement regarding further evaluation of indeterminate findings on prior imaging



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Borger M, Fedak P, Stephens E, Gleason T, Girdauskas E et al. The American Association for Thoracic Surgery consensus guidelines on bicuspid aortic valve-related aortopathy: Full online-only version. *J Thorac Cardiovasc Surg.* Aug 2018; 156: e41-e74. 10.1016/j.jtcvs.2018.02.115.
2. Ferreira Tda A, Chagas I, Ramos R, Souza E. Congenital thoracic malformations in pediatric patients: two decades of experience. *J Bras Pneumol.* Mar-Apr 2015; 41: 196-9. 10.1590/s1806-37132015000004374.
3. Isselbacher E M, Preventza O, Hamilton Black III J, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Journal of the American College of Cardiology.* 2022; 80: e223 - e393. <https://doi.org/10.1016/j.jacc.2022.08.004>.
4. Mariscalco G, Debiec R, Elefteriades J, Samani N, Murphy G. Systematic Review of Studies That Have Evaluated Screening Tests in Relatives of Patients Affected by Nonsyndromic Thoracic Aortic Disease. *Journal of the American Heart Association.* 2018; 7: true. 10.1161/JAHA.118.009302.
5. Erbel R, Aboyans V, Boileau C, Bossone E, Bartolomeo R et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J.* Nov 1, 2014; 35: 2873-926. 10.1093/eurheartj/ehu281.
6. American College of Radiology. ACR Appropriateness Criteria® Thoracic Outlet Syndrome. 2019; 2022:
7. Bonci G, Steigner M, Hanley M, Braun A, Desjardins B et al. ACR Appropriateness Criteria Thoracic Aorta Interventional Planning and Follow-Up. *Journal of the American College of Radiology.* 2017; 14: S570 - S583. 10.1016/j.jacr.2017.08.042.
8. Friedman T, Quencer K, Kishore S, Winokur R, Madoff D. Malignant Venous Obstruction: Superior Vena Cava Syndrome and Beyond. *Semin Intervent Radiol.* Dec 2017; 34: 398-408. 10.1055/s-0037-1608863.
9. Osiro S, Zurada A, Gielecki J, Shoja M, Tubbs R. A review of subclavian steal syndrome with clinical correlation. *Med Sci Monit.* May 2012; 18: Ra57-63. 10.12659/msm.882721.
10. Bae S, Kang E, Choo K, Lee J, Kim S et al. Aortic Arch Variants and Anomalies: Embryology, Imaging Findings, and Clinical Considerations. *J Cardiovasc Imaging.* 2022; 30: 231 - 262.
11. Leo I, Sabatino J, Avesani M, Moscatelli S, Bianco F et al. Non-Invasive Imaging Assessment in Patients with Aortic Coarctation: A Contemporary Review. 2024; 13: 10.3390/jcm13010028.
12. Orozco V U H M F. Thoracic Vascular Variants and Anomalies: Imaging Findings, Review of the Embryology, and Clinical Features. *Indian Journal of Radiology and Imaging.* 2022; 32: 568 - 575. 10.1055/s-0042-1757742.
13. Pascall E, Tulloh R. Pulmonary hypertension in congenital heart disease. *Future Cardiol.* Jul 2018; 14: 343-353. 10.2217/fca-2017-0065.
14. Bennett K, Kent K, Schumacher J, Greenberg C, Scarborough J. Targeting the most important complications in vascular surgery. *J Vasc Surg.* Mar 2017; 65: 793-803. 10.1016/j.jvs.2016.08.107.
15. Choudhury M. Postoperative management of vascular surgery patients: a brief review. *Clin Surg.* 2017; 2: 1584.

16. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
17. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
18. Bowen J M, Hernandez M, Johnson D S, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European journal of human genetics: EJHG*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
19. Byers P. Vascular Ehlers-Danlos Syndrome. 1999 Sep 2 [Updated 2019 Feb 21]. *GeneReviews® [Internet]*. 2019.
20. Dietz H. FBN1-Related Marfan Syndrome. [Updated 2022 Feb 17]. *GeneReviews® [Internet]*. 2022; Accessed May 2024:
21. Weinrich J M, Lenz A, Schön G, Behzadi C, Molwitz I et al. Magnetic resonance angiography derived predictors of progressive dilatation and surgery of the aortic root in Marfan syndrome. *PLOS ONE*. 2022; 17: true.
22. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 March 1]. *GeneReviews® [Internet]*. 2018.
23. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. *GeneReviews® [Internet]*. 2023.
24. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis & Rheumatology (Hoboken, N.J.)*. 2021; 73: 1349-1365. 10.1002/art.41774.
25. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
26. Hedgire S, Saboo S, Galizia M, Aghayev A, Bolen M et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic Valve Replacement: 2023 Update. *Journal of the American College of Radiology: JACR*. 2023; 20: S501-S512. 10.1016/j.jacr.2023.08.009.
27. Kicska G, Hurwitz Kowek L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. *Journal of the American College of Radiology: JACR*. 2021; 18: S474-S481. 10.1016/j.jacr.2021.09.004.

EVOLENT CLINICAL GUIDELINE 041 FOR CERVICAL SPINE CT

Guideline or Policy Number: Evolent_CG_041	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR CERVICAL SPINE CT	3
EVALUATION OF NEUROLOGIC DEFICITS	3
EVALUATION OF NECK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF SUSPECTED MYELOPATHY	6
EVALUATION OF TRAUMA OR ACUTE INJURY	6
EVALUATION OF KNOWN FRACTURE OR NEW COMPRESSION FRACTURES.....	7
CT MYELOGRAM	7
EVALUATION OF TUMOR, CANCER, OR METASTASIS.....	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	8
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS	8
EVALUATION OF KNOWN OR SUSPECTED INFLAMMATORY DISEASE OR ATLANTOAXIAL INSTABILITY	8
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION	9
OTHER INDICATIONS	9
COMBINATION STUDIES	10
Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any Combination)	10
Cervical Spine and Thoracic Spine CT	10
Cervical Spine and/or Thoracic Spine and/or Lumbar Spine CTs (any Combination)	10
Combination Studies for Malignancy for Initial Staging or Restaging	12
Other.....	12
CODING AND STANDARDS	12
CODING	12
CPT Codes	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	13
*CONSERVATIVE TREATMENT.....	13
**HOME EXERCISE PROGRAM	13

CERVICAL MYELOPATHY	13
GAIT AND SPINE IMAGING	14
<i>Table 1</i>	14
CT MYELOGRAM	15
CONTRAINDICATION AND PREFERRED STUDIES	15
POLICY HISTORY	15
<i>Summary</i>	15
LEGAL AND COMPLIANCE	16
GUIDELINE APPROVAL	16
<i>Committee</i>	16
DISCLAIMER	16
REFERENCES	17

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography (CT) is performed for the evaluation of the cervical spine. CT may be used as the primary imaging modality, or it may complement other modalities. Primary indications for CT include conditions, e.g., traumatic, neoplastic, and infectious. CT is often used to study the cervical spine for conditions such as degenerative disc disease when MRI is contraindicated. CT provides excellent depiction of bone detail and is used in the evaluation of known fractures of the cervical spine and for evaluation of postoperative patients.

Special Note

+If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for inconclusive or show a need for additional or follow-up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR CERVICAL SPINE CT

Evaluation of Neurologic Deficits ^(1,2)

When Cervical Spine MRI is Contraindicated or Inappropriate

- With any of the following new neurological deficits documented on physical exam

- Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)
- Pathologic (e.g., Babinski, Lhermitte's sign⁽³⁾, Chaddock Sign⁽⁴⁾, Hoffman's and other upper motor neuron signs); **OR** abnormal deep tendon reflexes (and not likely caused by plexopathy, or peripheral neuropathy)
- Absent/decreased sensory changes along a particular cervical dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature (and not likely caused by plexopathy or peripheral neuropathy)
- Upper or lower extremity increase muscle tone/spasticity
- New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
- Gait abnormalities (see **Table 1** below for more details)
- Suspected cord compression with any neurological deficits as listed above

Evaluation of Neck Pain ^(5,6)

With any of the Following when Cervical Spine MRI is Contraindicated

- With new or worsening objective **neurologic deficits** on exam, as above
- Failure of **conservative treatment*** for a minimum of six (6) weeks within the last six (6) months;
- **NOTE** - Failure of conservative treatment is defined as one of the following:
 - Lack of meaningful improvement after a full course of treatment; **OR**
 - Progression or worsening of symptoms during treatment; **OR**
 - Documentation of a medical reason the member is unable to participate in treatment
 - *Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute "inability to complete" treatment.*
- With progression or worsening of symptoms during the course of **conservative treatment***
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a cervical radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽⁷⁾
- Isolated neck pain in pediatric population^(8,9) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain
 - Pain lasting > 4 weeks

- Abnormal neurologic examination
- Early morning stiffness and/or gelling
- Night pain that prevents or disrupts sleep
- Radicular pain
- Fever or weight loss or malaise,
- Postural changes (e.g., kyphosis or scoliosis)
- Limp (or refusal to walk in a younger child)

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)⁽¹⁰⁾

Note: If ordered by Neurosurgeon or orthopedic surgeon for purposes of surgical planning, a contraindication to MRI is not required.

- For preoperative evaluation/planning
- CT discogram
- Evaluation of post operative pseudoarthrosis after initial x-rays (CT should not be done before 6 months after surgery)
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽¹¹⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽¹²⁾ (see **neurological deficit** section above).
- When combo requests (see [±]) are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽¹³⁾
 - Combination requests where both cervical spine CT and MRI cervical spine are both approvable (not an all-inclusive list):

- OPLL (Ossification of posterior longitudinal ligament)⁽¹⁴⁾
- Pathologic or complex fractures
- Malignant process of spine with both bony and soft tissue involvement
- Unstable craniocervical junction
- Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Suspected Myelopathy ^(15,16)

When Cervical Spine MRI is Contraindicated

- Does **NOT** require conservative care
- Progressive symptoms including hand clumsiness, worsening handwriting, difficulty with grasping and holding objects, diffuse numbness in the hands, pins and needles sensation, increasing difficulty with balance and ambulation
- Any of the neurological deficits as noted above

Evaluation of Trauma or Acute Injury ⁽¹⁷⁾

- Presents with any of the following neurological deficits as above
- With progression or worsening of symptoms during the course of conservative treatment*
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis) (Both MRI and CT are approvable)^(18,19)
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation
- When office notes specify the patient meets NEXUS (National Emergency X-Radiography Utilization Study) or CCR (Canadian Cervical Rules) criteria for imaging:⁽¹⁷⁾
 - CT for initial imaging
 - MRI when suspect spinal cord or nerve root injury or when patient is obtunded, and CT is negative
 - CT or MRI for treatment planning of unstable spine

MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations

Evaluation of Known Fracture or New Compression Fractures^(17,20)

(With Worsening Neck Pain)

- To assess union of a fracture when physical examination, plain radiographs, or prior imaging suggest delayed or non-healing
- To determine the position of fracture fragments
- With history of malignancy (if MRI is contraindicated or cannot be performed)
- With an associated new focal **neurologic deficit** as above
- Prior to a planned surgery/intervention or if the results of the CT will change management

CT Myelogram^(1,11)

When MRI cannot be Performed/Contraindicated/Surgeon Preference

- When signs and symptoms inconsistent or not explained by the MRI findings
- Demonstration of the site of a CSF leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- Surgical planning, especially regarding to the nerve roots or evaluation of dural sac
- Evaluation of suspected brachial plexus or nerve root injury in the neonate

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following:

MRI is usually the preferred study (CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(6,21,22)

- **Primary tumor**
 - Initial staging primary spinal tumor⁽²³⁾
 - Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
 - Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
 - With an associated new focal **neurologic deficit** as above⁽¹⁷⁾
- **Metastatic tumor**

- With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
- With an associated new focal neurologic deficit⁽¹⁷⁾
- Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or neck pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^(6,24)

Further Evaluation of Indeterminate Findings

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification. When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding⁽⁶⁾
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam). When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.⁽⁶⁾

Evaluation of Known or Suspected Infection/Abscess ⁽²⁵⁾

When Cervical Spine MRI is contraindicated

- As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
- Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings

E.g., Osteomyelitis

Evaluation of Known or Suspected Inflammatory Disease or Atlantoaxial Instability ⁽²⁶⁾

When MRI is Contraindicated or for Surgical Treatment Planning

- In rheumatoid arthritis with neurologic signs/symptoms, or evidence of subluxation on radiographs (lateral radiograph in flexion and neutral should be the initial study)^(27,28)
 - Patients with negative radiographs but symptoms suggestive of cervical instability or in patients with neurologic deficits

- High-risk disorders affecting the atlantoaxial articulation, such as Down syndrome, Marfan syndrome with neurological signs/symptoms, abnormal neurological exam, or evidence of abnormal or inconclusive radiographs of the cervical spine⁽²⁹⁾
- Spondyloarthropathies, known or suspected
 - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and appropriate rheumatology workup

Evaluation of Spine Abnormalities Related to Immune System Suppression ⁽²⁵⁾

When Cervical Spine MRI is Contraindicated

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications

When MRI is Contraindicated or Cannot be Performed

Note: See combination requests, below, for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected), based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(30,31,32)
 - Known Arnold-Chiari syndrome (For initial imaging (one-time initial modality assessment) see combination below)
 - Known Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis with new or changing signs/symptoms or exam findings consistent with spinal cord pathology⁽³³⁾
 - Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation
 - Achondroplasia (one Cervical Spine MRI to assess the craniocervical junction, as early as possible (even in asymptomatic cases)⁽³⁴⁾
- Syrinx or syringomyelia (known or suspected)⁽³⁵⁾
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptoms
- Toe walking in a child with signs/symptoms of myelopathy localized to the Cervical Spine⁽³⁶⁾

- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)
 - After detailed neurological exam and appropriate initial work up

Initial evaluation of trigeminal neuralgia not explained on recent Brain imaging

Combination Studies

Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any Combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms (37,38,39,40,41)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (CT spine imaging in this scenario is usually CT myelogram) see background
 - Suspected leptomeningeal carcinomatosis (see background) (40)
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula - CT spine imaging in this scenario is usually CT myelogram)

Cervical Spine and Thoracic Spine CT

- Initial evaluation of known or suspected syrinx or syringomyelia
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis) (35)
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptom

Cervical Spine and/or Thoracic Spine and/or Lumbar Spine CTs (any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular

segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception: Indications for combination studies^(42,43): Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(44,45,46) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽⁴⁷⁾
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following⁽⁴⁸⁾:
 - Progressive spinal deformity;
 - Neurologic deficit (new or unexplained);
 - Early onset;
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies);
 - Pre-operative planning; **OR**
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(32,49)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed^(30,33)
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽³⁰⁾
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(30,31,32) when anesthesia required for imaging⁽⁵⁰⁾ (e.g., meningocele, lipomenocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (imaging also includes brain; CT spine imaging in this scenario is usually CT myelogram)

- Suspected leptomeningeal carcinomatosis (LC)⁽⁵¹⁾
- Any combination of these for spinal survey in patient with metastases
- Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽¹¹⁾
- CT myelogram when meets above guidelines and MRI is contraindicated or for surgical planning
- Post-procedure (discogram) CT

Combination Studies for Malignancy for Initial Staging or Restaging

- Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:
 - Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine

Other

- When MRI is contraindicated **OR** cannot be performed **OR** Surgeon preference

CODING AND STANDARDS

Coding

CPT Codes

72125, 72126, 72127, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace

<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Treatment

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy
- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

**Home Exercise Program

The following two elements are required to meet conservative therapy guidelines for HEP: ⁽¹⁰⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**
- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Cervical Myelopathy

Symptom severity varies, and a high index of suspicion is essential for making the proper diagnosis in early cases. Symptoms of pain and radiculopathy may not be present. The natural history of myelopathy is characterized by neurological deterioration. The most frequently encountered symptom is gait abnormality (86%) followed by increased muscular reflexes (79.1%), pathological reflexes (65.1%), paresthesia of upper limb (69.8%) and pain (67.4%).⁽¹⁵⁾

Gait and Spine Imaging

Table 1 (52,53,54,55,56,57)

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

CT Myelogram

Myelography is the instillation of intrathecal contrast media under fluoroscopy. Patients are then imaged with CT to evaluate for spinal canal pathology. Although this technique has diminished greatly due to the advent of MRI due to its non-invasiveness and superior soft-tissue contrast, myelography is still a useful technique for conventional indications, such as spinal stenosis, when MRI is contraindicated or nondiagnostic or surgeon preference (see guidelines above), brachial plexus injury in neonates, radiation therapy treatment planning, and cerebrospinal fluid (CSF) leak.⁽⁵⁸⁾

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2025	<ul style="list-style-type: none"> • Aligned Combinations Studies across guidelines • Added Contraindications and Preferred Studies section • Reduced background section • Updated references
May 2023	<ul style="list-style-type: none"> • Updated references • Updated background section • Clarified pathological reflexes • Added pseudoarthrosis to surgery section • Added “Further evaluation of indeterminate or questionable findings on prior imaging”: • Clarified cerebellar ataxia in gait table • Added: “Initial evaluation of trigeminal neuralgia not explained on recent Brain imaging” • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Removed Additional Resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bono C, Ghiselli G, Gilbert T, et al. Evidence-based clinical guideline for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society. 2010; 1-181.
2. Magnus W, Viswanath O, Viswanathan V, et al. Cervical Radiculopathy. [Updated 2024 Jan 31]. StatPearls Publishing. 2024;
3. Teoli D, Rocha Cabrero F, Smith T, Ghassemzadeh S. Lhermitte Sign [Updated 2023 Jul 21]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK493237/>.
4. Acharya A B, Fowler J B. Chaddock Reflex [Updated 2023 Jun 26]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK519555/>.
5. Costello J E, Shah L M, Peckham M E, Hutchins T A, Anzai Y. Imaging Appropriateness for Neck Pain. Journal of the American College of Radiology. 2020; 17: 584 - 589. 10.1016/j.jacr.2019.11.005.
6. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. Journal of the American College of Radiology. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
7. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
8. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. Journal of the American College of Radiology. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
9. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. Children (Basel, Switzerland). 2022; 9: 10.3390/children9020192.
10. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. Journal of the American College of Radiology. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
11. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. RadioGraphics. 2020; 40: 470 - 484. 10.1148/rg.2020190135.
12. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. Biomed Res Int. 2021; 2021: 9940001. 10.1155/2021/9940001.
13. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. Trauma Surgery & Acute Care Open. 2016; 1: true. 10.1136/tsaco-2016-000016.
14. Choi B, Song K, Chang H. Ossification of the posterior longitudinal ligament: a review of literature. Asian Spine J. Dec 2011; 5: 267-76. 10.4184/asj.2011.5.4.267.
15. Donnally III C, Hanna A, Odom C. Myelopathy [Updated 2023 Jan 15]. StatPearls Publishing. 2023; Accessed April 2024:
16. Agarwal V, Shah L M, Parsons M S, Boulter D J, Cassidy R C et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. Journal of the American College of Radiology. 2021; 18: S73 - S82. 10.1016/j.jacr.2021.01.020.
17. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. Journal of the American College of Radiology. 2019; 16: S264 - S285. 10.1016/j.jacr.2019.02.002.

18. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S340 - S360. 10.1016/j.jacr.2021.08.003.
19. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. *Quantitative imaging in medicine and surgery*. 2021; 11: 2499-2508. 10.21037/qims-20-962.
20. Khan M A, Jennings J W, Baker J C, Smolock A R, Shah L M et al. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S102 - S124. 10.1016/j.jacr.2023.02.015.
21. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
22. Roberts C C, Daffner R H, Weissman B N, Bancroft L, Bennett D L et al. ACR Appropriateness Criteria® on Metastatic Bone Disease. *Journal of the American College of Radiology*. 2010; 7: 400 - 409. 10.1016/j.jacr.2010.02.015.
23. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;
24. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023;
25. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology*. 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
26. Lacy J, Bajaj J, Gillis C. Atlantoaxial Instability. [Updated 2023 Jun 12]. StatPearls Publishing. 2023;
27. Colebatch A N, Edwards C J, Østergaard M, van der Heijde D, Balint P V et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis*. 2013; 72: 804-14. 10.1136/annrheumdis-2012-203158.
28. Mańczak M, Gasik R. Cervical spine instability in the course of rheumatoid arthritis - imaging methods. *Reumatologia*. 2017; 55: 201-207. 10.5114/reum.2017.69782.
29. Henderson F C S, Austin C, Benzel E, Bolognese P, Ellenbogen R et al. Neurological and spinal manifestations of the Ehlers-Danlos syndromes. *Am J Med Genet C Semin Med Genet*. 2017; 175C: 195-211. 10.1002/ajmg.c.31549.
30. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
31. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Morais Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *RadioGraphics*. 2021; 41: 559 - 575. 10.1148/rg.2021200103.
32. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
33. Kular S, Cascella M. Chiari I Malformation. [Updated 2022 Feb 5]. StatPearls Publishing. 2022;
34. Legare J M. Achondroplasia [Updated 2023 May 11]. GeneReviews®. 2023;
35. Shenoy V, Sampath R. Syringomyelia. [Updated 2023 Apr 10]. StatPearls Publishing. 2023;
36. Zileli M, Borkar S, Sinha S, Reinas R, Alves O et al. Cervical Spondylotic Myelopathy: Natural Course and the Value of Diagnostic Techniques -WFNS Spine Committee Recommendations. *Neurospine*. 2019; 16: 386-402. 10.14245/ns.1938240.120.

37. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation [Updated 2023 Sep 4]. StatPearls [Internet]. 2023; Accessed May 2024:
38. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. Insights into imaging. 2019; 10: 3. 10.1186/s13244-019-0686-x.
39. Radic J, Cochrane D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. Paediatr Child Health. Sep 2018; 23: 383-387. 10.1093/pch/pxy012.
40. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management.. Cancer. 2018; 124: 21-35. 10.1002/cncr.30911.
41. Hatgaonkar A M, Mahajan S M, Hatgoankar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations With Hydrosyringomyelia. Cureus. 2024; 16: e55676.
42. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. Journal of the American College of Radiology. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
43. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. Journal of the American College of Radiology. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
44. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. J Neurosurg Pediatr. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
45. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations With Pulmonary Dysfunction. Cureus. 2023; 15: e48900. 10.7759/cureus.48900.
46. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis—Child. Journal of the American College of Radiology. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
47. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. J Child Orthop. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
48. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. Int Orthop. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
49. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. Brain sciences. 2023; 13: 10.3390/brainsci13121658.
50. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. Diagnostics (Basel, Switzerland). 2023; 13: 10.3390/diagnostics13182973.
51. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. Neuro-oncology advances. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
52. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. Wien Klin Wochenschr. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.
53. Chhetri S, Gow D, Shaunak S, Varma A. Clinical assessment of the sensory ataxias; diagnostic algorithm with illustrative cases. Pract Neurol. Aug 2014; 14: 242-51. 10.1136/practneurol-2013-000764.

54. Foster H , Drummond P , Jandial S , Clinch J , Wood M. Evaluation of gait disorders in children. BMJ Best Practice. February 23, 2021; 2023:
55. Haynes K, Wimberly R, VanPelt J, Jo C, Riccio A. Toe Walking: A Neurological Perspective After Referral From Pediatric Orthopaedic Surgeons. J Pediatr Orthop. Mar 2018; 38: 152-156. 10.1097/bpo.0000000000001115.
56. Marshall F. Approach to the elderly patient with gait disturbance. Neurol Clin Pract. Jun 2012; 2: 103-111. 10.1212/CPJ.0b013e31825a7823.
57. Stanford Medicine. Gait Abnormalities. 2023:
58. American College of Radiology (ACR) , American Society of Neuroradiology (ASNR) , Society for Pediatric Radiology (SPR). ACR-ASNR-SPR Practice Parameter for the Performance of Myelography and Cisternography. American Society of Neuroradiology. 2019 [Revised];



EVOLENT CLINICAL GUIDELINE 043 FOR THORACIC SPINE CT

Guideline or Policy Number: Evolent_CG_043	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR THORACIC SPINE CT	4
EVALUATION OF NEUROLOGIC DEFICITS	4
EVALUATION OF BACK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF SUSPECTED MYELOPATHY	6
EVALUATION OF TRAUMA OR ACUTE INJURY	6
EVALUATION OF KNOWN FRACTURE OR KNOWN/NEW COMPRESSION FRACTURES	7
CT MYELOGRAM ^(10,21)	7
EVALUATION OF TUMOR, CANCER, OR METASTASIS	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	8
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS/INFLAMMATORY DISEASE	8
SPONDYLOARTHROPATHIES	8
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION	9
OTHER INDICATIONS FOR THORACIC SPINE CT	9
COMBINATION STUDIES	10
Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any Combination)	10
Cervical Spine and Thoracic Spine CT	10
Cervical Spine and/or Thoracic Spine and/or Lumbar Spine CTs (Any Combination)	10
Combination Studies for Malignancy for Initial Staging or Restaging	12
CODING AND STANDARDS	12
CODING	12
CPT Codes	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
*CONSERVATIVE TREATMENT	12
**HOME EXERCISE PROGRAM	13
GAIT AND SPINE IMAGING	13

<i>Table 1</i>	13
CONTRAINDICATIONS AND PREFERRED STUDIES	14
POLICY HISTORY	14
<i>Summary</i>	14
LEGAL AND COMPLIANCE	15
GUIDELINE APPROVAL.....	15
<i>Committee</i>	15
DISCLAIMER.....	15
REFERENCES	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography is used for the evaluation, assessment of severity, and follow-up of diseases of the spine. Its use in the thoracic spine is limited, however, due to the lack of epidural fat in this part of the body. CT myelography improves the contrast severity of CT, but it is also invasive. CT may be used for conditions, e.g., degenerative changes, infection, and immune suppression, when magnetic resonance imaging (MRI) is contraindicated. It may also be used in the evaluation of tumors, cancer, or metastasis in the thoracic spine, and it may be used for preoperative and post-surgical evaluations. CT obtains images from different angles and uses computer processing to show a cross-section of body tissues and organs. CT is fast and is often performed in acute settings. It provides good visualization of cortical bone.

Special Note

If there is a combination request for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for additional or follow-up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient (the entire spinal cord **and/or** autonomic postganglionic chain must be assessed).

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR THORACIC SPINE CT

Evaluation of Neurologic Deficits ^(1,2)

When Thoracic Spine MRI is Contraindicated or Inappropriate

- With any of the following new neurological deficits documented on physical exam
 - Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)⁽³⁾
 - Pathologic (e.g., Babinski, Lhermitte's sign⁽⁴⁾, Chaddock Sign⁽⁵⁾, Hoffman's and other upper motor neuron signs); **OR** abnormal deep tendon reflexes (and not likely caused by plexopathy, or peripheral neuropathy)
 - Absent/decreased sensory changes along a particular thoracic dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature weakness (and not likely caused by plexopathy, or peripheral neuropathy)
 - Upper or lower extremity increase muscle tone/spasticity and likely localized to the thoracic spinal cord
 - New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
 - Gait abnormalities (see **Table 1** below for more details)
- Suspected cord compression with any neurological deficits as listed above

Evaluation of Back Pain ⁽⁶⁾

With any of the following when Thoracic Spine MRI is Contraindicated

- With new or worsening objective **neurologic deficits** on exam, as above
- Failure of **conservative treatment*** for a minimum of six (6) weeks within the last six (6) months;

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute "inability to complete" treatment.

- With progression or worsening of symptoms during the course of **conservative treatment***

- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽⁷⁾
- Isolated back pain in pediatric population^(8,9) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain
 - Pain lasting > 4 weeks
 - Abnormal neurologic examination
 - Early morning stiffness and/or gelling
 - Night pain that prevents or disrupts sleep
 - Radicular pain
 - Fever or weight loss or malaise
 - Postural changes (e.g., kyphosis or scoliosis)
 - Limp (or refusal to walk in a younger child)

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)⁽⁶⁾

Note: If ordered by neurosurgeon or orthopedic surgeon for purposes of surgical planning, a contraindication to MRI is not required.

- For preoperative evaluation/planning
- CT discogram
- Evaluation of post operative pseudoarthrosis after initial x-rays (CT should not be done before 6 months after surgery)
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽¹⁰⁾
- Prior to spinal cord stimulator to exclude canal stenosis if no prior imaging of the thoracic spine has been done recently and MRI is contraindicated
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for

the type and area(s) requested (routine surveillance post-op not indicated without symptoms)

- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽¹¹⁾(see **neurological deficit** section above).
- When combo requests are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽¹²⁾
 - Combination requests where both thoracic spine CT and MRI thoracic spine are both approvable (not an all-inclusive list):
 - OPLL (Ossification of posterior longitudinal ligament)
 - Most common in cervical spine (rare but more severe in thoracic spine)⁽¹³⁾
 - Pathologic or complex fractures
 - Malignant process of spine with both bony and soft tissue involvement
 - Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Suspected Myelopathy ^(14,15)

When Thoracic Spine MRI is Contraindicated

- Does **NOT** require conservative care
- Progressive symptoms including unsteadiness; broad-based gait; increased muscle tone; pins and needles sensation; weakness and wasting of the lower limbs; diminished sensation to light touch, temperature, proprioception, and vibration; limb hyperreflexia and pathologic reflexes; bowel and bladder dysfunction in more severe cases
- Any of the **neurological deficits** as noted above

Evaluation of Trauma or Acute Injury ⁽¹⁶⁾

- Presents with any of the following **neurological deficits** as above
- With progression or worsening of symptoms during the course of **conservative treatment***
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis, diffuse idiopathic skeletal hyperostosis) (Both MRI and CT are approvable)^(17,18,19)
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation

MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations

Evaluation of Known Fracture or Known/New Compression Fractures ^(16,20)

(With Worsening Back Pain)

- To assess union of a fracture when physical examination, plain radiographs, or prior imaging suggest delayed or non-healing
- To determine the position of fracture fragments
- With history of malignancy (if MRI is contraindicated or cannot be performed)
- With an associated new focal **neurologic deficit** as above
- Prior to a planned surgery/intervention or if the results of the CT will change management

CT Myelogram ^(10,21)

When MRI cannot be Performed/Contraindicated/Surgeon Preference

When signs and symptoms inconsistent or not explained by the MRI findings

- Demonstration of the site of a CSF leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- Surgical planning, especially regarding to the nerve roots or evaluation of dural sac

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following:

MRI is usually the preferred study (CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(22,23)

- **Primary tumor**
 - Initial staging primary spinal tumor⁽²⁴⁾
 - Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer

- Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal **neurologic deficit** as above⁽¹⁶⁾
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
 - With an associated new focal **neurologic deficit**⁽¹⁶⁾
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or neck pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^(25,26)

Further Evaluation of Indeterminate Findings

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification. When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.
- One follow-up exam of a prior indeterminate MRI/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam). (When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding).

Evaluation of Known or Suspected Infection/Abscess/Inflammatory disease⁽²⁷⁾

When Thoracic Spine MRI is contraindicated or cannot be performed

- As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
- Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings

E.g., Osteomyelitis

Spondyloarthropathies

- Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and appropriate rheumatology workup

Evaluation of Spine Abnormalities Related to Immune System Suppression⁽²⁷⁾

When Thoracic Spine MRI is Contraindicated

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications for Thoracic Spine CT

When MRI is Contraindicated or Cannot be Performed

Note: See **combination requests** below for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(28,29,30)
- Known Arnold-Chiari syndrome (For **initial imaging** (one-time initial modality assessment) see **combination** below)
 - Known Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis with new or changing signs/symptoms or exam findings consistent with spinal cord pathology⁽³¹⁾
 - Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation
- Syrinx or syringomyelia (known or suspected)⁽³²⁾
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptoms
- Toe walking in a child with signs/symptoms of myelopathy localized to the thoracic spine
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)- After detailed neurological exam and appropriate initial work up completed
- Follow-up known neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's) with new or worsening signs/symptoms or to evaluate treatment response

Combination Studies

Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any Combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms (33,34,35,36,37)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (CT spine imaging in this scenario is usually CT myelogram) see background
 - Suspected leptomeningeal carcinomatosis (see background) (36)
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula - CT spine imaging in this scenario is usually CT myelogram)

Cervical Spine and Thoracic Spine CT

- Initial evaluation of known or suspected syrinx or syringomyelia
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)(32)
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptom

Cervical Spine and/or Thoracic Spine and/or Lumbar Spine CTs (Any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception: Indications for combination studies^(38,39): Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:

- Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(40,41,42) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
- In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽⁴³⁾
- Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
- Scoliosis with any of the following⁽⁴⁴⁾:
 - Progressive spinal deformity;
 - Neurologic deficit (new or unexplained);
 - Early onset;
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies);
 - Pre-operative planning; **OR**
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(30,45)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed^(28,31)
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽²⁸⁾
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(28,29,30) when anesthesia required for imaging⁽⁴⁶⁾ (e.g., meningocele, lipomeningocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (imaging also includes brain; CT spine imaging in this scenario is usually CT myelogram)
 - Suspected leptomeningeal carcinomatosis (LC)⁽⁴⁷⁾
 - Any combination of these for spinal survey in patient with metastases
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic

headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽¹⁰⁾

- CT myelogram when meets above guidelines and MRI is contraindicated or for surgical planning
- Post-procedure (discogram) CT

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

72128, 72129, 72130, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

***Conservative Treatment**

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy

- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

****Home Exercise Program**

The following two elements are required to meet conservative therapy guidelines for HEP: ⁽⁶⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**
- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Gait and Spine Imaging

Table 1 ⁽⁴⁸⁾

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline

Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Aligned Combination Studies across guidelines • Added Contraindications and Preferred Studies section • Reduced Background Section • Updated references
May 2023	<ul style="list-style-type: none"> • Updated references

	<ul style="list-style-type: none"> • Updated background section • Clarified pathological reflexes • Added pseudoarthrosis to surgery section • Added “Further evaluation of indeterminate or questionable findings on prior imaging”: • Clarified cerebellar ataxia in gait table • Removed radicular pain and malaise from Isolated Back Pain in the Pediatric population: Red flags. • Removed Additional Resources • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members’ health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bono C, Ghiselli G, Gilbert T, et al. Evidence-based clinical guideline for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society. 2010; 1-181.
2. Magnus W, Viswanath O, Viswanathan V, et al. Cervical Radiculopathy. [Updated 2024 Jan 31]. StatPearls Publishing. 2024;
3. Dydyk A, Hameed S. Lumbosacral Plexopathy [Updated 2023 Jul 16]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK556030/>.
4. Teoli D, Rocha Cabrero F, Smith T, Ghassemzadeh S. Lhermitte Sign [Updated 2023 Jul 21]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK493237/>.
5. Acharya A B, Fowler J B. Chaddock Reflex [Updated 2023 Jun 26]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK519555/>.
6. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. Journal of the American College of Radiology. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
7. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy [Updated 2023 Aug 23]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK563152/>.
8. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. Journal of the American College of Radiology. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
9. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. Children (Basel). 2022; 9: 192. [10.3390/children9020192](https://doi.org/10.3390/children9020192).
10. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. Radio Graphics. 2020; 40: 470 - 484. [10.1148/rg.2020190135](https://doi.org/10.1148/rg.2020190135).
11. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. Biomed Res Int. 2021; 2021: 9940001. [10.1155/2021/9940001](https://doi.org/10.1155/2021/9940001).
12. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. Trauma Surgery; Acute Care Open. 2016; 1: true. [10.1136/tsaco-2016-000016](https://doi.org/10.1136/tsaco-2016-000016).
13. Choi B W, Song K J, Chang H. Ossification of the posterior longitudinal ligament: a review of literature. Asian Spine J. 2011; 5: 267-76. [10.4184/asj.2011.5.4.267](https://doi.org/10.4184/asj.2011.5.4.267).
14. Donnally III C, Hanna A, Odom C. Myelopathy [Updated 2023 Jan 15]. StatPearls Publishing. 2023; Accessed April 2024:
15. Agarwal V, Shah L M, Parsons M S, Boulter D J, Cassidy R C et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. Journal of the American College of Radiology. 2021; 18: S73 - S82. [10.1016/j.jacr.2021.01.020](https://doi.org/10.1016/j.jacr.2021.01.020).
16. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. Journal of the American College of Radiology. 2019; 16: S264 - S285. [10.1016/j.jacr.2019.02.002](https://doi.org/10.1016/j.jacr.2019.02.002).
17. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. Journal of the American College of Radiology. 2021; 18: S340 - S360. [10.1016/j.jacr.2021.08.003](https://doi.org/10.1016/j.jacr.2021.08.003).

18. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. *Quantitative imaging in medicine and surgery*. 2021; 11: 2499-2508. 10.21037/qims-20-962.
19. Taljanovic M, Hunter T, Wisneski R, Seeger J, Friend C et al. Imaging characteristics of diffuse idiopathic skeletal hyperostosis with an emphasis on acute spinal fractures: review. *AJR Am J Roentgenol*. 2009; 193: S10-9, Quiz S20-4. 10.2214/AJR.07.7102.
20. Khan M A, Jennings J W, Baker J C, Smolock A R, Shah L M et al. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S102 - S124. 10.1016/j.jacr.2023.02.015.
21. Kreiner D, Hwang S, Easa J, Resnick D, Baisden J et al. Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy. *North American Spine Society*. 2012;
22. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
23. Roberts C C, Daffner R H, Weissman B N, Bancroft L, Bennett D L et al. ACR Appropriateness Criteria® on Metastatic Bone Disease. *Journal of the American College of Radiology*. 2010; 7: 400 - 409. 10.1016/j.jacr.2010.02.015.
24. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;
25. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. *Journal of the American College of Radiology*. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
26. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023;
27. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology*. 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
28. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
29. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Moraes Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *Radio Graphics*. 2021; 41: 559 - 575. 10.1148/rg.2021200103.
30. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
31. Kular S, Cascella M. Chiari I Malformation. [Updated 2022 Feb 5]. StatPearls Publishing. 2022;
32. Shenoy V, Sampath R. Syringomyelia. [Updated 2023 Apr 10]. StatPearls Publishing. 2023;
33. Hatgaonkar A M, Mahajan S M, Hatgoankar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations with Hydrosyringomyelia. *Cureus*. 2024; 16: e55676.
34. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation [Updated 2023 Sep 4]. StatPearls [Internet]. 2023; Accessed May 2024:
35. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights into imaging*. 2019; 10: 3. 10.1186/s13244-019-0686-x.

36. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. 2018; 124: 21-35. 10.1002/cncr.30911.
37. Radic J A E, Cochrane D D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. 2018; 23: 383-387. 10.1093/pch/pxy012.
38. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
39. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
40. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
41. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations with Pulmonary Dysfunction. *Cureus*. 2023; 15: e48900. 10.7759/cureus.48900.
42. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis—Child. *Journal of the American College of Radiology*. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
43. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. *J Child Orthop*. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
44. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. *Int Orthop*. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
45. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. *Brain sciences*. 2023; 13: 10.3390/brainsci13121658.
46. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. *Diagnostics (Basel, Switzerland)*. 2023; 13: 10.3390/diagnostics13182973.
47. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. *Neuro-oncology advances*. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
48. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. *Wien Klin Wochenschr*. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.

*Evolent	
Clinical guidelines THORACIC SPINE CT	Original Date: September 1997
CPT Codes: 72128, 72129, 72130	Last Revised Date: December 2023
Guideline Number: Evolent_CG_043	Implementation Date: July 2024

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR THORACIC SPINE CT

***If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:**

- **Inconclusive or show a need for additional or follow up imaging evaluation OR**
- **The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient (the entire spinal cord and/or autonomic postganglionic chain must be assessed)**

(*Unless approvable in the combination section as noted in the guidelines)

For evaluation of neurologic deficits when Thoracic Spine MRI is contraindicated or inappropriate¹⁻³

- With any of the following new neurological deficits documented on physical exam
 - Extremity muscular weakness (and not likely caused by plexopathy, or peripheral neuropathy)^{4, 5}
 - Pathologic (e.g., Babinski, Chaddock Sign) reflexes

- Pathologic (e.g., Babinski, Lhermitte's sign, Chaddock Sign, Hoffman's and other upper motor neuron signs); **OR** abnormal deep tendon reflexes (and not likely caused by plexopathy, or peripheral neuropathy)
- Absent/decreased sensory changes along a particular thoracic dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature weakness (and not likely caused by plexopathy, or peripheral neuropathy)
- Upper or lower extremity increase muscle tone/spasticity and likely localized to the thoracic spinal cord
- New onset bowel or bladder dysfunction (e.g., retention or incontinence) - not related to an inherent bowel or bladder process
- Gait abnormalities (see [Table 1](#) for more details)
- Suspected cord compression with any neurological deficits as listed above

For evaluation of back pain with any of the following when Thoracic Spine MRI is contraindicated⁶⁻⁹

- With new or worsening objective [neurologic deficits](#) on exam, as above
- Failure of conservative treatment* for a minimum of six (6) weeks within the last six (6) months;¹⁰

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute "inability to complete" treatment.

- With progression or worsening of symptoms during the course of conservative treatment*
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)¹¹
- Isolated back pain in pediatric population¹² – conservative care not required if red flags present. Red flags that prompt imaging include any of the following:
 - Age 5 or younger, **OR**
 - Constant pain, **OR**
 - Pain lasting > 4 weeks, **OR**
 - Abnormal neurologic examination, **OR**
 - Early morning stiffness and/or gelling, **OR**
 - Night pain that prevents or disrupts sleep, **OR**
 - Radicular pain, **OR**
 - Fever or weight loss or malaise, **OR**
 - Postural changes (e.g., kyphosis or scoliosis), **OR**

- Limp (or refusal to walk in a younger child < 5yo)

As part of initial pre-operative/post-operative/procedural evaluation (“CT best examination to assess for hardware complication, extent of fusion and pseudoarthrosis”^{13, 14} and MRI for cord, nerve root compression, disc pathology, or post-op infection)

If ordered by Neurosurgeon or orthopedic surgeon for purposes of surgical planning. A contraindication to MRI is not required

- For preoperative evaluation/planning
- CT discogram
- Evaluation of post operative pseudoarthrosis after initial x-rays (CT should not be done before 6 months after surgery)
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram)¹⁵
- Prior to spinal cord stimulator to exclude canal stenosis if no prior imaging of the thoracic spine has been done recently and MRI is contraindicated
- A follow-up study may be needed to help evaluate a patient’s progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively ^{13, 16} - see [neurological deficit](#) section above
- When combo requests are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously, i.e., the need for both soft tissue and bony anatomy is required¹⁷
 - Combination requests where both thoracic spine CT and MRI thoracic spine are both approvable (not an all-inclusive list):
 - OPLL (Ossification of posterior longitudinal ligament)
 - Most common in cervical spine (rare but more severe in thoracic spine)¹⁸
 - Pathologic or complex fractures
 - Malignant process of spine with both bony and soft tissue involvement
 - Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

For evaluation of suspected myelopathy when Thoracic Spine MRI is contraindicated¹⁹⁻²³

- Does NOT require conservative care

- Progressive symptoms including unsteadiness; broad-based gait; increased muscle tone; pins and needles sensation; weakness and wasting of the lower limbs; diminished sensation to light touch, temperature, proprioception, and vibration; limb hyperreflexia and pathologic reflexes; bowel and bladder dysfunction in more severe cases
- Any of the [neurological deficits](#) as noted above

For evaluation of trauma or acute injury²⁴

- Presents with any of the following [neurological deficits](#) as above
- With progression or worsening of symptoms during the course of a trial of conservative treatment*
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis, diffuse idiopathic skeletal hyperostosis) (Both MRI and CT would be approvable)²⁵⁻²⁷
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation

("MRI and CT provide complementary information. When indicated It is appropriate to perform both examinations")²⁴

For evaluation of known fracture or known/new compression fractures with worsening back pain^{24, 28}

- To assess union of a fracture when physical examination, plain radiographs, or prior imaging suggest delayed or non-healing
- To determine the position of fracture fragments
- With history of malignancy (if MRI is contraindicated or cannot be performed)
- With an associated new focal [neurologic deficit](#) as above²⁹
- Prior to a planned surgery/intervention or if the results of the CT will change management

CT myelogram: When MRI cannot be performed/contraindicated/surgeon preference³⁰⁻³⁴

- When signs and symptoms are inconsistent or not explained by the MRI findings
- Demonstration of the site of a CSF leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- Surgical planning, especially regarding to the nerve roots or evaluation of dural sac

For evaluation of tumor, cancer, or metastasis with any of the following:

(MRI is usually the preferred study- CT may be needed to further characterize solitary indeterminate lesions seen on MRI)³⁵

- **Primary tumor**

- Initial staging primary spinal tumor³⁶
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal [neurologic deficit](#) as above²⁹
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification OR inconclusive findings on a prior imaging exam
 - With an associated new focal neurologic deficit²⁹
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or neck pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^{37, 38}

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification. When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.) (When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.)

Indication for combination studies for the initial pre-therapy staging of cancer, OR active monitoring for recurrence as clinically indicated, OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine, or Lumbar Spine

For evaluation of known or suspected infection (osteomyelitis), abscess or inflammatory disease when Thoracic MRI is contraindicated or cannot be performed^{39, 40}

- As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings⁴¹
- Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings⁴²

Spondyloarthropathies

- Initial staging primary spinal tumor³⁶
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal [neurologic deficit](#) as above²⁹
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification OR inconclusive findings on a prior imaging exam
 - With an associated new focal neurologic deficit²⁹
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or neck pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^{37, 38}

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification. When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.) (When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.)

Indication for combination studies for the initial pre-therapy staging of cancer, OR active monitoring for recurrence as clinically indicated, OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine, or Lumbar Spine

For evaluation of known or suspected infection (osteomyelitis), abscess or inflammatory disease when Thoracic MRI is contraindicated or cannot be performed^{39, 40}

- As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings⁴¹
- Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings⁴²

Spondyloarthropathies

- Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and appropriate rheumatology workup

For evaluation of spine abnormalities related to immune system suppression, e.g., HIV, chemotherapy, leukemia, or lymphoma when Thoracic MRI is contraindicated³⁹

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

Other Indications for a Thoracic Spine CT when MRI is contraindicated or cannot be performed

(Note- See [combination requests](#), below, for initial advanced imaging assessment and pre-operatively)

- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata⁴³⁻⁴⁵
- Known Arnold-Chiari syndrome (For [initial imaging](#) (one-time initial modality assessment) see combination below)
 - Known Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis with new or changing signs/symptoms or exam findings consistent with spinal cord pathology⁴⁶
 - Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation
- Syrinx or syringomyelia (known or suspected)
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)⁴⁷
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptoms
- Toe walking in a child with signs/symptoms of myelopathy localized to the Thoracic Spine
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)
 - After detailed neurological exam and appropriate initial work up

COMBINATION STUDIES WITH THORACIC SPINE CT WHEN MRI IS CONTRAINDICATED OR CANNOT BE PERFORMED OR SURGEON PREFERENCE

Cervical and Thoracic CT

- Initial evaluation of known or suspected syrinx or syringomyelia
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)⁴⁷
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptom

Any combination of Cervical and/or Thoracic and/or Lumbar CTs

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception- Indications for combination studies^{48, 49}: Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10⁵⁰⁻⁵² (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁵³
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following⁵⁴:
 - Progressive spinal deformity;
 - Neurologic deficit (new or unexplained);
 - Early onset;
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies);
 - Pre-operative planning; OR
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^{55, 56}
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed^{44, 50}
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele)
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,⁴³⁻⁴⁵ when anesthesia required for imaging⁵⁷ (e.g., meningocele, lipomeningocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (imaging also includes brain; CT spine imaging in this scenario is usually CT myelogram)- See [Overview](#)
 - Suspected leptomeningeal carcinomatosis (LC)⁵⁸- See [Overview](#)

- Any combination of these for spinal survey in patient with metastases
 - Tumor evaluation and monitoring in neurocutaneous syndromes
 - CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))¹⁵
 - CT myelogram when meets above guidelines and MRI is contraindicated or for surgical planning
 - Post-procedure (discogram) CT
-

BACKGROUND

Computed tomography is used for the evaluation, assessment of severity, and follow-up of diseases of the spine. Its use in the thoracic spine is limited, however, due to the lack of epidural fat in this part of the body. CT myelography improves the contrast severity of CT, but it is also invasive. CT may be used for conditions, e.g., degenerative changes, infection, and immune suppression, when magnetic resonance imaging (MRI) is contraindicated. It may also be used in the evaluation of tumors, cancer, or metastasis in the thoracic spine, and it may be used for preoperative and post-surgical evaluations. CT obtains images from different angles and uses computer processing to show a cross-section of body tissues and organs. CT is fast and is often performed in acute settings. It provides good visualization of cortical bone.

OVERVIEW

*Conservative Treatment

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy
- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

**Home Exercise Program (HEP)

The following two elements are required to meet conservative therapy guidelines for HEP:^{9, 14}

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**

- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Table 1: Gait and spine imaging⁵⁹⁻⁶⁴

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Cerebellar ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

Myelopathy – Symptom severity varies, and a high index of suspicion is essential for making the proper diagnosis in early cases. Symptoms of pain and radiculopathy may not be present. The natural history of myelopathy is characterized by neurological deterioration. The most frequently encountered symptom is gait abnormality (86%), followed by increased muscular reflexes (79.1%), pathological reflexes (65.1%), paresthesia of upper limb (69.8%), and pain (67.4%).⁶⁵

CT Myelogram – Myelography is the instillation of intrathecal contrast media under fluoroscopy. Patients are then imaged with CT to evaluate for spinal canal pathology. Although this technique has diminished greatly due to the advent of MRI and its non-invasiveness and superior soft-tissue contrast, myelography is still a useful technique for conventional indications, such as spinal stenosis, when MRI is contraindicated, nondiagnostic or surgeon preference (see guidelines above), brachial plexus injury in neonates, radiation therapy treatment planning, and cerebrospinal fluid (CSF) leak.⁶⁶

Back Pain with Cancer History – Bone is the third most common site of metastases after the liver and the lungs, and approximately two-thirds of all osseous metastases occur in the spine. Approximately 60–70% of patients with systemic cancer will have spinal metastasis. Radiographic (x-ray) examination should be performed in cases of back pain when a patient has a cancer history, but without known active cancer or a tumor that tends to metastasize to the spine. This can make a diagnosis in many cases. This may occasionally allow for selection of bone scan in lieu of MRI in some cases. When radiographs do not answer the clinical question, then MRI may be appropriate after a consideration of conservative care.

“Neoplasms causing VCF (vertebral compression fractures) include 1) primary bone neoplasms, such as hemangioma (aggressive type) or giant cell tumors, and tumor-like conditions causing bony and cellular remodeling, such as aneurysmal bone cysts, or Paget’s disease (osteitis deformans); ; 2) primary malignant neoplasms including but not limited to multiple myeloma and lymphoma; and 3) metastatic neoplasms, including and not limited to, multiple myeloma and lymphoma, and metastatic neoplasms.”²⁸

Most common spine metastasis involving primary metastasis originate from the following tumors in descending order: breast (21%), lung (19%), prostate (7.5%), renal (5%), gastrointestinal (4.5%), and thyroid (2.5%). While all tumors can seed to the spine, the cancers mentioned above metastasize to the spinal column early in the disease process.³⁷

Drop Metastases⁶⁷ – Drop metastases are intradural extramedullary spinal metastases that arise from intracranial lesions. Common examples of intracranial neoplasms that result in drop metastases include pineal tumors, ependymomas, medulloblastomas, germinomas, primitive neuroectodermal tumors (PNET), glioblastomas multiform, anaplastic astrocytomas, oligodendrogliomas and less commonly choroid plexus neoplasms and teratomas.

Leptomeningeal Carcinomatosis⁶⁸ – Leptomeningeal carcinomatosis is a complication of cancer in which cancerous cells spread to the membranes (meninges) that covers the brain and spinal cord. The most common solid tumors that involve the leptomeninges are breast, lung, melanoma, gastrointestinal, and primary central nervous system tumors.

Table 2: CT and Cutaneous Stigmata⁶⁹

Risk Stratification for Various Cutaneous Markers		
High Risk	Intermediate Risk	Low Risk
<ul style="list-style-type: none"> • Hypertrichosis • Infantile hemangioma • Atretic meningocele • DST • Subcutaneous lipoma • Caudal appendage • Segmental hemangiomas in association with LUMBAR[‡] syndrome 	<ul style="list-style-type: none"> • Capillary malformations (also referred to as NFS or salmon patch when pink and poorly defined or PWS when darker red and well-defined) 	<ul style="list-style-type: none"> • Coccygeal dimple • Light hair • Isolated café au lait spots • Mongolian spots • Hypo- and hypermelanotic macules or papules • Deviated or forked gluteal cleft • Nonmidline lesions
[‡] LUMBAR, lower body hemangioma and other cutaneous defects, urogenital abnormalities, ulcerations, myelopathy, bony defects, anorectal malformations, arterial anomalies, and renal anomalies.		

POLICY HISTORY

Date	Summary
Dec 2023	Conservative treatment language updated in body and background
May 2023	<ul style="list-style-type: none">• Updated references• Updated background section• Clarified pathological reflexes• Added pseudoarthrosis to surgery section• Added “Further evaluation of indeterminate or questionable findings on prior imaging”:• Clarified cerebellar ataxia in gait table• Removed radicular pain and malaise from Isolated Back Pain in the Pediatric population: Red flags.• Removed Additional Resources• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Added statement regarding further evaluation of indeterminate findings on prior imaging
March 2022	<p>Added</p> <ul style="list-style-type: none">• Combination request for overlapping body part statement• Clarified muscle weakness not related to plexopathy or peripheral neuropathy• Clarified bowel and bladder dysfunction – not related to an inherent bowel or bladder problem• Descriptions for tethered cord• Clarified CT myelogram section• Background section of Drop Metastases• Background section of Leptomeningeal Carcinomatosis• Clarified toe walking in pediatric patient with myelopathy for thoracic spine <p>Removed</p> <ul style="list-style-type: none">• Removed from combination section syrinx and syringomyelia and added subsection for cervical and thoracic spine section• Removed pediatric back pain from the total spine combination section

REFERENCES

1. Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society (NASS). Updated 2010. Accessed December 1, 2022. <https://www.spine.org/Portals/0/Assets/Downloads/ResearchClinicalCare/Guidelines/CervicalRadiculopathy.pdf>
2. Acharya AB, Fowler JB. Chaddock Reflex. StatPearls Publishing. Updated June 27, 2022. Accessed December 1, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK519555/>
3. Albert TJ, Murrell SE. Surgical management of cervical radiculopathy. *J Am Acad Orthop Surg*. Nov-Dec 1999;7(6):368-76. doi:10.5435/00124635-199911000-00003
4. Moore KR, Tsuruda JS, Dailey AT. The value of MR neurography for evaluating extraspinal neuropathic leg pain: a pictorial essay. *AJNR Am J Neuroradiol*. Apr 2001;22(4):786-94.
5. Dydyk AM, Hameed S. Lumbosacral Plexopathy. StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC. Updated March 26, 2022. Accessed November 16, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK556030/>
6. Allegri M, Montella S, Salici F, et al. Mechanisms of low back pain: a guide for diagnosis and therapy. *F1000Res*. 2016;5doi:10.12688/f1000research.8105.2
7. American Association of Neurological Surgeons, Congress of Neurological Surgeons. Five things physicians and patients should question: Don't obtain imaging (plain radiographs, magnetic resonance imaging, computed tomography [CT], or other advanced imaging) of the spine in patients with non-specific acute low back pain and without red flags. Choosing Wisely Initiative ABIM Foundation. Updated 2014. Accessed November 19, 2022. <https://www.choosingwisely.org/clinician-lists/american-association-neurological-surgeons-imaging-for-nonspecific-acute-low-back-pain/>
8. Jarvik JG, Gold LS, Comstock BA, et al. Association of early imaging for back pain with clinical outcomes in older adults. *Jama*. Mar 17 2015;313(11):1143-53. doi:10.1001/jama.2015.1871
9. Last AR, Hulbert K. Chronic low back pain: evaluation and management. *Am Fam Physician*. Jun 15 2009;79(12):1067-74.
10. Eubanks JD. Cervical radiculopathy: nonoperative management of neck pain and radicular symptoms. *Am Fam Physician*. Jan 1 2010;81(1):33-40.
11. North American Spine Society. Five things physicians and patients should question: Don't use electromyography (EMG) and nerve conduction studies (NCS) to determine the cause of axial lumbar, thoracic or cervical spine pain. Choosing Wisely Initiative ABIM Foundation. Updated 2019. Accessed December 1, 2022. <https://www.choosingwisely.org/clinician-lists/nass-emg-nerve-conduction-studies-to-determine-cause-of-spine-pain/>
12. American College of Radiology. ACR Appropriateness Criteria® Back Pain—Child. American College of Radiology (ACR). Updated 2016. Accessed December 1, 2022. <https://acsearch.acr.org/docs/3099011/Narrative/>
13. Rao D, Scuderi G, Scuderi C, Grewal R, Sandhu SJ. The Use of Imaging in Management of Patients with Low Back Pain. *J Clin Imaging Sci*. 2018;8:30. doi:10.4103/jcis.JCIS_16_18

14. American College of Radiology. ACR Appropriateness Criteria® Low Back Pain. American College of Radiology (ACR). Updated 2021. Accessed January 29, 2023. <https://acsearch.acr.org/docs/69483/Narrative/>
15. Starling A, Hernandez F, Hoxworth JM, et al. Sensitivity of MRI of the spine compared with CT myelography in orthostatic headache with CSF leak. *Neurology*. Nov 12 2013;81(20):1789-92. doi:10.1212/01.wnl.0000435555.13695.22
16. Corona-Cedillo R, Saavedra-Navarrete MT, Espinoza-Garcia JJ, Mendoza-Aguilar AN, Ternovoy SK, Roldan-Valadez E. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. *Biomed Res Int*. 2021;2021:9940001. doi:10.1155/2021/9940001
17. Fisher BM, Cowles S, Matulich JR, Evanson BG, Vega D, Dissanaik S. Is magnetic resonance imaging in addition to a computed tomographic scan necessary to identify clinically significant cervical spine injuries in obtunded blunt trauma patients? *Am J Surg*. Dec 2013;206(6):987-93; discussion 993-4. doi:10.1016/j.amjsurg.2013.08.021
18. Choi BW, Song KJ, Chang H. Ossification of the posterior longitudinal ligament: a review of literature. *Asian Spine J*. Dec 2011;5(4):267-76. doi:10.4184/asj.2011.5.4.267
19. American College of Radiology. ACR Appropriateness Criteria® Myelopathy. American College of Radiology (ACR). Updated 2020. Accessed January 29, 2023. <https://acsearch.acr.org/docs/69484/Narrative/>
20. Behrbalk E, Salame K, Regev GJ, Keynan O, Boszczyk B, Lidar Z. Delayed diagnosis of cervical spondylotic myelopathy by primary care physicians. *Neurosurg Focus*. Jul 2013;35(1):E1. doi:10.3171/2013.3.Focus1374
21. Davies BM, Mowforth OD, Smith EK, Kotter MR. Degenerative cervical myelopathy. *Bmj*. Feb 22 2018;360:k186. doi:10.1136/bmj.k186
22. de Oliveira Vilaça C, Orsini M, Leite MA, et al. Cervical Spondylotic Myelopathy: What the Neurologist Should Know. *Neurol Int*. Nov 2 2016;8(4):6330. doi:10.4081/ni.2016.6330
23. Waly FJ, Abduljabbar FH, Fortin M, Nooh A, Weber M. Preoperative Computed Tomography Myelography Parameters as Predictors of Outcome in Patients With Degenerative Cervical Myelopathy: Results of a Systematic Review. *Global Spine J*. Sep 2017;7(6):521-528. doi:10.1177/2192568217701101
24. American College of Radiology. ACR Appropriateness Criteria® Suspected Spine Trauma American College of Radiology. Updated 2018. Accessed December 1, 2022. <https://acsearch.acr.org/docs/69359/Narrative/>
25. American College of Radiology. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis. American College of Radiology (ACR). Updated 2021. Accessed December 1, 2022. <https://acsearch.acr.org/docs/3094107/Narrative/>
26. Koivikko MP, Koskinen SK. MRI of cervical spine injuries complicating ankylosing spondylitis. *Skeletal Radiol*. Sep 2008;37(9):813-9. doi:10.1007/s00256-008-0484-x
27. Taljanovic MS, Hunter TB, Wisneski RJ, et al. Imaging characteristics of diffuse idiopathic skeletal hyperostosis with an emphasis on acute spinal fractures: review. *AJR Am J Roentgenol*. Sep 2009;193(3 Suppl):S10-9, Quiz S20-4. doi:10.2214/ajr.07.7102

28. American College of Radiology. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures. American College of Radiology. Updated 2022. Accessed December 1, 2022. <https://acsearch.acr.org/docs/70545/Narrative/>
29. Alexandru D, So W. Evaluation and management of vertebral compression fractures. *Perm J*. Fall 2012;16(4):46-51. doi:10.7812/tpp/12-037
30. Grams AE, Gempt J, Förschler A. Comparison of spinal anatomy between 3-Tesla MRI and CT-myelography under healthy and pathological conditions. *Surg Radiol Anat*. Jul 2010;32(6):581-5. doi:10.1007/s00276-009-0601-0
31. Morita M, Miyauchi A, Okuda S, Oda T, Iwasaki M. Comparison between MRI and myelography in lumbar spinal canal stenosis for the decision of levels of decompression surgery. *J Spinal Disord Tech*. Feb 2011;24(1):31-6. doi:10.1097/BSD.0b013e3181d4c993
32. Naganawa T, Miyamoto K, Ogura H, Suzuki N, Shimizu K. Comparison of magnetic resonance imaging and computed tomogram-myelography for evaluation of cross sections of cervical spinal morphology. *Spine (Phila Pa 1976)*. Jan 1 2011;36(1):50-6. doi:10.1097/BRS.0b013e3181cb469c
33. Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy. North American Spine Society (NASS). Updated 2012. Accessed December 1, 2022. <https://www.spine.org/Portals/0/Assets/Downloads/ResearchClinicalCare/Guidelines/LumbarDiscHerniation.pdf>
34. Ozdoba C, Gralla J, Rieke A, Binggeli R, Schroth G. Myelography in the Age of MRI: Why We Do It, and How We Do It. *Radiol Res Pract*. 2011;2011:329017. doi:10.1155/2011/329017
35. Kim YS, Han IH, Lee IS, Lee JS, Choi BK. Imaging findings of solitary spinal bony lesions and the differential diagnosis of benign and malignant lesions. *J Korean Neurosurg Soc*. 2012;52(2):126-132. doi:10.3340/jkns.2012.52.2.126
36. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Central Nervous System Cancers Version 2.2022. National Comprehensive Cancer Network (NCCN). Updated September 29, 2022. Accessed January 23, 2023. https://www.nccn.org/professionals/physician_gls/pdf/cns.pdf
37. Ziu E, Viswanathan VK, Mesfin FB. Spinal Metastasis. StatPearls Publishing. Updated August 22, 2022. Accessed December 1, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK441950/>
38. McDonald MA, Kirsch CFE, Amin BY, et al. ACR Appropriateness Criteria(®) Cervical Neck Pain or Cervical Radiculopathy. *J Am Coll Radiol*. May 2019;16(5s):S57-s76. doi:10.1016/j.jacr.2019.02.023
39. American College of Radiology. ACR Appropriateness Criteria® Suspected Spine Infection. American College of Radiology (ACR). Updated 2021. Accessed December 1, 2022. <https://acsearch.acr.org/docs/3148734/Narrative/>
40. Lener S, Hartmann S, Barbagallo GMV, Certo F, Thomé C, Tschugg A. Management of spinal infection: a review of the literature. *Acta Neurochir (Wien)*. Mar 2018;160(3):487-496. doi:10.1007/s00701-018-3467-2
41. Bond A, Manian FA. Spinal Epidural Abscess: A Review with Special Emphasis on Earlier Diagnosis. *Biomed Res Int*. 2016;2016:1614328. doi:10.1155/2016/1614328

42. Berbari EF, Kanj SS, Kowalski TJ, et al. 2015 Infectious Diseases Society of America (IDSA) Clinical Practice Guidelines for the Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults. *Clin Infect Dis*. Sep 15 2015;61(6):e26-46. doi:10.1093/cid/civ482
43. Düz B, Gocmen S, Secer HI, Basal S, Gönül E. Tethered cord syndrome in adulthood. *J Spinal Cord Med*. 2008;31(3):272-8. doi:10.1080/10790268.2008.11760722
44. Milhorat TH, Bolognese PA, Nishikawa M, et al. Association of Chiari malformation type I and tethered cord syndrome: preliminary results of sectioning filum terminale. *Surg Neurol*. Jul 2009;72(1):20-35. doi:10.1016/j.surneu.2009.03.008
45. Zalatimo O. Tethered Spinal Cord Syndrome. American Association of Neurological Surgeons (AANS). Accessed December 1, 2022. <https://www.aans.org/Patients/Neurosurgical-Conditions-and-Treatments/Tethered-Spinal-Cord-Syndrome>
46. Whitson WJ, Lane JR, Bauer DF, Durham SR. A prospective natural history study of nonoperatively managed Chiari I malformation: does follow-up MRI surveillance alter surgical decision making? *J Neurosurg Pediatr*. Aug 2015;16(2):159-66. doi:10.3171/2014.12.Peds14301
47. Timpone VM, Patel SH. MRI of a syrinx: is contrast material always necessary? *AJR Am J Roentgenol*. May 2015;204(5):1082-5. doi:10.2214/ajr.14.13310
48. American College of Radiology. ACR Appropriateness Criteria® Headache. American College of Radiology. Updated 2022. Accessed January 23, 2023. <https://acsearch.acr.org/docs/69482/Narrative/>
49. American College of Radiology. ACR Appropriateness Criteria® Headache-Child. American College of Radiology. Updated 2017. Accessed December 1, 2022. <https://acsearch.acr.org/docs/69439/Narrative/>
50. Strahle J, Smith BW, Martinez M, et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. Jun 2015;15(6):607-11. doi:10.3171/2014.11.Peds14135
51. Juvenile Scoliosis. Scoliosis Research Society (SRS). Accessed December 1, 2022. <https://www.srs.org/professionals/online-education-and-resources/conditions-and-treatments/juvenile-scoliosis>
52. American College of Radiology. ACR Appropriateness Criteria® Scoliosis-Child. American College of Radiology. Updated 2018. Accessed December 1, 2022. <https://acsearch.acr.org/docs/3101564/Narrative/>
53. Trenga AP, Singla A, Feger MA, Abel MF. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. *J Child Orthop*. Aug 2016;10(4):343-52. doi:10.1007/s11832-016-0752-6
54. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K, Hamzaoglu A. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. *Int Orthop*. Apr 2010;34(4):543-6. doi:10.1007/s00264-009-0817-y
55. Strahle J, Muraszko KM, Kapurch J, Bapuraj JR, Garton HJ, Maher CO. Chiari malformation Type I and syrinx in children undergoing magnetic resonance imaging. *J Neurosurg Pediatr*. Aug 2011;8(2):205-13. doi:10.3171/2011.5.Peds1121
56. Radic JAE, Cochrane DD. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. Sep 2018;23(6):383-387. doi:10.1093/pch/pxy012

57. Hertzler DA, 2nd, DePowell JJ, Stevenson CB, Mangano FT. Tethered cord syndrome: a review of the literature from embryology to adult presentation. *Neurosurg Focus*. Jul 2010;29(1):E1. doi:10.3171/2010.3.Focus1079
58. Shah LM, Salzman KL. Imaging of spinal metastatic disease. *Int J Surg Oncol*. 2011;2011:769753. doi:10.1155/2011/769753
59. Chhetri SK, Gow D, Shaunak S, Varma A. Clinical assessment of the sensory ataxias; diagnostic algorithm with illustrative cases. *Pract Neurol*. Aug 2014;14(4):242-51. doi:10.1136/practneurol-2013-000764
60. Foster H, Drummond P, Jandial S, Clinch J, Wood M, Driscoll S. Evaluation of gait disorders in children. *BMJ Best Practice*. Updated February 23, 2021. Accessed January 23, 2023. <https://bestpractice.bmj.com/topics/en-us/709>
61. Stanford Medicine. Gait Abnormalities. Stanford University. Accessed January 23, 2023. <https://stanfordmedicine25.stanford.edu/the25/gait.html>
62. Haynes KB, Wimberly RL, VanPelt JM, Jo CH, Riccio AI, Delgado MR. Toe Walking: A Neurological Perspective After Referral From Pediatric Orthopaedic Surgeons. *J Pediatr Orthop*. Mar 2018;38(3):152-156. doi:10.1097/bpo.0000000000001115
63. Marshall FJ. Approach to the elderly patient with gait disturbance. *Neurol Clin Pract*. Jun 2012;2(2):103-111. doi:10.1212/CPJ.0b013e31825a7823
64. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. *Wien Klin Wochenschr*. Feb 2017;129(3-4):81-95. doi:10.1007/s00508-016-1096-4
65. Vitzthum HE, Dalitz K. Analysis of five specific scores for cervical spondylogenic myelopathy. *Eur Spine J*. Dec 2007;16(12):2096-103. doi:10.1007/s00586-007-0512-x
66. Pomerantz SR. Myelography: modern technique and indications. *Handb Clin Neurol*. 2016;135:193-208. doi:10.1016/b978-0-444-53485-9.00010-6
67. Ahmed A. MRI features of disseminated 'drop metastases'. *S Afr Med J*. Jul 2008;98(7):522-3.
68. Batool A, Kasi A. Leptomeningeal Carcinomatosis. StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC. Updated April 5, 2022. Accessed December 1, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK499862/>
69. Dias M, Partington M. Congenital Brain and Spinal Cord Malformations and Their Associated Cutaneous Markers. *Pediatrics*. Oct 2015;136(4):e1105-19. doi:10.1542/peds.2015-2854

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***

EVOLENT CLINICAL GUIDELINE 045 FOR LUMBAR SPINE CT

Guideline or Policy Number: Evolent_CG_045	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: July 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR LUMBAR SPINE CT	3
EVALUATION OF NEUROLOGIC DEFICITS	3
EVALUATION OF BACK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF TRAUMA OR ACUTE INJURY	6
EVALUATION OF KNOWN FRACTURE OR NEW COMPRESSION FRACTURES	6
CT MYELOGRAM	6
PARS DEFECT OR SPONDYLOLISTHESIS	7
EVALUATION OF TUMOR, CANCER, OR METASTASIS.....	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	7
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS/INFLAMMATORY DISEASE	8
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION	8
OTHER INDICATIONS FOR A LUMBAR SPINE CT	8
COMBINATION STUDIES	9
<i>Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any combination)</i>	9
<i>Cervical and/or Thoracic and/or Lumbar CTs (any Combination)</i>	10
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	11
CODING AND STANDARDS	11
CODING	11
<i>CPT Codes</i>	11
APPLICABLE LINES OF BUSINESS	11
BACKGROUND	12
*CONSERVATIVE TREATMENT.....	12
**HOME EXERCISE PROGRAM	12
GAIT AND SPINE IMAGING	12
<i>Table 1</i>	12
CT MYELOGRAM	13

CAUDA EQUINA SYNDROME	14
CONTRAINDICATIONS AND PREFERRED STUDIES	14
POLICY HISTORY	14
<i>Summary</i>	14
LEGAL AND COMPLIANCE	15
GUIDELINE APPROVAL.....	15
<i>Committee</i>	15
DISCLAIMER.....	15
REFERENCES.....	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography is used for the evaluation, assessment of severity, and follow-up of diseases of the spine.

Special Note

If there is a combination request for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR LUMBAR SPINE CT

Evaluation of Neurologic Deficits

When Lumbar Spine MRI is Contraindicated or Inappropriate

With any of the following new neurological deficits documented on physical exam

- Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)⁽¹⁾
- Pathologic or abnormal reflexes (and not likely caused by plexopathy, or peripheral neuropathy)

- Absent/decreased sensory changes along a particular lumbar dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature weakness (and not likely caused by plexopathy, or peripheral neuropathy)
- Lower extremity increased muscle tone
- New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
- Gait abnormalities (see **Table 1** below for more details)
- New onset foot drop (Not related to a peripheral nerve injury, e.g., peroneal nerve)
- Cauda Equina Syndrome as evidence by severe back pain/sciatica along with one of the defined symptoms (see **Cauda Equina Syndrome** section)

Evaluation of Back Pain (2)

With any of the following when Lumbar Spine MRI is Contraindicated

- With new or worsening objective **neurologic deficits** on exam, as above
- Failure of **conservative treatment*** for at minimum of six (6) weeks within the last six (6) months;

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute “inability to complete” treatment.

- With progression or worsening of symptoms during the course of **conservative treatment***
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a lumbar radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽³⁾
- Isolated back pain in pediatric population^(4,5) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain
 - Pain lasting > 4 weeks
 - Abnormal neurologic examination
 - Early morning stiffness and/or gelling

- Night pain that prevents or disrupts sleep
- Radicular pain
- Fever or weight loss or malaise
- Postural changes (e.g., kyphosis or scoliosis)
- Limp (or refusal to walk in a younger child)⁽⁵⁾

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)⁽²⁾

Note: If ordered by neurosurgeon or orthopedic surgeon for purposes of surgical planning, a contraindication to MRI is not required.

- For preoperative evaluation/planning
- CT discogram
- Evaluation of post operative pseudoarthrosis after initial x-rays (CT should not be done before 6 months after surgery)
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽⁶⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽⁷⁾ ⁽²⁾(see **neurological deficit** section above).
- When **combo requests** are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽⁸⁾
 - Combination requests where both lumbar spine CT and MRI lumbar spine are both approvable (not an all-inclusive list):
 - Pathologic or complex fractures
 - Malignant process of spine with both bony and soft tissue involvement

- Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Trauma or Acute Injury ⁽⁹⁾

- Presents with any of the following **neurological deficits** as above
- With progression or worsening of symptoms during the course of **conservative treatment***
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis) (Both MRI and CT are approvable)⁽¹⁰⁾
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation
- MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations

Evaluation of Known Fracture or New Compression Fractures ^(9,11)

(With Worsening Back Pain)

- To assess union of a fracture when physical examination, plain radiographs, or prior imaging suggest delayed or non-healing
- To determine the position of fracture fragments
- With history of malignancy (if MRI is contraindicated or cannot be performed)
- With an associated new focal **neurologic deficit** as above
- Prior to a planned surgery/intervention or if the results of the CT will change management

CT Myelogram ^(6,12)

When MRI cannot be Performed/Contraindicated/Surgeon Preference

- When signs and symptoms are inconsistent or not explained by the MRI findings
- Demonstration of the site of a CSF leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- Surgical planning, especially regarding to the nerve roots or evaluation of dural sac

Pars defect or spondylolisthesis

- Pars defect (spondylolysis) or spondylolisthesis in adults when Flexion/Extension x-rays show instability⁽¹³⁾
- Clinically suspected Pars defect (spondylolysis) after plain films in pediatric population (< 18 yr.), or athletes (flexion extension instability not required) and imaging would change treatment ⁽⁴⁾ when MRI is contraindicated/cannot be performed or surgeon preference

NOTE: Initial imaging (x-ray, or planar bone scan without SPECT; Bone scan with SPECT is superior to MRI and CT in the detection of pars interarticularis pathology including spondylolysis)⁽⁴⁾

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following:

MRI is usually the preferred study (CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(14,15)

- **Primary tumor**
 - Initial staging primary spinal tumor⁽¹⁶⁾
 - Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
 - Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
 - With an associated new focal **neurologic deficit** as above⁽⁹⁾
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
 - With an associated new focal neurologic deficit⁽⁹⁾
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or back pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^(15,17)

Further Evaluation of Indeterminate Findings ⁽¹⁵⁾

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification. When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding.

- One follow-up exam of a prior indeterminate MRI/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam). (When MRI cannot be performed, is contraindicated, or CT is preferred to characterize the finding).

Evaluation of Known or Suspected Infection/Abscess/Inflammatory disease ^(18,19)

When Lumbar Spine MRI is contraindicated

- Infection
 - As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
 - Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings
- Spondyloarthropathies
 - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and rheumatology workup

E.g., Osteomyelitis

Evaluation of Spine Abnormalities Related to Immune System Suppression ⁽¹⁹⁾

When Lumbar Spine MRI is Contraindicated

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications for a Lumbar Spine CT

When MRI is Contraindicated or Cannot be Performed

Note: See combination requests, below, for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected), based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(20,21,22)
- Known anorectal malformations⁽²³⁾

- Suspicious sacral dimple (those that are deep, larger than 0.5 cm, located within the superior portion of the gluteal crease or above the gluteal crease, multiple dimples, or associated with other cutaneous markers) or duplicated or deviated gluteal cleft⁽²⁴⁾
 - in patients \leq 3 months should have ultrasound
- Toe walking in a child when associated with upper motor neuron signs, including hyperreflexia, spasticity; or orthopedic deformity with concern for spinal cord pathology/tethered cord (e.g., pes cavus, clawed toes, leg, or foot length deformity (excluding tight heel cords))⁽²⁵⁾
- Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation⁽²²⁾
- For follow-up/repeat evaluation of Arnold-Chiari I with new signs or symptoms suggesting recurrent spinal cord tethering (For initial diagnosis see below)
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)- After detailed neurological exam and appropriate initial work up completed
- Follow-up known neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's) with new or worsening signs/symptoms or to evaluate treatment response

Combination Studies

Brain CT/Cervical Spine CT/Thoracic Spine CT/Lumbar Spine CT (any combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms^(26,27,28,29,30)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (CT spine imaging in this scenario is usually CT myelogram) see background
 - Suspected leptomeningeal carcinomatosis (see background)⁽³⁰⁾
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula - CT spine imaging in this scenario is usually CT myelogram)

Cervical and/or Thoracic and/or Lumbar CTs (any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception: Indications for combination studies^(31,32): Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(33,34,35) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽³⁶⁾
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following⁽³⁷⁾:
 - Progressive spinal deformity
 - Neurologic deficit (new or unexplained)
 - Early onset
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies)
 - Pre-operative planning; **OR**
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(22,38)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed⁽³³⁾
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽²⁰⁾
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(20,21,22) when anesthesia required for imaging⁽³⁹⁾ (e.g., meningocele, lipomenocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)

- Drop metastasis from brain or spine (imaging also includes brain; CT spine imaging in this scenario is usually CT myelogram)
- Suspected leptomeningeal carcinomatosis (LC)⁽⁴⁰⁾
- Any combination of these for spinal survey in patient with metastases
- Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽⁶⁾
- CT myelogram when meets above guidelines and MRI is contraindicated or for surgical planning
- Post-procedure (discogram) CT

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

72131, 72132, 72133, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Treatment

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

- **Active Modalities**
 - Physical therapy
 - Physician-supervised home exercise program**
 - Chiropractic care
- **Inactive Modalities**
 - Medications (e.g., NSAIDs, steroids, analgesics)
 - Injections (e.g., epidural injection, selective nerve root block)
 - Medical Devices (e.g., TENS unit, bracing)

**Home Exercise Program

The following elements are required to meet for conservative therapy guidelines for HEP: ⁽²⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**
- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Gait and Spine Imaging

Table 1 ⁽⁴¹⁾

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms

Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

CT Myelogram

Myelography is the instillation of intrathecal contrast media under fluoroscopy. Patients are then imaged with CT to evaluate for spinal canal pathology. Although this technique has diminished greatly due to the advent of MRI due to its non-invasiveness and superior soft-tissue contrast, myelography is still a useful technique for conventional indications, such as spinal stenosis, when MRI is contraindicated, nondiagnostic, or surgeon preference (see guidelines above), brachial plexus injury in neonates, radiation therapy treatment planning, and cerebrospinal fluid (CSF) leak.

Cauda Equina Syndrome

- Symptoms include severe back pain or sciatica along with one or more of the following:
 - Saddle anesthesia — loss of sensation restricted to the area of the buttocks, perineum and inner surfaces of the thighs (areas that would sit on a saddle).
 - Recent bladder/bowel dysfunction
 - Achilles reflex absent on both sides
 - Sexual dysfunction that can come on suddenly
 - Absent anal reflex and bulbocavernosus reflex
- This is a “Red Flag” situation and Lumbar Spine MRI is approvable.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> ● Aligned Combination Studies across guidelines ● Added Contraindications and Preferred Studies section ● Reduced background ● Updated References
Dec 2023	<ul style="list-style-type: none"> ● Conservative treatment language updated in body and background
May 2023	<ul style="list-style-type: none"> ● Updated references ● Updated background section ● Clarified pathological reflexes ● Added pseudoarthrosis to surgery section ● Added “Further evaluation of indeterminate or questionable findings on prior imaging”: ● Clarified cerebellar ataxia in gait table

	<ul style="list-style-type: none"> • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Removed Additional Resources
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Dydyk A, Hameed S. Lumbosacral Plexopathy [Updated 2023 Jul 16]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK556030/>.
2. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. Journal of the American College of Radiology. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
3. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy [Updated 2023 Aug 23]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK563152/>.
4. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. Journal of the American College of Radiology. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
5. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. Children (Basel). 2022; 9: 192. 10.3390/children9020192.
6. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. Radio Graphics. 2020; 40: 470 - 484. 10.1148/rg.2020190135.
7. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. Biomed Res Int. 2021; 2021: 9940001. 10.1155/2021/9940001.
8. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. Trauma Surgery; Acute Care Open. 2016; 1: true. 10.1136/tsaco-2016-000016.
9. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. Journal of the American College of Radiology. 2019; 16: S264 - S285. 10.1016/j.jacr.2019.02.002.
10. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. Quantitative imaging in medicine and surgery. 2021; 11: 2499-2508. 10.21037/qims-20-962.
11. Khan M A, Jennings J W, Baker J C, Smolock A R, Shah L M et al. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures: 2022 Update. Journal of the American College of Radiology. 2023; 20: S102 - S124. 10.1016/j.jacr.2023.02.015.
12. Kreiner D, Hwang S, Easa J, Resnick D, Baisden J et al. Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy. North American Spine Society. 2012;
13. Mansfield J, Wroten M. Pars Interarticularis Defect. [Updated 2023 Jun 12]. StatPearls Publishing [Internet]. 2023; Accessed May 2024:
14. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. Journal of the American College of Radiology. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
15. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. Journal of the American College of Radiology. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
16. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;

17. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023;
18. Lener S, Hartmann S, Barbagallo G, Certo F, Thomé C. Management of spinal infection: a review of the literature. *Acta Neurochir (Wien)*. 2018; 160: 487-496. 10.1007/s00701-018-3467-2.
19. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology*. 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
20. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
21. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Morais Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *Radio Graphics*. 2021; 41: 559 - 575. 10.1148/rg.2021200103.
22. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
23. Wood R, Levitt M. Anorectal Malformations. *Clin Colon Rectal Surg*. 2018; 31: 61-70. 10.1055/s-0037-1609020.
24. Choi S, Yoon H, Hwang J, Suh C, Jung A et al. Incidence of Occult Spinal Dysraphism Among Infants with Cutaneous Stigmata and Proportion Managed with Neurosurgery: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2020; 3: e207221. 10.1001/jamanetworkopen.2020.7221.
25. Zileli M, Borkar S, Sinha S, Reinas R, Alves Ó et al. Cervical Spondylotic Myelopathy: Natural Course and the Value of Diagnostic Techniques -WFNS Spine Committee Recommendations. *Neurospine*. 2019; 16: 386-402. 10.14245/ns.1938240.120.
26. Hatgaonkar A M, Mahajan S M, Hatgoankar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations with Hydrosyringomyelia. *Cureus*. 2024; 16: e55676.
27. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation [Updated 2023 Sep 4]. StatPearls [Internet]. 2023; Accessed May 2024:
28. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights into imaging*. 2019; 10: 3. 10.1186/s13244-019-0686-x.
29. Radic J A E, Cochrane D D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. 2018; 23: 383-387. 10.1093/pch/pxy012.
30. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. 2018; 124: 21-35. 10.1002/cncr.30911.
31. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
32. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
33. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
34. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations with Pulmonary Dysfunction. *Cureus*. 2023; 15: e48900. 10.7759/cureus.48900.

35. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis-Child. Journal of the American College of Radiology. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
36. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. J Child Orthop. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
37. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. Int Orthop. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
38. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. Brain sciences. 2023; 13: 10.3390/brainsci13121658.
39. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. Diagnostics (Basel, Switzerland). 2023; 13: 10.3390/diagnostics13182973.
40. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. Neuro-oncology advances. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
41. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. Wien Klin Wochenschr. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.



EVOLENT CLINICAL GUIDELINE 040 FOR CERVICAL SPINE MRI

Guideline or Policy Number: Evolent_CG_040	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR CERVICAL SPINE MRI	3
EVALUATION OF NEUROLOGIC DEFICITS	3
EVALUATION OF NECK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF SUSPECTED MYELOPATHY	5
EVALUATION OF KNOWN OR SUSPECTED MULTIPLE SCLEROSIS (MS)	6
COMBINATION STUDIES MULTIPLE SCLEROSIS (MS)	6
EVALUATION OF TRAUMA OR ACUTE INJURY	7
EVALUATION OF KNOWN FRACTURE OR NEW COMPRESSION FRACTURES	7
EVALUATION OF TUMOR, CANCER, OR METASTASIS	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	8
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS	8
EVALUATION OF KNOWN OR SUSPECTED INFLAMMATORY DISEASE OR ATLANTOAXIAL INSTABILITY	9
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION ⁽²⁸⁾	9
OTHER INDICATIONS	9
GENETICS AND RARE DISEASES	10
COMBINATION STUDIES	10
Brain/Cervical/Thoracic/Lumbar/Abdomen MRI	10
Brain MRI/Cervical MRI	10
Brain MRI/Cervical Spine MRI/Thoracic Spine MRI	10
Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)	11
Cervical and Thoracic MRI	11
Cervical and/or Thoracic and/or Lumbar MRIs (Any Combination)	12
Combination Studies for Malignancy for Initial Staging or Restaging	13
CODING AND STANDARDS	13
CODING	13
CPT Codes	13

APPLICABLE LINES OF BUSINESS	13
BACKGROUND	14
*CONSERVATIVE TREATMENT	14
**HOME EXERCISE PROGRAM	14
CERVICAL MYELOPATHY	14
GAIT AND SPINE IMAGING	15
<i>Table 1</i>	15
MRI AND NEURO CUTANEOUS SYNDROMES	16
CONTRAINDICATIONS AND PREFERRED STUDIES	16
POLICY HISTORY	16
<i>Summary</i>	16
LEGAL AND COMPLIANCE	17
GUIDELINE APPROVAL	17
<i>Committee</i>	17
DISCLAIMER	17
REFERENCES	18

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance imaging (MRI) produces high quality multiplanar images of organs and structures within the body without radiation. It is the preferred modality for evaluating the internal structure of the spinal cord, providing assessment of conditions such as degenerative disc pathology, osteomyelitis, and discitis.

Special Note

+If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for additional or follow-up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR CERVICAL SPINE MRI

Evaluation of Neurologic Deficits ^(1,2)

- With any of the following new neurological deficits documented on physical exam
 - Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)
 - Pathologic (e.g., Babinski, Lhermitte's sign,⁽³⁾ Chaddock Sign,⁽⁴⁾ Hoffman's and other upper motor neuron signs); **OR** abnormal deep tendon reflexes (and not likely caused by plexopathy, or peripheral neuropathy)

- Absent/decreased sensory changes along a particular cervical dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature (and not likely caused by plexopathy or peripheral neuropathy)
- Upper or lower extremity increase muscle tone/spasticity
- New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
- Gait abnormalities (see **Table 1** below for more details)
- Suspected cord compression with any neurological deficits as listed above

Evaluation of Neck Pain ^(5,6)

- With new or worsening objective **neurologic deficits** on exam, as above
- Failure of **conservative treatment*** for a minimum of six (6) weeks within the last six (6) months;

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute “inability to complete” treatment.

- With progression or worsening of symptoms during the course of **conservative treatment***
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a cervical radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽⁷⁾
- Isolated neck pain in pediatric population^(8,9) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain
 - Pain lasting > 4 weeks
 - Abnormal neurologic examination
 - Early morning stiffness and/or gelling
 - Night pain that prevents or disrupts sleep
 - Radicular pain
 - Fever or weight loss or malaise

- Postural changes (e.g., kyphosis or scoliosis)
- Limp (or refusal to walk in a younger child)

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)^(6,10)

- For preoperative evaluation/planning
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))⁽¹¹⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽¹²⁾ (see **neurological deficit** section above).
- When combo requests (see [±]) are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽¹³⁾
 - Combination requests where both cervical spine CT and MRI cervical spine are both approvable (not an all-inclusive list):
 - OPLL (Ossification of posterior longitudinal ligament)⁽¹⁴⁾
 - Pathologic or complex fractures
 - Malignant process of spine with both bony and soft tissue involvement
 - Unstable craniocervical junction
 - Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Suspected Myelopathy ^(15,16)

- Does **NOT** require conservative care

- Progressive symptoms including hand clumsiness, worsening handwriting, difficulty with grasping and holding objects, diffuse numbness in the hands, pins and needles sensation, increasing difficulty with balance and ambulation
- Any of the **neurological deficits** as noted above

Evaluation of Known or Suspected Multiple Sclerosis (MS) (16,17)

- Evidence of MS on recent baseline Brain MRI
- Suspected or known MS with new or changing symptoms consistent with cervical spinal cord disease (focal **neurologic deficit** or clinical sign, e.g., Lhermitte sign)⁽³⁾
- Suspected or known pediatric demyelinating diseases (MS/ADEM)

Combination Studies Multiple Sclerosis (MS) ⁽¹⁷⁾

- These body regions might be evaluated separately or in combination as guided by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history (e.g., symptom(s), time course, and where in the CNS the likely localization(s) is/are), and other available information, including prior imaging.
 - Cervical **and/or** Thoracic MRI for evaluation of highly suspected multiple sclerosis (MS) when Brain MRI has indeterminate findings and/or does not fulfill the McDonald criteria for the diagnosis of MS
 - Cervical **and/or** Thoracic MRI with suspected transverse myelitis - with appropriate clinical symptoms (e.g., bilateral weakness, sensory disturbance, and autonomic dysfunction which typically evolve over hours or days)
 - Brain MRI with Cervical **and/or** Thoracic MRI for evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis)⁽¹⁸⁾
 - Known MS, entire CNS axis (Brain, **and/or** Cervical **and/or** Thoracic spine) is approvable prior to the initiation or change of disease modification treatments and assess disease burden (to establish a new baseline)
 - Known MS- Follow-up scans, including brain and spine imaging, if patients have known spine disease:
 - 6-12 months after starting/changing treatment
 - Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years

Evaluation of Trauma or Acute Injury ^(6,19)

- Presents with any of the following **neurological deficits** as above
- With progression or worsening of symptoms during the course of **conservative treatment***
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis) (Both MRI and CT are approvable)^(20,21)
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation
- When office notes specify the patient meets NEXUS (National Emergency X-Radiography Utilization Study) or CCR (Canadian Cervical Rules) criteria for imaging:⁽¹⁹⁾
 - CT for initial imaging
 - MRI when suspect spinal cord or nerve root injury or when patient is obtunded, and CT is negative
 - CT or MRI for treatment planning of unstable spine
- MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations⁽²⁰⁾

Evaluation of Known Fracture or New Compression Fractures ⁽⁶⁾

(With Worsening Neck Pain)

- With history of malignancy
 - To aid in differentiation of benign osteoporotic fractures from metastatic disease
 - A follow-up MRI in 6-8 weeks after initial MRI when initial imaging cannot decipher (indeterminate) benign osteoporotic fracture from metastatic disease⁽²²⁾
- With an associated new focal **neurologic deficit** as above⁽¹⁹⁾
- Prior to a planned surgery/intervention or if the results of the MRI will change management

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following:

MRI is usually the preferred study (CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(6,23,24,25)

- **Primary tumor**

- Initial staging primary spinal tumor⁽²⁶⁾
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal **neurologic deficit** as above⁽¹⁹⁾
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
 - With an associated new focal neurologic deficit⁽¹⁹⁾
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or neck pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^(6,27)

Further Evaluation of Indeterminate Findings

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam).

Evaluation of Known or Suspected Infection/Abscess ⁽⁶⁾

- Infection⁽²⁸⁾
 - As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
 - Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings

E.g., Osteomyelitis

Evaluation of Known or Suspected Inflammatory Disease or Atlantoaxial Instability ⁽²⁹⁾

- In rheumatoid arthritis with neurologic signs/symptoms, or evidence of subluxation on radiographs (lateral radiograph in flexion and neutral should be the initial study)^(30,31)
 - Patients with negative radiographs but symptoms suggestive of cervical instability or in patients with neurologic deficits MRI is indicated⁽³²⁾
- High-risk disorders affecting the atlantoaxial articulation, such as Down syndrome, Marfan syndrome with neurological signs/symptoms, abnormal neurological exam, or evidence of abnormal or inconclusive radiographs of the cervical spine⁽³³⁾
- Spondyloarthropathies, known or suspected
 - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and appropriate rheumatology workup

Evaluation of Spine Abnormalities Related to Immune System Suppression ⁽²⁸⁾

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications

Note: See **combination requests**, below, for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected), based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(34,35,36)
 - Known Arnold-Chiari syndrome (For **initial imaging** (one-time initial MRI-modality assessment) see combination below)
 - Known Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis with new or changing signs/symptoms or exam findings consistent with spinal cord pathology⁽³⁷⁾
 - Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation
- Syrinx or syringomyelia (known or suspected)⁽³⁸⁾
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptoms

- Toe walking in a child with signs/symptoms of myelopathy localized to the Cervical Spine⁽³⁹⁾
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)- After detailed neurological exam and appropriate initial work up completed
- Follow-up known neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's) with new or worsening signs/symptoms or to evaluate treatment response
- Initial evaluation of trigeminal neuralgia⁽⁴⁰⁾ not explained on recent Brain imaging
- Horner's syndrome with symptoms localizing the lesion to the central nervous system⁽⁴¹⁾

Genetics and Rare Diseases

- Von Hippel Lindau (VHL) at least every other year starting at age 16⁽⁴²⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Brain/Cervical/Thoracic/Lumbar/Abdomen MRI

- Von Hippel Lindau (VHL) every 2 years starting at age 15

Brain MRI/Cervical MRI

- Horner's syndrome with symptoms localizing the lesion to the central nervous system⁽⁴¹⁾

Brain MRI/Cervical Spine MRI/Thoracic Spine MRI

- Combination studies for MS: These body regions might be evaluated separately or in combination as guided by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history (e.g., symptom(s), time course, and where in the CNS the likely localization(s) is/are), and other available information, including prior imaging.
 - For evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis)⁽⁴³⁾
 - For known MS, prior to the initiation or change of disease modification treatments and assess disease burden (to establish a new baseline)^(44,45)

- Follow-up scans, including brain and spine imaging, if patients have known spine disease:
 - 6-12 months after starting/changing treatment
 - Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years

Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms (46,47,48)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine
 - Suspected leptomeningeal carcinomatosis⁽⁴⁹⁾
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- For evaluation of known Arnold-Chiari Malformation
- Tumor evaluation and monitoring in cancer predisposition syndromes
 - Von Hippel Lindau (VHL) - imaging of the brain and spinal cord for hemangioblastomas every 2 years starting at age 14 ^(50,51,52)
 - Rhabdoid Tumor Predisposition Syndrome- Brain and Spine MRI at diagnosis and monthly age 0-6 months if whole body MRI not done; Q2-3 months age 7-18months, Q3months age 19 months-5 years
 - NF-2- Brain IAC annually starting at the age of 10 years and spinal imaging at baseline and every 2 to 3 years with more frequent imaging, if warranted, based on sites of tumor involvement ⁽⁵³⁾
 - Schwannomatosis - Brain and spine MRI every two to three years beginning at age 12 years

Note: diagnosis is met with both genetic testing **AND** clinical features due to incomplete penetrance

Cervical and Thoracic MRI

- Initial evaluation of known or suspected syrinx or syringomyelia

- With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)⁽³⁸⁾
- To further characterize a suspicious abnormality seen on prior imaging
- Known syrinx with new/worsening symptom

Cervical and/or Thoracic and/or Lumbar MRIs (Any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception- Indications for combination studies:^(54,55) Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(56,57,58) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽⁵⁹⁾
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following:⁽⁶⁰⁾
 - Progressive spinal deformity
 - Neurologic deficit (new or unexplained)
 - Early onset
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies)
 - Pre-operative planning; **OR**
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(36,61)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed⁽⁵⁶⁾
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽³⁴⁾

- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(34,35,36) when anesthesia required for imaging⁽⁶²⁾ (e.g., meningomyelocele, lipomeningomyelocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (imaging also includes brain)
 - Suspected leptomeningeal carcinomatosis (LC)⁽⁶³⁾
 - Any combination of these for spinal survey in patient with metastases
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula -preferred exam CT myelogram))⁽¹¹⁾

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

72141, 72142, 72156, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Treatment

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy
- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

**Home Exercise Program

The following two elements are required to meet conservative therapy guidelines for HEP: ⁽¹⁰⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**
- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Cervical Myelopathy

Symptom severity varies, and a high index of suspicion is essential for making the proper diagnosis in early cases. Symptoms of pain and radiculopathy may not be present. The natural history of myelopathy is characterized by neurological deterioration. The most frequently encountered symptom is gait abnormality (86%) followed by increased muscular reflexes (79.1%), pathological reflexes (65.1%), paresthesia of upper limb (69.8%) and pain (67.4%).⁽¹⁵⁾

Gait and Spine Imaging

Table 1 (64,65,66,67,68,69)

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

MRI and Neurocutaneous Syndromes

- In NF-1, clinical evaluation appears to be more useful to detect complications than is screening imaging in asymptomatic patients. Imaging is indicated in evaluation of suspected tumors based on clinical evaluation and for follow-up of known intracranial and intraspinal tumors.⁽⁷⁰⁾
- Conversely in NF-2, routine MR imaging screening is always indicated, given the high prevalence of CNS tumors, especially vestibular schwannomas. In patients with NF-2, routine screening brain/IAC imaging is indicated annually starting from age 10, if asymptomatic, or earlier with clinical signs/symptoms. Most individuals with NF2 eventually develop a spinal tumor, mostly commonly schwannomas, but meningioma and ependymomas are also seen. Spinal imaging at baseline and every 2 to 3 years is also advised with more frequent imaging, if warranted, based on sites of tumor involvement.⁽⁷¹⁾
- In patients with Tuberous Sclerosis, Brain MRI should be obtained every 1-3 years up until age 25 for surveillance for CNS abnormalities.⁽⁷²⁾
- In Von Hippel Lindau Syndrome, imaging of the brain and spinal cord for hemangioblastomas is recommended every 2 years⁽⁷³⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Aligned Combinations Studies across guidelines • Added Contraindications and Preferred Studies section • Reduced background section • Updated references
May 2023	<ul style="list-style-type: none"> • Updated references • Updated background section • Clarified pathological reflexes • Added trigeminal neuralgia

	<ul style="list-style-type: none"> • Added “Further evaluation of indeterminate or questionable findings on prior imaging”: • Clarified cerebellar ataxia in gait table • Removed Additional Resources • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding clinical indications not addressed in the guideline.
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bono C, Ghiselli G, Gilbert T, et al. Evidence-based clinical guideline for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society. 2010; 1-181.
2. Magnus W, Viswanath O, Viswanathan V, et al. Cervical Radiculopathy. [Updated 2024 Jan 31]. StatPearls Publishing. 2024;
3. Teoli D, Rocha Cabrero F, Smith T, Ghassemzadeh S. Lhermitte Sign [Updated 2023 Jul 21]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK493237/>.
4. Acharya A B, Fowler J B. Chaddock Reflex [Updated 2023 Jun 26]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK519555/>.
5. Costello J E, Shah L M, Peckham M E, Hutchins T A, Anzai Y. Imaging Appropriateness for Neck Pain. *Journal of the American College of Radiology*. 2020; 17: 584 - 589. 10.1016/j.jacr.2019.11.005.
6. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. *Journal of the American College of Radiology*. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
7. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
8. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. *Journal of the American College of Radiology*. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
9. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. *Children (Basel, Switzerland)*. 2022; 9: 10.3390/children9020192.
10. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
11. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. *Radio Graphics*. 2020; 40: 470 - 484. 10.1148/rg.2020190135.
12. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. *Biomed Res Int*. 2021; 2021: 9940001. 10.1155/2021/9940001.
13. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. *Trauma Surgery; Acute Care Open*. 2016; 1: true. 10.1136/tsaco-2016-000016.
14. Choi B, Song K, Chang H. Ossification of the posterior longitudinal ligament: a review of literature. *Asian Spine J*. Dec 2011; 5: 267-76. 10.4184/asj.2011.5.4.267.
15. Donnally III C, Hanna A, Odom C. Myelopathy [Updated 2023 Jan 15]. StatPearls Publishing. 2023; Accessed April 2024:
16. Agarwal V, Shah L M, Parsons M S, Boulter D J, Cassidy R C et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S73 - S82. 10.1016/j.jacr.2021.01.020.
17. Wattjes M P, Ciccarelli O, Reich D S, Banwell B, de Stefano N et al. 2021 MAGNIMS—CMSC—NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. *The Lancet Neurology*. 2021; 20: 653 - 670. 10.1016/S1474-4422(21)00095-8.

18. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology*. 2015; 85: 177-89. 10.1212/WNL.0000000000001729.
19. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. *Journal of the American College of Radiology*. 2019; 16: S264 - S285. 10.1016/j.jacr.2019.02.002.
20. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S340 - S360. 10.1016/j.jacr.2021.08.003.
21. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. *Quantitative imaging in medicine and surgery*. 2021; 11: 2499-2508. 10.21037/qims-20-962.
22. Kumar Y, Hayashi D. Role of magnetic resonance imaging in acute spinal trauma: a pictorial review. *BMC musculoskeletal disorders*. 2016; 17: 310. 10.1186/s12891-016-1169-6.
23. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
24. Roberts C C, Daffner R H, Weissman B N, Bancroft L, Bennett D L et al. ACR Appropriateness Criteria® on Metastatic Bone Disease. *Journal of the American College of Radiology*. 2010; 7: 400 - 409. 10.1016/j.jacr.2010.02.015.
25. Aulino J M, Kirsch C F, Burns J, Busse P M, Chakraborty S et al. ACR Appropriateness Criteria® Neck Mass-Adenopathy. *Journal of the American College of Radiology*. 2019; 16: S150 - S160. 10.1016/j.jacr.2019.02.025.
26. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;
27. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023;
28. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology*. 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
29. Lacy J, Bajaj J, Gillis C. Atlantoaxial Instability. [Updated 2023 Jun 12]. StatPearls Publishing. 2023;
30. Colebatch A N, Edwards C J, Østergaard M, van der Heijde D, Balint P V et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis*. 2013; 72: 804-14. 10.1136/annrheumdis-2012-203158.
31. Mańczak M, Gasik R. Cervical spine instability in the course of rheumatoid arthritis - imaging methods. *Reumatologia*. 2017; 55: 201-207. 10.5114/reum.2017.69782.
32. Gillick J, Wainwright J , Das K. Rheumatoid Arthritis and the Cervical Spine: A Review on the Role of Surgery. *International journal of rheumatology*. 2015; 2015: 252456. 10.1155/2015/252456.
33. Henderson F C S, Austin C, Benzel E, Bolognese P, Ellenbogen R et al. Neurological and spinal manifestations of the Ehlers-Danlos syndromes. *Am J Med Genet C Semin Med Genet*. 2017; 175C: 195-211. 10.1002/ajmg.c.31549.
34. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;

35. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Morais Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *Radio Graphics*. 2021; 41: 559 - 575. 10.1148/rg.2021200103.
36. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
37. Kular S, Cascella M. Chiari I Malformation. [Updated 2022 Feb 5]. StatPearls Publishing. 2022;
38. Shenoy V, Sampath R. Syringomyelia. [Updated 2023 Apr 10]. StatPearls Publishing. 2023;
39. Zileli M, Borkar S, Sinha S, Reinas R, Alves O et al. Cervical Spondylotic Myelopathy: Natural Course and the Value of Diagnostic Techniques -WFNS Spine Committee Recommendations. *Neurospine*. 2019; 16: 386-402. 10.14245/ns.1938240.120.
40. Shim Y, Paeng S, Lee K, Kim S, Lee W. Trigeminal Neuralgia Resulting from Delayed Cervical Cord Compression after Acute Traumatic Fracture of Odontoid Process. *Korean journal of neurotrauma*. 2019; 15: 38-42. 10.13004/kjnt.2019.15.e10.
41. Davagnanam I, Fraser C L, Miszkiet K, Daniel C S, Plant G T. Adult Horner's syndrome: a combined clinical, pharmacological, and imaging algorithm. *Eye (London, England)*. 2013; 27: 291-8. 10.1038/eye.2012.281.
42. van Leeuwen R, Ahmad S, van Nesselrooij B, et al. Von Hippel-Lindau Syndrome. 2000 May 17 [Updated 2024 Feb 29]. *GeneReviews®* [Internet]. 2024;
43. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology*. Jul 14, 2015; 85: 177-89. 10.1212/wnl.0000000000001729.
44. Wattjes M, Ciccarelli O, Reich D, Banwell B, de Stefano N et al. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. *Lancet Neurol*. Aug 2021; 20: 653-670. 10.1016/s1474-4422(21)00095-8.
45. Kaunzner U, Gauthier S. MRI in the assessment and monitoring of multiple sclerosis: an update on best practice. *Ther Adv Neurol Disord*. Jun 2017; 10: 247-261. 10.1177/1756285617708911.
46. Hatgaonkar A M, Mahajan S M, Hatgoankar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations with Hydrosyringomyelia. *Cureus*. 2024; 16: e55676. 10.7759/cureus.55676.
47. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights into imaging*. 2019; 10: 3. 10.1186/s13244-019-0686-x.
48. Radic J, Cochrane D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. Sep 2018; 23: 383-387. 10.1093/pch/pxy012.
49. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. 2018; 124: 21-35. 10.1002/cncr.30911.
50. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024. https://www.nccn.org/professionals/physician_gls/pdf/neuroendocrine.pdf.
51. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024.
52. Rednam S P, Erez A, Druker H, Janeway K A, Kamihara J et al. Von Hippel-Lindau and Hereditary Pheochromocytoma/Paraganglioma Syndromes: Clinical Features, Genetics, and Surveillance Recommendations in Childhood. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e68-e75. 10.1158/1078-0432.

53. Evans D G R, Salvador H, Chang V Y, Erez A, Voss S D et al. Cancer and Central Nervous System Tumor Surveillance in Pediatric Neurofibromatosis 2 and Related Disorders. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e54-e61. 10.1158/1078-0432.
54. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
55. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
56. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
57. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations with Pulmonary Dysfunction. *Cureus*. 2023; 15: e48900. 10.7759/cureus.48900.
58. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis—Child. *Journal of the American College of Radiology*. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
59. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. *J Child Orthop*. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
60. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. *Int Orthop*. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
61. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. *Brain sciences*. 2023; 13: 10.3390/brainsci13121658.
62. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. *Diagnostics (Basel, Switzerland)*. 2023; 13: 10.3390/diagnostics13182973.
63. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. *Neuro-oncology advances*. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
64. Chhetri S, Gow D, Shaunak S, Varma A. Clinical assessment of the sensory ataxias; diagnostic algorithm with illustrative cases. *Pract Neurol*. Aug 2014; 14: 242-51. 10.1136/practneurol-2013-000764.
65. Foster H , Drummond P , Jandial S , Clinch J , Wood M. Evaluation of gait disorders in children. *BMJ Best Practice*. February 23, 2021; 2023:
66. Haynes K, Wimberly R, VanPelt J, Jo C, Riccio A. Toe Walking: A Neurological Perspective After Referral from Pediatric Orthopaedic Surgeons. *J Pediatr Orthop*. Mar 2018; 38: 152-156. 10.1097/bpo.0000000000001115.
67. Marshall F. Approach to the elderly patient with gait disturbance. *Neurol Clin Pract*. Jun 2012; 2: 103-111. 10.1212/CPJ.0b013e31825a7823.
68. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. *Wien Klin Wochenschr*. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.
69. Stanford Medicine. Gait Abnormalities. 2023:

70. Friedman J. Neurofibromatosis 1. 1998 Oct 2 [Updated 2022 Apr 21]. GeneReviews® [Internet]. 2022;
71. Evans D. NF2-Related Schwannomatosis. 1998 Oct 14 [Updated 2023 Apr 20]. GeneReviews® [Internet]. 2023;
72. Northrup H, Koenig M, Pearson D, et al. Tuberous Sclerosis Complex. 1999 Jul 13 [Updated 2021 Dec 9]. GeneReviews® [Internet]. 2021;
73. van Leeuwen R, Ahmad S, van Nesselrooij B, et al. Von Hippel-Lindau Syndrome. 2000 May 17 [Updated 2024 Feb 29]. GeneReviews® [Internet].



EVOLENT CLINICAL GUIDELINE 042 FOR THORACIC SPINE MRI

Guideline or Policy Number: Evolent_CG_042	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR THORACIC SPINE MRI.....	3
EVALUATION OF NEUROLOGIC DEFICITS	3
EVALUATION OF BACK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF SUSPECTED MYELOPATHY	6
EVALUATION OF KNOWN OR SUSPECTED MULTIPLE SCLEROSIS.....	6
COMBINATION STUDIES FOR MULTIPLE SCLEROSIS	6
EVALUATION OF TRAUMA OR ACUTE INJURY	7
EVALUATION OF KNOWN OR NEW COMPRESSION FRACTURES	7
EVALUATION OF TUMOR, CANCER, OR METASTASIS.....	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	8
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS/INFLAMMATORY DISEASE	8
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION	9
OTHER INDICATIONS FOR A THORACIC SPINE MRI.....	9
GENETIC SYNDROMES AND RARE DISEASES.....	9
COMBINATION STUDIES	10
Brain/Cervical/Thoracic/Lumbar/Abdomen MRI	10
Brain MRI/Cervical Spine MRI/Thoracic Spine MRI.....	10
Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any Combination)	10
Cervical and Thoracic MRI	11
Cervical and/or Thoracic and/or Lumbar MRIs (any Combination).....	11
Combination Studies for Malignancy for Initial Staging or Restaging	12
CODING AND STANDARDS	13
CODING	13
CPT Codes	13
APPLICABLE LINES OF BUSINESS	13
BACKGROUND	13

*CONSERVATIVE TREATMENT.....	13
**HOME EXERCISE PROGRAM.....	13
GAIT AND SPINE IMAGING	14
<i>Table 1</i>	14
MYELOPATHY.....	15
MRI AND NEURO CUTANEOUS SYNDROMES.....	15
CONTRAINDICATIONS AND PREFERRED STUDIES	15
POLICY HISTORY	16
<i>Summary</i>	16
LEGAL AND COMPLIANCE	16
GUIDELINE APPROVAL.....	16
<i>Committee</i>	16
DISCLAIMER.....	16
REFERENCES.....	17

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance imaging (MRI) produces high quality multiplanar images of organs and structures within the body without using ionizing radiation. It is used for evaluation, assessment of severity, and follow-up of diseases of the spine and is the preferred modality for imaging intervertebral disc degeneration. High contrast resolution (soft tissue contrast) and multiplanar imaging (sagittal as well as axial planes) are helpful in the evaluation of possible disc herniation and detecting nerve root compression. MRI is one of the most useful techniques to evaluate spine infection and is also used to evaluate tumors, cancer, and immune system suppression.

Special Note

If there is a combination request for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for additional or follow-up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient (the entire spinal cord and/or autonomic postganglionic chain must be assessed).

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR THORACIC SPINE MRI

Evaluation of Neurologic Deficits ^(1,2)

- With any of the following new neurological deficits documented on physical exam

- Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)⁽³⁾
- Pathologic (e.g., Babinski, Lhermitte's sign⁽⁴⁾, Chaddock Sign⁽⁵⁾, Hoffman's and other upper motor neuron signs); **OR** abnormal deep tendon reflexes (and not likely caused by plexopathy, or peripheral neuropathy)
- Absent/decreased sensory changes along a particular thoracic dermatome (nerve distribution): pin prick, touch, vibration, proprioception, or temperature weakness (and not likely caused by plexopathy, or peripheral neuropathy)
- Upper or lower extremity increase muscle tone/spasticity and likely localized to the thoracic spinal cord
- New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
- Gait abnormalities, most likely cause by a suspected or known myelopathy (see **Table 1** below for more details)
- Suspected thoracic cord compression with any neurological deficits as listed above

Evaluation of Back Pain ^(6,7)

With any of the following

- With new or worsening objective **neurologic deficits** (as listed above) on exam
- Failure of **conservative treatment*** for a minimum of six (6) weeks within the last six (6) months;

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute "inability to complete" treatment.

- With progression or worsening of symptoms during the course of **conservative treatment***
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽⁸⁾
- Isolated back pain in pediatric population^(9,10) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain

- Pain lasting > 4 weeks
- Abnormal neurologic examination
- Early morning stiffness and/or gelling
- Night pain that prevents or disrupts sleep
- Radicular pain
- Fever or weight loss or malaise
- Postural changes (e.g., kyphosis or scoliosis)
- Limp (or refusal to walk in a younger child)

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)^(7,11)

- For preoperative evaluation/planning
- Prior to spinal cord stimulator to exclude canal stenosis if no prior MRI imaging of the thoracic spine has been done recently⁽¹²⁾
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula or dural fistula))
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽¹³⁾(see **neurological deficit** section above).
- When combo requests (see **above statement***) are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽¹⁴⁾
 - Combination requests where both thoracic spine CT and MRI thoracic spine are both approvable (not an all-inclusive list):
 - OPLL (Ossification of posterior longitudinal ligament)
 - Most common in cervical spine (rare but more severe in thoracic spine)⁽¹⁵⁾

- Pathologic or complex fractures
- Malignant process of spine with both bony and soft tissue involvement
- Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Suspected Myelopathy ^(16,17)

- Does **NOT** require conservative care
- Progressive symptoms including unsteadiness, broad-based gait, increased muscle tone, pins and needles sensation, weakness and wasting of the lower limbs, diminished sensation to light touch, temperature, proprioception, and vibration; limb hyperreflexia and pathologic reflexes; bowel and bladder dysfunction in more severe cases
- Any of the neurological deficits as noted above

Evaluation of Known or Suspected Multiple Sclerosis ^(16,18)

- Suspected or known multiple sclerosis (MS) with new or changing symptoms suggesting underlying thoracic spinal cord disease (i.e., transverse myelitis, progressive myelopathy)
- Suspected or known pediatric demyelinating diseases (MS/ADEM)

Combination Studies for Multiple Sclerosis

Note: These body regions might be evaluated separately or in combination as guided by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history (e.g., symptom(s), time course, and where in the CNS the likely localization(s) is/are), and other available information, including prior imaging.

- Cervical **and/or** Thoracic MRI for evaluation of highly suspected multiple sclerosis (MS) when Brain MRI has indeterminate findings and/or does not fulfill the McDonald criteria for the diagnosis of MS
- Cervical **and/or** Thoracic MRI with suspected transverse myelitis —with appropriate clinical symptoms (e.g., bilateral weakness, sensory disturbance, and autonomic dysfunction which typically evolve over hours or days)
- Brain MRI with Cervical **and/or** Thoracic MRI for evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis)⁽¹⁹⁾
- Known MS- entire CNS axis (Brain, **and/or** Cervical **and/or** Thoracic spine) is approvable prior to the initiation or change of disease modification treatments and assess disease burden (to establish a new baseline)

- Known MS — Follow-up scans, including brain and spine imaging, if patients have known spine disease:
 - 6-12 months after starting/changing treatment
 - Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years

Evaluation of Trauma or Acute Injury ⁽²⁰⁾

- Presents with any of the following **neurological deficits** as above
- With progression or worsening of symptoms during the course of **conservative treatment***
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis, diffuse idiopathic skeletal hyperostosis) (Both MRI and CT are approvable)^(21,22)
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation

MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations

Evaluation of Known or New Compression Fractures ^(7,20)

(With Worsening Back Pain)

- With history of malignancy
 - To aid in differentiation of benign osteoporotic fractures from metastatic disease
 - A follow-up MRI in 6-8 weeks after initial MRI when initial imaging cannot decipher (indeterminate) benign osteoporotic fracture from metastatic disease⁽²³⁾
- With an associated new focal **neurologic deficit** as above⁽²⁰⁾
- Prior to a planned surgery/intervention or if the results of the MRI will change management

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following

MRI is usually the preferred study but CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(7,24,25)

- **Primary tumor**
 - Initial staging primary spinal tumor⁽²⁶⁾

- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Known primary tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal **neurologic deficit** as above⁽²⁰⁾
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
 - With an associated new focal **neurologic deficit**⁽²⁰⁾
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or back pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine^(7,27,28)

Further Evaluation of Indeterminate Findings

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MRI/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam).

Evaluation of Known or Suspected Infection/Abscess/Inflammatory disease^(29,30)

When Thoracic Spine MRI is contraindicated or cannot be performed

- **Infection**
 - As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
 - Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings
- **Spondyloarthropathies**
 - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and appropriate rheumatology workup

E.g., Osteomyelitis

Evaluation of Spine Abnormalities Related to Immune System Suppression⁽²⁹⁾

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications for a Thoracic Spine MRI

Note: See combination requests, below, for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected), based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(31,32,33)
- Known Arnold-Chiari syndrome (For initial imaging (one-time initial modality assessment) see combination below)
 - Known Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis with new or changing signs/symptoms or exam findings consistent with spinal cord pathology⁽³⁴⁾
 - Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation
- Syrinx or syringomyelia (known or suspected)
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)⁽³⁵⁾
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptoms
- Toe walking in a child with signs/symptoms of myelopathy localized to the Thoracic Spine⁽³⁶⁾
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)- After detailed neurological exam and appropriate initial work up completed
- Follow-up known neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's) with new or worsening signs/symptoms or to evaluate treatment response

Genetic Syndromes and Rare Diseases

- Von Hippel Lindau (VHL) at least every other year starting at age 16⁽³⁷⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Brain/Cervical/Thoracic/Lumbar/Abdomen MRI

- Von Hippel Lindau (VHL) every 2 years starting at age 15

Brain MRI/Cervical Spine MRI/Thoracic Spine MRI

- Combination studies for MS: These body regions might be evaluated separately or in combination as guided by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history (e.g., symptom(s), time course, and where in the CNS the likely localization(s) is/are), and other available information, including prior imaging.
 - For evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis) ⁽³⁸⁾
 - For known MS, prior to the initiation or change of disease modification treatments and assess disease burden (to establish a new baseline) ^(39,40)
 - Follow-up scans, including brain and spine imaging, if patients have known spine disease:
 - 6-12 months after starting/changing treatment
 - Every 1-2 years while on disease-modifying therapy to assess for subclinical disease activity, less frequently when stable for 2-3 years

Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any Combination)

- For initial evaluation of a suspected Arnold Chiari malformation
- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms ^(41,42,43)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine
 - Suspected leptomeningeal carcinomatosis⁽⁴⁴⁾
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- For evaluation of known Arnold-Chiari Malformation
- Tumor evaluation and monitoring in cancer predisposition syndromes

- Von Hippel Lindau (VHL) - imaging of the brain and spinal cord for hemangioblastomas every 2 years starting at age 14 ^(45,46,47)
- Rhabdoid Tumor Predisposition Syndrome- Brain and Spine MRI at diagnosis and monthly age 0-6 months if whole body MRI not done; Q2-3 months age 7-18months, Q3months age 19 months-5 years
- NF-2- Brain IAC annually starting at the age of 10 years and spinal imaging at baseline and every 2 to 3 years with more frequent imaging, if warranted, based on sites of tumor involvement ⁽⁴⁸⁾
- Schwannomatosis - Brain and spine MRI every two to three years beginning at age 12 years

Note: diagnosis is met with both genetic testing AND clinical features due to incomplete penetrance

Cervical and Thoracic MRI

- Initial evaluation of known or suspected syrinx or syringomyelia
 - With neurologic findings and/or predisposing conditions (e.g., Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis)⁽³⁵⁾
 - To further characterize a suspicious abnormality seen on prior imaging
 - Known syrinx with new/worsening symptom

Cervical and/or Thoracic and/or Lumbar MRIs (any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception- Indications for combination studies^(49,50): Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(51,52,53) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽⁵⁴⁾
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following⁽⁵⁵⁾:

- Progressive spinal deformity
- Neurologic deficit (new or unexplained)
- Early onset
- Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies)
- Pre-operative planning; **OR**
- When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(33,56)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed⁽⁵¹⁾
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽³¹⁾
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(31,32,33) when anesthesia required for imaging⁽⁵⁷⁾ (e.g., meningocele, lipomeningocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine (imaging also includes brain)
 - Suspected leptomeningeal carcinomatosis (LC)⁽⁵⁸⁾
 - Any combination of these for spinal survey in patient with metastases
 - Tumor evaluation and monitoring in neurocutaneous syndromes
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))⁽⁵⁹⁾

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

72146, 72147, 72157, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

***Conservative Treatment**

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy
- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

****Home Exercise Program**

The following two elements are required to meet conservative therapy guidelines for HEP: ⁽¹¹⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**

- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Gait and Spine Imaging

Table 1 ⁽⁶⁰⁾

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> • EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • Pelvis MR if there is evidence of plexopathy

Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline
-------------------	--	---

Myelopathy

Symptom severity varies, and a high index of suspicion is essential for making the proper diagnosis in early cases. Symptoms of pain and radiculopathy may not be present. The natural history of myelopathy is characterized by neurological deterioration. The most frequently encountered symptom is gait abnormality (86%), followed by increased muscular reflexes (79.1%), pathological reflexes (65.1%), paresthesia of upper limb (69.8%), and pain (67.4%)⁽¹⁷⁾

MRI and Neurocutaneous Syndromes

- In NF-1, clinical evaluation appears to be more useful to detect complications than is screening imaging in asymptomatic patients. Imaging is indicated in evaluation of suspected tumors based on clinical evaluation and for follow-up of known intracranial and intraspinal tumors.⁽⁶¹⁾
- Conversely in NF-2, routine MR imaging screening is always indicated, given the high prevalence of CNS tumors, especially vestibular schwannomas. In patients with NF-2, routine screening brain/IAC imaging is indicated annually starting from age 10, if asymptomatic, or earlier with clinical signs/symptoms. Most individuals with NF2 eventually develop a spinal tumor, mostly commonly schwannomas, but meningioma and ependymomas are also seen. Spinal imaging at baseline and every 2 to 3 years is also advised with more frequent imaging, if warranted, based on sites of tumor involvement.⁽⁶²⁾
- In patients with Tuberous Sclerosis, Brain MRI should be obtained every 1-3 years up until age 25 for surveillance for CNS abnormalities.⁽⁶³⁾
- In Von Hippel Lindau Syndrome, imaging of the brain and spinal cord for hemangioblastomas is recommended every 2 years.⁽⁶⁴⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Aligned combination studies across guidelines • Added contraindications and preferred studies section • Added Genetics and Rare Diseases section • Reduced background section • Updated references
May 2023	<ul style="list-style-type: none"> • Updated references • Updated background section • Clarified pathological reflexes • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Clarified cerebellar ataxia in gait table • Removed radicular pain and malaise from Isolated Back Pain in the Pediatric population: Red flags • Removed Additional Resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bono C, Ghiselli G, Gilbert T, et al. Evidence-based clinical guideline for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society. 2010; 1-181.
2. Magnus W, Viswanath O, Viswanathan V, et al. Cervical Radiculopathy. [Updated 2024 Jan 31]. StatPearls Publishing. 2024;
3. Dydyk A, Hameed S. Lumbosacral Plexopathy [Updated 2023 Jul 16]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK556030/>.
4. Teoli D, Rocha Cabrero F, Smith T, Ghassemzadeh S. Lhermitte Sign [Updated 2023 Jul 21]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK493237/>.
5. Acharya A B, Fowler J B. Chaddock Reflex [Updated 2023 Jun 26]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK519555/>.
6. Costello J, Shah L, Peckham M, Hutchins T, Anzai Y. Imaging Appropriateness for Neck Pain. J Am Coll Radiol. 2020; 17: 584-589. 10.1016/j.jacr.2019.11.005.
7. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. Journal of the American College of Radiology. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
8. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy [Updated 2023 Aug 23]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK563152/>.
9. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. Journal of the American College of Radiology. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
10. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. Children (Basel). 2022; 9: 192. 10.3390/children9020192.
11. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. Journal of the American College of Radiology. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
12. Carayannopoulos A, Han A, Telfeian A, Scarfo K. Preoperative Surveillance Thoracic MRI for Thoracic Dorsal Column Stimulation: Case Serie S. IPM Reports. 2019; 3: 1-7. 10.36076/pmc.2019/3/1.
13. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. Biomed Res Int. 2021; 2021: 9940001. 10.1155/2021/9940001.
14. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. Trauma Surgery Acute Care Open. 2016; 1: true. 10.1136/tsaco-2016-000016.
15. Choi B W, Song K J, Chang H. Ossification of the posterior longitudinal ligament: a review of literature. Asian Spine J. 2011; 5: 267-76. 10.4184/asj.2011.5.4.267.
16. Agarwal V, Shah L M, Parsons M S, Boulter D J, Cassidy R C et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. Journal of the American College of Radiology. 2021; 18: S73 - S82. 10.1016/j.jacr.2021.01.020.
17. Donnally III C, Hanna A, Odom C. Cervical Myelopathy [Updated 2023 Jan 15]. StatPearls Publishing. 2023; Accessed April 2024: <https://www.ncbi.nlm.nih.gov/books/NBK482312/>.

18. Wattjes M, Ciccarelli O, Reich D, Banwell B, de Stefano N et al. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients. *Lancet Neurol.* 2021; 20: 653-670. 10.1016/S1474-4422(21)00095-8.
19. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology.* 2015; 85: 177-89. 10.1212/WNL.0000000000001729.
20. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. *Journal of the American College of Radiology.* 2019; 16: S264 - S285. 10.1016/j.jacr.2019.02.002.
21. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. *Journal of the American College of Radiology.* 2021; 18: S340 - S360. 10.1016/j.jacr.2021.08.003.
22. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. *Quantitative imaging in medicine and surgery.* 2021; 11: 2499-2508. 10.21037/qims-20-962.
23. Kumar Y, Hayashi D. Role of magnetic resonance imaging in acute spinal trauma: a pictorial review. *BMC Musculoskelet Disord.* 2016; 17: 310. 10.1186/s12891-016-1169-6.
24. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology.* 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
25. Roberts C C, Daffner R H, Weissman B N, Bancroft L, Bennett D L et al. ACR Appropriateness Criteria® on Metastatic Bone Disease. *Journal of the American College of Radiology.* 2010; 7: 400 - 409. 10.1016/j.jacr.2010.02.015.
26. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;
27. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK441950/>.
28. Khan M A, Jennings J W, Baker J C, Smolock A R, Shah L M et al. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures: 2022 Update. *Journal of the American College of Radiology.* 2023; 20: S102 - S124. 10.1016/j.jacr.2023.02.015.
29. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology.* 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
30. Lener S, Hartmann S, Barbagallo G, Certo F, Thomé C. Management of spinal infection: a review of the literature. *Acta Neurochir (Wien).* 2018; 160: 487-496. 10.1007/s00701-018-3467-2.
31. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
32. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Morais Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *Radio Graphics.* 2021; 41: 559 - 575. 10.1148/rg.2021200103.
33. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
34. Kular S, Cascella M. Chiari I Malformation. [Updated 2022 Feb 5]. StatPearls Publishing. 2022;
35. Shenoy V, Sampath R. Syringomyelia. [Updated 2023 Apr 10]. StatPearls Publishing. 2023;

36. Zileli M, Borkar S , Sinha S, Reinas R, Alves Ó et al. Cervical Spondylotic Myelopathy: Natural Course and the Value of Diagnostic. *Neurospine*. 2019; 16: 386-402. 10.14245/ns.1938240.120.
37. van Leeuwaarde R, Ahmad S, van Nesselrooij B, et al. Von Hippel-Lindau Syndrome. 2000 May 17 [Updated 2024 Feb 29]. *GeneReviews®* [Internet]. 2024;
38. Wingerchuk D, Banwell B, Bennett J, Cabre P, Carroll W et al. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology*. Jul 14, 2015; 85: 177-89. 10.1212/wnl.0000000000001729.
39. Wattjes M, Ciccarelli O, Reich D, Banwell B, de Stefano N et al. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. *Lancet Neurol*. Aug 2021; 20: 653-670. 10.1016/s1474-4422(21)00095-8.
40. Kaunzner U, Gauthier S. MRI in the assessment and monitoring of multiple sclerosis: an update on best practice. *Ther Adv Neurol Disord*. Jun 2017; 10: 247-261. 10.1177/1756285617708911.
41. Hatgaonkar A M, Mahajan S M, Hatgoankar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations With Hydrosyringomyelia. *Cureus*. 2024; 16: e55676. 10.7759/cureus.55676.
42. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights into imaging*. 2019; 10: 3. 10.1186/s13244-019-0686-x.
43. Radic J A E, Cochrane D D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Pediatrics Childs Health*. 2018; 23: 383-387. 10.1093/pch/pxy012.
44. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. 2018; 124: 21-35. 10.1002/cncr.30911.
45. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024. https://www.nccn.org/professionals/physician_gls/pdf/neuroendocrine.pdf.
46. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024.
47. Rednam S P, Erez A, Druker H, Janeway K A, Kamihara J et al. Von Hippel-Lindau and Hereditary Pheochromocytoma/Paraganglioma Syndromes: Clinical Features, Genetics, and Surveillance Recommendations in Childhood. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e68-e75. 10.1158/1078-0432.
48. Evans D G R, Salvador H, Chang V Y, Erez A, Voss S D et al. Cancer and Central Nervous System Tumor Surveillance in Pediatric Neurofibromatosis 2 and Related Disorders. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e54-e61. 10.1158/1078-0432.
49. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
50. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
51. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
52. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations with Pulmonary Dysfunction. *Cureus*. 2023; 15: e48900. 10.7759/cureus.48900.

53. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis-Child. Journal of the American College of Radiology. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
54. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. J Child Orthop. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
55. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. Int Orthop. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
56. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. Brain sciences. 2023; 13: 10.3390/brainsci13121658.
57. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. Diagnostics (Basel, Switzerland). 2023; 13: 10.3390/diagnostics13182973.
58. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. Neuro-oncology advances. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
59. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. Radio Graphics. 2020; 40: 470 - 484. 10.1148/rg.2020190135.
60. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. Wien Klin Wochenschr. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.
61. Friedman J. Neurofibromatosis 1 [Updated 2022 Apr 21]. GeneReviews. 2022;
62. Evans D. NF2-Related Schwannomatosis [Updated 2023 Apr 20]. GeneReviews. 2023;
63. Northrup H, Koenig M, Pearson D, Au K. Tuberous Sclerosis Complex [Updated 2021 Dec 9]. GeneReviews. 2021;
64. van Leeuwen R, Ahmad S, van Nesselrooij B, Zandee W, Giles R. Von Hippel-Lindau Syndrome [Updated 2024 Feb 29]. GeneReviews. 2024;



EVOLENT CLINICAL GUIDELINE 044 FOR LUMBAR SPINE MRI

Guideline or Policy Number: Evolent_CG_044	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR LUMBAR SPINE MRI	3
EVALUATION OF NEUROLOGIC DEFICITS	3
EVALUATION OF BACK PAIN	4
PRE-OPERATIVE/POST-OPERATIVE/PROCEDURAL EVALUATION	5
EVALUATION OF TRAUMA OR ACUTE INJURY	6
PARS DEFECT (SPONDYLOLYSIS) OR SPONDYLOLISTHESIS	6
EVALUATION OF KNOWN FRACTURE OR NEW COMPRESSION FRACTURES	6
EVALUATION OF TUMOR, CANCER, OR METASTASIS.....	7
FURTHER EVALUATION OF INDETERMINATE FINDINGS	7
EVALUATION OF KNOWN OR SUSPECTED INFECTION/ABSCESS	7
EVALUATION OF SPINE ABNORMALITIES RELATED TO IMMUNE SYSTEM SUPPRESSION	8
OTHER INDICATIONS FOR LUMBAR SPINE MRI	8
GENETICS AND RARE DISEASES	8
COMBINATION STUDIES	9
<i>Brain/Cervical/Thoracic/Lumbar/Abdomen MRI</i>	<i>9</i>
<i>Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)</i>	<i>9</i>
<i>Cervical and/or Thoracic and/or Lumbar MRIs (Any Combination)</i>	<i>10</i>
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	<i>11</i>
CODING AND STANDARDS	11
CODING	11
<i>CPT Codes</i>	<i>11</i>
APPLICABLE LINES OF BUSINESS	11
BACKGROUND	12
*CONSERVATIVE TREATMENT.....	12
**HOME EXERCISE PROGRAM	12
GAIT AND SPINE IMAGING	12
<i>Table 1.....</i>	<i>12</i>

CAUDA EQUINA SYNDROME	13
MRI AND NEUROCUTANEOUS SYNDROMES.....	14
CONTRAINDICATION AND PREFERRED STUDIES.....	14
POLICY HISTORY	14
<i>Summary</i>	14
LEGAL AND COMPLIANCE	15
GUIDELINE APPROVAL.....	15
<i>Committee</i>	15
DISCLAIMER.....	15
REFERENCES.....	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance imaging (MRI) is used in the evaluation, diagnosis, and management of spine-related conditions, e.g., degenerative disc disease, cauda equine compression, radiculopathy, infections, or cancer in the lumbar spine. MRI provides high quality multiplanar images of organs and structures within the body without the use of x-rays or radiation. In the lumbar area where gonadal exposure may occur, MRI's lack of radiation is an advantage.

Special Note

+If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months):

- The results of the prior study should be inconclusive or show a need for additional or follow-up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the **combination section** as noted in the guidelines)

INDICATIONS FOR LUMBAR SPINE MRI

Evaluation of Neurologic Deficits ^(1,2)

- With any of the following new neurological deficits documented on physical exam
 - Extremity muscular weakness (and not likely caused by plexopathy or peripheral neuropathy)⁽³⁾

- Pathologic or abnormal reflexes (and not likely caused by plexopathy, or peripheral neuropathy)⁽⁴⁾
- Absent/decreased sensory changes along a particular lumbar dermatome (nerve distribution): pin prick, touch, vibration, proprioception or temperature (and not likely caused by plexopathy, or peripheral neuropathy)
- Lower extremity increased muscle tone
- New onset bowel or bladder dysfunction (e.g., retention or incontinence)—not related to an inherent bowel or bladder process
- Gait abnormalities (see **Table 1** below for more details)
- New onset foot drop (Not related to a peripheral nerve injury, e.g., peroneal nerve)
- Cauda Equina Syndrome as evidence by severe back pain/sciatica along with one of the defined symptoms (see **Cauda Equina Syndrome** section)

Evaluation of Back Pain ⁽⁵⁾

With any of the Following:

- With new or worsening objective **neurologic deficits** on exam, as above
- Failure of **conservative treatment*** for a minimum of six (6) weeks within the last six (6) months;

NOTE - Failure of conservative treatment is defined as one of the following:

- Lack of meaningful improvement after a full course of treatment; **OR**
- Progression or worsening of symptoms during treatment; **OR**
- Documentation of a medical reason the member is unable to participate in treatment

Closure of medical or therapy offices, patient inconvenience, or noncompliance without explanation does not constitute “inability to complete” treatment.

- With progression or worsening of symptoms during the course of **conservative treatment***
- With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a lumbar radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain)⁽⁶⁾
- Isolated back pain in pediatric population^(7,8) (conservative care not required if red flags present). Red flags that prompt imaging include any **ONE** of the following:
 - Age 5 or younger
 - Constant pain
 - Pain lasting > 4 weeks

- Abnormal neurologic examination
- Early morning stiffness and/or gelling
- Night pain that prevents or disrupts sleep
- Radicular pain
- Fever or weight loss or malaise
- Postural changes (e.g., kyphosis or scoliosis)
- Limp (or refusal to walk in a younger child)

Pre-Operative/Post-Operative/Procedural Evaluation

As part of initial pre-operative/post-operative/procedural evaluation (The best examinations are CT to assess for hardware complication, extent of fusion and pseudarthrosis and MRI for cord, nerve root compression, disc pathology, or post-op infection)⁽⁵⁾

- For preoperative evaluation/planning
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))⁽⁹⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested (routine surveillance post-op not indicated without symptoms)
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- New or changing neurological deficits or symptoms post-operatively⁽¹⁰⁾ (see **neurological deficit** section above).
- When combo requests (see **above statement***) are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously (e.g., the need for both soft tissue and bony anatomy is required)⁽¹¹⁾
 - Combination requests where both lumbar spine CT and MRI lumbar spine are both approvable (not an all-inclusive list):
 - Pathologic or complex fractures
 - Malignant process of spine with both bony and soft tissue involvement
 - Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

Evaluation of Trauma or Acute Injury ⁽¹²⁾

- Presents with any of the following **neurological deficits** as above
- With progression or worsening of symptoms during the course of **conservative treatment***
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis) (Both MRI and CT are approvable)^(13,14)
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation

MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations⁽¹³⁾

Pars Defect (Spondylolysis) or Spondylolisthesis ^(15,16)

- Pars defect (spondylolysis) or spondylolisthesis in adults when Flexion/Extension x-rays show instability⁽¹⁷⁾
- Clinically suspected Pars defect (spondylolysis) after plain films in pediatric population (< 18 yr.) or athletes (flexion extension instability not required) and imaging would change treatment⁽⁷⁾

NOTE: Initial imaging (x-ray, or planar bone scan without SPECT; Bone scan with SPECT is superior to MRI and CT in the detection of pars interarticularis pathology including spondylolysis)⁽⁷⁾

Evaluation of Known Fracture or New Compression Fractures ⁽¹⁸⁾

(With Worsening Back Pain)

- With history of malignancy
 - To aid in differentiation of benign osteoporotic fractures from metastatic disease
 - A follow-up MRI in 6-8 weeks after initial MRI when initial imaging cannot decipher (indeterminate) benign osteoporotic fracture from metastatic disease⁽¹⁹⁾
- With an associated new focal **neurologic deficit** as above⁽¹²⁾
- Prior to a planned surgery/intervention or if the results of the MRI will change management

Evaluation of Tumor, Cancer, or Metastasis

With any of the Following:

MRI is usually the preferred study (CT may be needed to further characterize solitary indeterminate lesions seen on MRI)^(20,21,22)

- **Primary tumor**
 - Initial staging primary spinal tumor⁽²³⁾
 - Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
 - Known spinal tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
 - With an associated new focal **neurologic deficit** as above⁽¹²⁾
- **Metastatic tumor**
 - With evidence of metastasis on bone scan needing further clarification **OR** inconclusive findings on a prior imaging exam
 - With an associated new focal neurologic deficit⁽¹²⁾
 - Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or back pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine⁽²⁴⁾

Further Evaluation of Indeterminate Findings

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam).

Evaluation of Known or Suspected Infection/Abscess ^(25,26)

- Infection
 - As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings
 - Follow-up imaging of infection
 - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings

- Spondyloarthropathies
 - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and rheumatology workup

e.g., osteomyelitis

Evaluation of Spine Abnormalities Related to Immune System Suppression ⁽²⁵⁾

- As evidenced by signs/symptoms, laboratory, or prior imaging findings

E.g., HIV, chemotherapy, leukemia, or lymphoma

Other Indications for Lumbar Spine MRI

Note: See **combination requests**, below, for initial advanced imaging assessment and pre-operatively

- Tethered cord or spinal dysraphism (known or suspected), based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata^(27,28,29)
- Known anorectal malformations⁽³⁰⁾
- Suspicious sacral dimple (those that are deep, larger than 0.5 cm, located within the superior portion of the gluteal crease or above the gluteal crease, multiple dimples, or associated with other cutaneous markers) or duplicated or deviated gluteal cleft⁽³¹⁾
 - Patients \leq 3 months should have ultrasound
- Toe walking in a child when associated with upper motor neuron signs, including hyperreflexia, spasticity; or orthopedic deformity with concern for spinal cord pathology and/or tethered cord (e.g., pes cavus, clawed toes, leg or foot length deformity (excluding tight heel cords))⁽³²⁾
- Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation⁽²⁹⁾
- For follow-up/repeat evaluation of Arnold-Chiari I with new signs or symptoms suggesting recurrent spinal cord tethering (For initial diagnosis see below)
- Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)- After detailed neurological exam and appropriate initial work up completed
- Follow-up known neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's) with new or worsening signs/symptoms or to evaluate treatment response

Genetics and Rare Diseases

- Von Hippel Lindau (VHL) at least every other year starting at age 16⁽³³⁾

- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Brain/Cervical/Thoracic/Lumbar/Abdomen MRI

- Von Hippel Lindau (VHL) every 2 years starting at age 15⁽³³⁾

Brain MRI/Cervical Spine MRI/ Thoracic Spine MRI/Lumbar Spine MRI (any combination)

For initial evaluation of a suspected Arnold Chiari malformation

- Follow-up imaging of a known type II or type III Arnold Chiari malformation. For Arnold Chiari type I, follow-up imaging only if new or changing signs/symptoms^(34,35,36)
- Oncological Applications (e.g., primary nervous system, metastatic)
 - Drop metastasis from brain or spine
 - Suspected leptomeningeal carcinomatosis⁽³⁷⁾
- CSF leak highly suspected and supported by patient history and/or physical exam findings (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula)
- For evaluation of known Arnold-Chiari Malformation
- Tumor evaluation and monitoring in cancer predisposition syndromes
 - Von Hippel Lindau (VHL) - imaging of the brain and spinal cord for hemangioblastomas every 2 years starting at age 14^(38,39,40)
 - Rhabdoid Tumor Predisposition Syndrome- Brain and Spine MRI at diagnosis and monthly age 0-6 months if whole body MRI not done; Q2-3 months age 7-18months, Q3months age 19 months-5 years
 - NF-2- Brain IAC annually starting at the age of 10 years and spinal imaging at baseline and every 2 to 3 years with more frequent imaging, if warranted, based on sites of tumor involvement⁽⁴¹⁾
 - Schwannomatosis - Brain and spine MRI every two to three years beginning at age 12 years

Note: diagnosis is met with both genetic testing AND clinical features due to incomplete penetrance

Cervical and/or Thoracic and/or Lumbar MRIs (Any Combination)

Note: These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception: Indications for combination studies^(42,43): Are approved indications as noted below and being performed in children who will need anesthesia for the procedure

- Any combination of these studies for:
 - Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10^(44,45,46) (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
 - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning⁽⁴⁷⁾
 - Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
 - Scoliosis with any of the following:⁽⁴⁸⁾
 - Progressive spinal deformity
 - Neurologic deficit (new or unexplained)
 - Early onset
 - Atypical curve (e.g., short segment, >30° kyphosis, left thoracic curve, associated organ anomalies)
 - Pre-operative planning; **OR**
 - When office notes clearly document how imaging will change management
- Arnold-Chiari malformations^(29,49)
 - Arnold-Chiari I
 - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed⁽⁴⁴⁾
 - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
 - Usually associated with open and closed spinal dysraphism, particularly meningocele⁽²⁷⁾
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,^(27,28,29) when anesthesia required for imaging⁽⁵⁰⁾ (e.g., meningocele, lipomeningocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)

- Drop metastasis from brain or spine (imaging also includes brain)
- Suspected leptomeningeal carcinomatosis (LC)⁽⁵¹⁾
- Any combination of these for spinal survey in patient with metastases
- Tumor evaluation and monitoring in neurocutaneous syndromes (See **Neurocutaneous Syndromes**)
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))⁽⁹⁾

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

CODING AND STANDARDS

Coding

CPT Codes

72148, 72149, 72158, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Treatment

Non-operative conservative treatment should include a multimodality approach consisting of at least one (1) active and one (1) inactive component targeting the affected region.

Active Modalities

- Physical therapy
- Physician-supervised home exercise program**
- Chiropractic care

Inactive Modalities

- Medications (e.g., NSAIDs, steroids, analgesics)
- Injections (e.g., epidural injection, selective nerve root block)
- Medical Devices (e.g., TENS unit, bracing)

**Home Exercise Program

The following two elements are required to meet conservative therapy guidelines for HEP: ⁽⁵⁾

- Documentation of an exercise prescription/plan provided by a physician, physical therapist, or chiropractor; **AND**
- Follow-up documentation regarding completion of HEP after the required 6-week timeframe or inability to complete HEP due to a documented medical reason (e.g., increased pain or inability to physically perform exercises).

Gait and Spine Imaging

Table 1 (52,53,54,55,56,57)

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms

Cerebellar Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging see Brain MRI Guideline
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging see Brain MRI Guideline
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging see Brain MRI Guideline
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	<ul style="list-style-type: none"> ● EMG initial testing; ● BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG ● Pelvis MR if there is evidence of plexopathy
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI see Brain MRI Guideline

Cauda Equina Syndrome

- Symptoms include severe back pain or sciatica along with one or more of the following:
 - Saddle anesthesia - loss of sensation restricted to the area of the buttocks, perineum, and inner surfaces of the thighs (areas that would sit on a saddle)
 - Recent bladder/bowel dysfunction
 - Achilles reflex absent on both sides
 - Sexual dysfunction that can come on suddenly
 - Absent anal reflex and bulbocavernosus reflex

MRI and Neurocutaneous Syndromes

- In NF-1, clinical evaluation appears to be more useful to detect complications than is screening imaging in asymptomatic patients. Imaging is indicated in evaluation of suspected tumors based on clinical evaluation and for follow-up of known intracranial and intraspinal I tumors.⁽⁵⁸⁾
- Conversely in NF-2, routine MR imaging screening is always indicated, given the high prevalence of CNS tumors, especially vestibular schwannomas. In patients with NF-2, routine screening brain/IAC imaging is indicated annually starting from age 10, if asymptomatic, or earlier with clinical signs/symptoms. Most individuals with NF2 eventually develop a spinal tumor, mostly commonly schwannomas, but meningioma and ependymomas are also seen. Spinal imaging at baseline and every 2 to 3 years is also advised with more frequent imaging, if warranted, based on sites of tumor involvement.⁽⁵⁹⁾
- In patients with Tuberous Sclerosis, Brain MRI should be obtained every 1-3 years up until age 25 for surveillance for CNS abnormalities.⁽⁶⁰⁾
- In Von Hippel Lindau Syndrome, imaging of the brain and spinal cord for hemangioblastomas is recommended every 2 years⁽³³⁾

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Combination Studies made uniform across Guidelines • Added Contraindications and Preferred studies section • Reduced Background • Updated references
May 2023	<ul style="list-style-type: none"> • Updated references • Updated background section • Clarified pathological reflexes • Added "Further evaluation of indeterminate or questionable findings on prior imaging":

	<ul style="list-style-type: none"> ● Clarified cerebellar ataxia in gait table ● Removed “radicular pain” and “malaise” from Isolated Back Pain in the Pediatric population: Red flags ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ● Added statement regarding further evaluation of indeterminate findings on prior imaging ● Removed Additional Resources
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bono C, Ghiselli G, Gilbert T, et al. Evidence-based clinical guideline for Multidisciplinary Spine Care: Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders. North American Spine Society. 2010; 1-181.
2. Magnus W, Viswanath O, Viswanathan V, et al. Cervical Radiculopathy. [Updated 2024 Jan 31]. StatPearls Publishing. 2024;
3. Dydyk A, Hameed S. Lumbosacral Plexopathy. [Updated 2023 Jul 16]: StatPearls Publishing. 2023;
4. Acharya A B, Fowler J B. Chaddock Reflex [Updated 2023 Jun 26]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK519555/>.
5. Hutchins T A, Peckham M, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Low Back Pain: 2021 Update. Journal of the American College of Radiology. 2021; 18: S361 - S379. <https://doi.org/10.1016/j.jacr.2021.08.002>.
6. Sarwan G, De Jesus O. Electrodiagnostic Evaluation of Cervical Radiculopathy. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
7. Booth T N, Iyer R S, Falcone R A J, Hayes L L, Jones J Y et al. ACR Appropriateness Criteria® Back Pain—Child. Journal of the American College of Radiology. 2017; 14: S13 - S24. <https://doi.org/10.1016/j.jacr.2017.01.039>.
8. Frosch M, Mauritz M, Bielack S, Blödt S, Dirksen U et al. Etiology, Risk Factors, and Diagnosis of Back Pain in Children and Adolescents: Evidence- and Consensus-Based Interdisciplinary Recommendations. Children (Basel, Switzerland). 2022; 9: 10.3390/children9020192.
9. Patel D M, Weinberg B D, Hoch M J. CT Myelography: Clinical Indications and Imaging Findings. Radio Graphics. 2020; 40: 470 - 484. 10.1148/rq.2020190135.
10. Corona-Cedillo R, Saavedra-Navarrete M, Espinoza-Garcia J, Mendoza-Aguilar A, Ternovoy S. Imaging Assessment of the Postoperative Spine: An Updated Pictorial Review of Selected Complications. Biomed Res Int. 2021; 2021: 9940001. 10.1155/2021/9940001.
11. Mohamed M A, Majeske K D, Sachwani-Daswani G, Coffey D, Elghawy K M et al. Impact of MRI on changing management of the cervical spine in blunt trauma patients with a 'negative' CT scan. Trauma Surgery; Acute Care Open. 2016; 1: true. 10.1136/tsaco-2016-000016.
12. Beckmann N M, West O C, Nunez D J, Kirsch C F, Aulino J M et al. ACR Appropriateness Criteria® Suspected Spine Trauma. Journal of the American College of Radiology. 2019; 16: S264 - S285. 10.1016/j.jacr.2019.02.002.
13. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. Journal of the American College of Radiology. 2021; 18: S340 - S360. 10.1016/j.jacr.2021.08.003.
14. Ren C, Zhu Q, Yuan H. Imaging features of spinal fractures in ankylosing spondylitis and the diagnostic value of different imaging methods. Quantitative imaging in medicine and surgery. 2021; 11: 2499-2508. 10.21037/qims-20-962.
15. Donnally III C, Hanna A, Odom C. Myelopathy [Updated 2023 Jan 15]. StatPearls Publishing. 2023; Accessed April 2024:
16. Agarwal V, Shah L M, Parsons M S, Boulter D J, Cassidy R C et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. Journal of the American College of Radiology. 2021; 18: S73 - S82. 10.1016/j.jacr.2021.01.020.
17. Mansfield J, Wroten M. Interarticularis Defect. [Updated 2023 Jun 12]. StatPearls Publishing [Internet]. 2023; Accessed May 2024:

18. Khan M A, Jennings J W, Baker J C, Smolock A R, Shah L M et al. ACR Appropriateness Criteria® Management of Vertebral Compression Fractures: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S102 - S124. 10.1016/j.jacr.2023.02.015.
19. Kumar Y, Hayashi D. Role of magnetic resonance imaging in acute spinal trauma: a pictorial review. *BMC musculoskeletal disorders*. 2016; 17: 310. 10.1186/s12891-016-1169-6.
20. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
21. McDonald M A, Kirsch C F, Amin B Y, Aulino J M, Bell A M et al. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. *Journal of the American College of Radiology*. 2019; 16: S57 - S76. <https://doi.org/10.1016/j.jacr.2019.02.023>.
22. Roberts C C, Daffner R H, Weissman B N, Bancroft L, Bennett D L et al. ACR Appropriateness Criteria® on Metastatic Bone Disease. *Journal of the American College of Radiology*. 2010; 7: 400 - 409. 10.1016/j.jacr.2010.02.015.
23. National Comprehensive Cancer Network®. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. NCCN. 2023;
24. Ziu E, Viswanathan V K, Mesfin F B. Spinal Metastasis [Updated 2023 Aug 14]. StatPearls Publishing. 2023;
25. Ortiz A O, Levitt A, Shah L M, Parsons M S, Agarwal V et al. ACR Appropriateness Criteria® Suspected Spine Infection. *Journal of the American College of Radiology*. 2021; 18: S488 - S501. 10.1016/j.jacr.2021.09.001.
26. Lerner S, Hartmann S, Barbagallo G, Certo F, Thome C. Management of spinal infection: a review of the literature. *Acta neurochirurgica*. 2018; 160: 487-496. 10.1007/s00701-018-3467-2.
27. Iftikhar W, De Jesus O. Myelomeningocele. [Updated 2023 Aug 23]. StatPearls Publishing. 2023;
28. Trapp B, de Andrade Lourenção Freddi T, de Oliveira Moraes Hans M, Fonseca Teixeira Lemos Calixto I, Fujino E. A Practical Approach to Diagnosis of Spinal Dysraphism. *Radio Graphics*. 2021; 41: 559 - 575. 10.1148/rg.2021200103.
29. Hidalgo J, Tork C, Varacallo M. Arnold-Chiari Malformation. [Updated 2023 Sep 4]. StatPearls Publishing.
30. Wood R, Levitt M. Anorectal Malformations. *Clinics in colon and rectal surgery*. 2018; 31: 61-70. 10.1055/s-0037-1609020.
31. Choi S, Yoon H, Hwang J, Suh C, Jung A et al. Incidence of Occult Spinal Dysraphism Among Infants With Cutaneous Stigmata and Proportion Managed With Neurosurgery: A Systematic Review and Meta-analysis. *JAMA network open*. 2020; 3: e207221. 10.1001/jamanetworkopen.2020.7221.
32. Zileli M, Borkar S, Sinha S, Reinas R, Alves O et al. Cervical Spondylotic Myelopathy: Natural Course and the Value of Diagnostic Techniques -WFNS Spine Committee Recommendations. *Neurospine*. 2019; 16: 386-402. 10.14245/ns.1938240.120.
33. van Leeuwen R, Ahmad S, van Nesselrooij B, et al. Von Hippel-Lindau Syndrome. 2000 May 17 [Updated 2024 Feb 29]. GeneReviews® [Internet].
34. Hatgaonkar A M, Mahajan S M, Hatgaonkar K A, Bandre G R. MRI Insights in Chiari Malformation Type 1 and Variations with Hydrosyringomyelia. *Cureus*. 2024; 16: e55676. 10.7759/cureus.55676.
35. Mohammad S A, Osman N M, Ahmed K A. The value of CSF flow studies in the management of CSF disorders in children: a pictorial review. *Insights into imaging*. 2019; 10: 3. 10.1186/s13244-019-0686-x.

36. Radic J, Cochrane D. Choosing Wisely Canada: Pediatric Neurosurgery Recommendations. *Paediatr Child Health*. Sep 2018; 23: 383-387. 10.1093/pch/pxy012.
37. Wang N, Bertalan M S, Brastianos P K. Leptomeningeal metastasis from systemic cancer: Review and update on management. *Cancer*. 2018; 124: 21-35. 10.1002/cncr.30911.
38. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024. https://www.nccn.org/professionals/physician_gls/pdf/neuroendocrine.pdf.
39. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Kidney Cancer Version 4.2023. National Comprehensive Cancer Network®. 2023; Accessed: May 2024.
40. Rednam S P, Erez A, Druker H, Janeway K A, Kamihara J et al. Von Hippel-Lindau and Hereditary Pheochromocytoma/Paraganglioma Syndromes: Clinical Features, Genetics, and Surveillance Recommendations in Childhood. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e68-e75. 10.1158/1078-0432.
41. Evans D G R, Salvador H, Chang V Y, Erez A, Voss S D et al. Cancer and Central Nervous System Tumor Surveillance in Pediatric Neurofibromatosis 2 and Related Disorders. *Clinical cancer research : an official journal of the American Association for*. 2017; 23: e54-e61. 10.1158/1078-0432.CCR-17-0590.
42. Utukuri P S, Shih R Y, Ajam A A, Callahan K E, Chen D et al. ACR Appropriateness Criteria® Headache: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S70 - S93. 10.1016/j.jacr.2023.02.018.
43. Hayes L L, Palasis S, Bartel T B, Booth T N, Iyer R S et al. ACR Appropriateness Criteria® Headache—Child. *Journal of the American College of Radiology*. 2018; 15: S78 - S90. 10.1016/j.jacr.2018.03.017.
44. Strahle J, Smith B W, Martinez M, Bapuraj J R, Muraszko K M et al. The association between Chiari malformation Type I, spinal syrinx, and scoliosis. *J Neurosurg Pediatr*. 2015; 15: 607-11. 10.3171/2014.11.Peds14135.
45. Mbamalu E, Hyacinthe J , Hui A, Tirabady T, Alvandi L. Early Onset Scoliosis and Adolescent Idiopathic Scoliosis: A Review of the Literature and Correlations with Pulmonary Dysfunction. *Cureus*. 2023; 15: e48900. 10.7759/cureus.48900.
46. Jones J Y, Saigal G, Palasis S, Booth T N, Hayes L L et al. ACR Appropriateness Criteria® Scoliosis-Child. *Journal of the American College of Radiology*. 2019; 16: S244 - S251. 10.1016/j.jacr.2019.02.018.
47. Trenga A P, Singla A, Feger M A, Abel M F. Patterns of congenital bony spinal deformity and associated neural anomalies on X-ray and magnetic resonance imaging. *J Child Orthop*. 2016; 10: 343-52. 10.1007/s11832-016-0752-6.
48. Ozturk C, Karadereler S, Ornek I, Enercan M, Ganiyusufoglu K. The role of routine magnetic resonance imaging in the preoperative evaluation of adolescent idiopathic scoliosis. *Int Orthop*. 2010; 34: 543-6. 10.1007/s00264-009-0817-y.
49. Toader C , Ples H, Covache-Busuioc R, Costin H, Bratu B et al. Decoding Chiari Malformation and Syringomyelia: From Epidemiology and Genetics to Advanced Diagnosis and Management Strategies. *Brain sciences*. 2023; 13: 10.3390/brainsci13121658.
50. Kadom M, Reddy K, Cooper M, Knight-Scott J , Jones R. Diagnostic Excellence in Pediatric Spine Imaging: Using Contextualized Imaging. *Diagnostics (Basel, Switzerland)*. 2023; 13: 10.3390/diagnostics13182973.

51. Sener U, Kumthekar P, Boire A. Advances in the diagnosis, evaluation, and management of leptomeningeal disease. *Neuro-oncology advances*. 2021; 3: v86-v95. 10.1093/noajnl/vdab108.
52. Chhetri S, Gow D, Shaunak S, Varma A. Clinical assessment of the sensory ataxias; diagnostic algorithm with illustrative cases. *Pract Neurol*. Aug 2014; 14: 242-51. 10.1136/practneurol-2013-000764.
53. Foster H , Drummond P , Jandial S , Clinch J , Wood M. Evaluation of gait disorders in children. *BMJ Best Practice*. February 23, 2021; 2023:
54. Haynes K, Wimberly R, VanPelt J, Jo C, Riccio A. Toe Walking: A Neurological Perspective After Referral from Pediatric Orthopaedic Surgeons. *J Pediatr Orthop*. Mar 2018; 38: 152-156. 10.1097/bpo.0000000000001115.
55. Marshall F. Approach to the elderly patient with gait disturbance. *Neurol Clin Pract*. Jun 2012; 2: 103-111. 10.1212/CPJ.0b013e31825a7823.
56. Pirker W, Katzenschlager R. Gait disorders in adults and the elderly : A clinical guide. *Wien Klin Wochenschr*. Feb 2017; 129: 81-95. 10.1007/s00508-016-1096-4.
57. Stanford Medicine. Gait Abnormalities. 2023:
58. Friedman J. Neurofibromatosis 1. 1998 Oct 2 [Updated 2022 Apr 21]. *GeneReviews®* [Internet]. 2022;
59. Evans D. NF2-Related Schwannomatosis. 1998 Oct 14 [Updated 2023 Apr 20]. *GeneReviews®* [Internet]. 2023;
60. Northrup H, Koenig M, Pearson D, et al. Tuberous Sclerosis Complex. 1999 Jul 13 [Updated 2021 Dec 9]. *GeneReviews®* [Internet]. 2021;



EVOLENT CLINICAL GUIDELINE 046 FOR SPINAL CANAL MRA/MRV

Guideline or Policy Number: Evolent_CG_046	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2008 - 2025 Evolent. All rights Reserved.</i>		
Original Date: May 2008	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS FOR SPINAL CANAL MAGNETIC RESONANCE ANGIOGRAPHY (MRA)	2
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	3
CODING AND STANDARDS	3
CODING	3
CPT Codes	3
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	3
SPINAL MR ANGIOGRAPHY/MR VENOGRAPHY	3
SPINAL ARTERIOVENOUS MALFORMATIONS (AVMs)	4
SPINAL ARTERIES/VEINS	4
CONTRAINDICATION AND PREFERRED STUDIES	4
POLICY HISTORY	5
SUMMARY	5
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL	5
Committee	5
DISCLAIMER	5
REFERENCES	6

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Spinal magnetic resonance angiography (MRA) allows for more effective and noninvasive screening for vascular lesions than magnetic resonance imaging (MRI) alone. It may improve characterization of normal and abnormal intradural vessels while maintaining good spatial resolution.

Spinal MRA may be used for the evaluation of spinal arteriovenous malformations, as well as injuries to blood vessels supplying the spine and cord.

INDICATIONS FOR SPINAL CANAL MAGNETIC RESONANCE ANGIOGRAPHY (MRA)

- Evaluation of spinal arteriovenous malformation (AVM)^(1,2,3,4)
- Myelopathy when the suspected etiology is a compromise of blood flow or drainage to the spinal cord⁽⁵⁾
- Evaluation of a known cervical spine fracture, disc herniation, infection, or venous thrombosis where there is concern for vascular pathology (compression or thrombosis) compromising spinal cord blood flow or venous drainage⁽⁶⁾
- Evaluation of known or suspected vertebral artery injury when there is also concern for vascular compromise to the spinal canal and its contents (otherwise neck MRA or CTA is sufficient to evaluate vertebral artery injury)⁽⁷⁾
- Preoperative evaluation (e.g., localization of the spinal arteries prior to complex spinal surgery, aortic aneurysm repair, or characterization of suspected vascular lesion of the spinal canal and its contents)^(8,9)
- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that



clearly indicates why additional imaging is needed for the type and area(s) requested.⁽¹⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam).

CODING AND STANDARDS

Coding

CPT Codes

72159

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Spinal MR Angiography/MR Venography ⁽¹⁰⁾

Typically, contrast-enhanced 3D time of flight techniques and contrast-enhanced CT angiography (CTA) have been used for evaluation of the spinal arteries, veins, and related pathology as a non-invasive alternative to the gold standard catheter angiography. Magnetic resonance angiography is well suited to patients who cannot receive iodinated contrast. CTA has the advantage over MRA of providing greater spatial resolution, can image the entire spine during one contrast bolus, and provides for a faster exam time that is less prone to motion artifact. MRA is limited by a finite field of view, typically ≤ 50 cm.⁽⁸⁾ MRI has the

advantage over CT of detecting areas of ischemia via diffusion weighted imaging as is very sensitive in detecting recurrent spinal arteriovenous fistulas post-treatment.⁽¹⁾

Spinal Arteriovenous Malformations (AVMs)

Spinal cord arteriovenous malformations are comprised of snarled tangles of arteries and veins that affect the spinal cord. They are fed by spinal cord arteries and drained by spinal cord veins. Spinal dural arteriovenous (AV) fistulas are the most encountered vascular malformation of the spinal cord and are a treatable cause of progressive paraparesis. Magnetic resonance angiography (MRA) can record the pattern and velocity of blood flow through vascular lesions as well as the flow of cerebrospinal fluid throughout the spinal cord. MRA can define the vascular malformation and may assist in determining treatment.⁽¹¹⁾

Spinal Arteries/Veins

Vascular malformations, trauma, disc herniations, neoplasms, and coagulopathies or infection causing thrombosis can compromise the spinal cord blood supply and drainage. The spinal cord arterial supply is derived from the anterior spinal artery, posterolateral spinal artery, and the arteria radicularis magna or artery of Adamkiewicz (AKA). The anterior spinal artery supplies the anterior two-thirds of the cord and arises from the vertebral arteries. It receives contributions from the ascending cervical artery, the inferior thyroid artery, the intercostal arteries, the lumbar artery, the iliolumbar artery, lateral sacral arteries, and the AKA. The AKA arises on the left side of the aorta between the T8 and L1 segments, to anastomose with the anterior spinal artery and supply the lower two-thirds of the spinal cord. Two posterolateral spinal arteries arise from the posteroinferior cerebellar arteries and supply the posterior third (posterior columns, posterior roots, and dorsal horns) of the spinal cord. The spinal venous system is divided into intrinsic and extrinsic veins differentiated by their location within the spinal canal or extrinsic to the canal, respectively. They drain into the radiculomedullary veins, subsequently to paravertebral and intervertebral plexuses, then to the segmental veins that eventually drain into the ascending lumbar veins, azygos system, and pelvic venous plexuses.

Contraindication and Preferred Studies

Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)

Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> Updated references and background Contraindications and preferred studies section added to the background
May 2023	<ul style="list-style-type: none"> Updated references General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline Added statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Mathur S, Symons S, Huynh T, Marotta T, Aviv R. First-Pass Contrast-Enhanced MR Angiography in Evaluation of Treated Spinal Arteriovenous Fistulas: Is Catheter Angiography Necessary? *AJNR Am J Neuroradiol*. 2017; 38: 200-205. 10.3174/ajnr.A4971.
2. Mathur S, Symons S, Huynh T, Muthusami P, Montanera W. First-Pass Contrast-Enhanced MRA for Pretherapeutic Diagnosis of Spinal Epidural Arteriovenous Fistulas with Intradural Venous Reflux. *AJNR. American journal of neuroradiology*. 2017; 38: 195-199. 10.3174/ajnr.A5008.
3. Shin J, Choi Y, Park B, Shin N, Jang J et al. Diagnostic accuracy and efficiency of combined acquisition of low-dose time-resolved and single-phase high-resolution contrast-enhanced magnetic resonance angiography in a single session for pre-angiographic evaluation of spinal vascular disease. *PLoS One*. 2019; 14: e0214289. 10.1371/journal.pone.0214289.
4. Wójtowicz K, Przepiórka L, Maj E, Kujawski S, Marchel A. Usefulness of time-resolved MR angiography in spinal dural arteriovenous fistula (SDAVF)-a systematic review and meta-analysis. *Neurosurgical review*. 2023; 47: 9. 10.1007/s10143-023-02242-7.
5. Agarwal V, Shah L, Parsons M, Boulter D, Cassidy R et al. ACR Appropriateness Criteria® Myelopathy: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S73 - S82. 10.1016/j.jacr.2021.01.020.
6. Vargas M, Gariani J, Sztajzel R, Barnaure-Nachbar I, Delattre B et al. Spinal cord ischemia: practical imaging tips, pearls, and pitfalls. *AJNR Am J Neuroradiol*. 2015; 36: 825-30. 10.3174/ajnr.A4118.
7. Montalvo M, Bayer A, Azher I, Knopf L, Yaghi S. Spinal Cord Infarction Because of Spontaneous Vertebral Artery Dissection. *Stroke*. 2018; 49: e314-e317. 10.1161/strokeaha.118.022333.
8. Backes W, Nijenhuis R. Advances in spinal cord MR angiography. *AJNR Am J Neuroradiol*. 2008; 29: 619-31. 10.3174/ajnr.A0910.
9. Mordasini P, El-Koussy M, Schmidli J, Bonel H, Ith M et al. Preoperative mapping of arterial spinal supply using 3.0-T MR angiography with an intravascular contrast medium and high-spatial-resolution steady-state. *Eur J Radiol*. 2012; 81: 979-84. 10.1016/j.ejrad.2011.02.025.
10. American College of Radiology (ACR), American Society of Neuroradiology (ASNR), Society of Computed Body Tomography and Magnetic Resonance (SCBT-MR), Society for Skeletal Radiology (SSR). ACR–ASNR–SABI–SSR PRACTICE PARAMETER FOR THE PERFORMANCE OF MAGNETIC RESONANCE IMAGING (MRI) OF THE ADULT SPINE. American College of Radiology. 2023; Accessed March 5, 2024: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Adult-Spine.pdf>.
11. National Institute of Neurological Disorders and Stroke. Arteriovenous Malformations and Other Vascular Lesions of the Central Nervous System Fact Sheet. 2022; 2023:



EVOLENT CLINICAL GUIDELINE 038 FOR PELVIS CTA

Guideline or Policy Number: Evolent_CG_038		<u>Applicable Codes</u>
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2008 - 2025. All rights Reserved		
Original Date: July 2008	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
SPECIAL NOTE	2
INDICATIONS FOR PELVIS CTA (ANGIOGRAPHY).....	2
VENOUS DISEASE	2
OTHER VASCULAR ABNORMALITIES SEEN ON PRIOR IMAGING STUDIES.....	3
<i>For Findings Limited to the Pelvis</i>	3
EVALUATION OF TUMOR	3
PRE-OPERATIVE EVALUATION	3
POST-OPERATIVE/POST-PROCEDURAL EVALUATION	4
COMBINATION STUDIES	4
<i>Pelvis CTA (or MRA) and Pelvis CT</i>	4
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	4
CODING AND STANDARDS	4
CODING.....	4
<i>CPT Codes</i>	4
APPLICABLE LINES OF BUSINESS.....	5
BACKGROUND	5
<i>Contraindications and Preferred Studies</i>	5
<i>Follow-Up of Asymptomatic, Incidentally Detected Iliac Artery Aneurysms</i>	5
<i>Iliac Aneurysm Ultrasound Screening Intervals</i>	5
POLICY HISTORY	6
<i>Summary</i>	6
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL.....	6
<i>Committee</i>	6
DISCLAIMER.....	6
REFERENCES.....	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography angiography (CTA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms. It is used to evaluate the arteries of the abdominal aorta and the renal arteries. CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function. It is not appropriate as a screening tool for asymptomatic patients without a previous diagnosis.

Special Note

For conditions where both abdomen and pelvis imaging are needed and/or the disease process is reasonably expected to involve both the abdomen and pelvis, requests should be resubmitted as CPT 74174. See Evolent Clinical Guideline 069 for Abdomen Pelvis CTA for coverage indications.

When vascular imaging of the aorta and both legs with Runoff is desired (sometimes incorrectly requested as Abd/Pelvis CTA & Lower Extremity CTA), only one authorization request is required, using CPT Code 75635 CT Angiography, Abdominal Aorta with Lower Extremity Runoff. This study provides for imaging of the abdomen, pelvis, and both legs.

INDICATIONS FOR PELVIS CTA (ANGIOGRAPHY)

Venous Disease

- Evaluation of suspected pelvic vascular disease or pelvic congestive syndrome when findings on ultrasound are indeterminate ⁽¹⁾
- Unexplained lower extremity edema (typically unilateral or asymmetric) with negative or inconclusive Abdomen and/or Pelvis CT ⁽²⁾

- Evaluation of venous thrombosis in the inferior vena cava ⁽³⁾
- Venous thrombosis if previous studies (such as ultrasound) have not resulted in a clear diagnosis ⁽⁴⁾
- Suspected May-Thurner Syndrome (iliac vein compression syndrome) when imaging of the abdomen is not needed ^(5,6)

Other Vascular Abnormalities seen on Prior Imaging Studies

For Findings Limited to the Pelvis

- Initial evaluation of inconclusive vascular findings on prior imaging
- For evaluation or monitoring of pelvic vascular disease when ultrasound is inconclusive ^(5,7,8,9,10,11,12)
 - Includes abnormalities such as aneurysm, dissection, arteriovenous malformations (AVM), vascular fistula, intramural hematoma, compression syndromes and vasculitis involving any of the following: inferior vena cava, iliac arteries/veins and/or other pelvic blood vessels
- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of pelvic pain

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor ^(13,14)
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery and abdominal imaging is not needed

Pre-Operative Evaluation ^(15,16)

- Evaluation of interventional vascular procedures prior to endovascular aneurysm repair (EVAR), or for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery and only pelvic imaging is needed (i.e. Abdomen CTA not requested) ⁽¹⁶⁾
- Prior to uterine artery embolization for fibroids (MRA preferred) ⁽¹⁷⁾
- Evaluation of vascular anatomy prior to solid organ transplantation

Post-Operative/Post-Procedural Evaluation

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Evaluation of endovascular/interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms related to surgical bypass grafts, vascular stents, and stent-grafts in the pelvis
- Evaluation of post-operative complications of renal transplant allograft ⁽¹⁷⁾

Combination Studies

Pelvis CTA (or MRA) and Pelvis CT

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)⁽¹³⁾
- Prior to uterine artery embolization for fibroids⁽¹⁸⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless Follow-up is Otherwise Specified within the Guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

72191

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Follow-Up of Asymptomatic, Incidentally Detected Iliac Artery Aneurysms

The definition of an iliac artery aneurysm (IAA) is dilatation to more than 1.5 times its normal diameter; in general, a common iliac artery ≥ 18 mm in men and ≥ 15 mm in women; an internal iliac artery (IIA) > 8 mm is considered aneurysmal.

Iliac Aneurysm Ultrasound Screening Intervals

From Wanhainen et al, 2019 ⁽¹¹⁾

- Aneurysm size 2.0 -2.9 cm, every 3 years
- Aneurysm size 3.0-3.4 cm, annually
- Aneurysm size > 3.5 cm, every 6 months

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Updated references • Clarified language on combining abdomen and pelvis CTA • Updated Combination studies to align across guidelines
March 2023	<ul style="list-style-type: none"> • Redirected vascular requests for abdomen alone or pelvis imaging alone to resubmit as abdomen and pelvis CTA required unless condition limited to pelvis • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Rezaei-Kalantari K, Fahrni G, Rotzinger D, Qanadli S. Insights into pelvic venous disorders. *Frontiers in Cardiovascular Medicine*. 2023; 10, doi.org/10.3389/fcvm.2023.1102063.
2. Gasparis A, Kim P, Dean S, Khilnani N, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. 2020; 35: 650 - 655. 10.1177/0268355520938283.
3. Aw-Zoretic J, Collins J. Considerations for Imaging the Inferior Vena Cava (IVC) with/without IVC Filters. *Semin Intervent Radiol*. Jun 2016; 33: 109-21. 10.1055/s-0036-1583207.
4. Hanley M, Steigner M L, Ahmed O, Azene E M, Bennett S J et al. ACR Appropriateness Criteria® Suspected Lower Extremity Deep Vein Thrombosis. *J Am Coll Radiol*. 2018; 15: S413-s417. 10.1016/j.jacr.2018.09.028.
5. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164.
6. Shammas N W, Jones-Miller S, Kovach T, Radaideh Q, Patel N et al. Predicting Significant Iliac Vein Compression Using a Probability Scoring System Derived From Minimal Luminal Area on Computed Tomography Angiography in Patients 65 Years of Age or Younger. *J Invasive Cardiol*. 2021; 33: E16-e18.
7. American College of Radiology. ACR Appropriateness Criteria® Noncerebral Vasculitis. 2021; 2022:
8. Harvin H J, Verma N, Nikolaidis P, Hanley M, Dogra V S et al. ACR Appropriateness Criteria® Renovascular Hypertension. *J Am Coll Radiol*. 2017; 14: S540-s549. 10.1016/j.jacr.2017.08.040.
9. Juntermanns B, Bernheim J, Karaindros K, Walensi M, Hoffmann J. Visceral artery aneurysms. *Gefasschirurgie*. 2018; 23: 19-22.
10. Thakur V, Inampudi P, Pena C. Imaging of mesenteric ischemia. *Applied Radiol*. 2018; 47: 13-18.
11. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. Editors Choice - European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *Eur J Vasc Endovasc Surg*. 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
12. Makazu M, Koizumi K, Masuda S, Jinushi R, Shionoya K. Spontaneous retroperitoneal hematoma with duodenal obstruction with diagnostic use of endoscopic ultrasound: A case series and literature review. *Clinical journal of gastroenterology*. 2023; 16: 377-386.
13. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa*. 2015/04/01; 57: e95-e100. <https://doi.org/10.1016/j.crvasa.2015.02.015>.
14. Smillie R, Shetty M, Boyer A, Madrazo B, Jafri S. Imaging Evaluation of the Inferior Vena Cava. *RadioGraphics*. 2015/03/01; 35: 578-592. 10.1148/rg.352140136.
15. American College of Radiology. ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery). 2022; 2022:
16. American College of Radiology. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm: Interventional Planning and Follow-up. 2017; 2022:
17. Serhal A, Aouad P, Serhal M, Pathrose A, Lombardi P et al. Evaluation of Renal Allograft Vasculature Using Non-contrast 3D Inversion. *Exploratory research and hypothesis in medicine*. 2021; 6: 90-98.

18. Maciel C, Tang Y, Sahdev A, Madureira A, Vilarés Morgado P. Preprocedural MRI and MRA in planning fibroid embolization. *Diagn Interv Radiol*. Mar-Apr 2017; 23: 163-171. 10.5152/dir.2016.16623.

*Evolent	
Clinical guidelines PELVIS CTA (Angiography)	Original Date: July 2008
CPT Codes: 72191	Last Revised Date: March 2023
Guideline Number: Evolent_CG_038	Implementation Date: January 2024

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR PELVIS CT Angiography / CT Venography (CTA/CTV)

IMPORTANT NOTE

When vascular imaging of the aorta and both legs, i.e., CTA aortogram and runoff is desired (sometimes incorrectly requested as Abd/Pelvis CTA & Lower Extremity CTA Runoff), only one authorization request is required, using CPT Code 75635 Abdominal Arteries CTA. This study provides for imaging of the abdomen, pelvis, and both legs. The CPT code description is CTA aorto-iliofemoral runoff; abdominal aorta and bilateral ilio-femoral lower extremity runoff.

When separate requests for CTA abdomen and CTA Pelvis are encountered for processes involving both the abdomen and pelvis (but do NOT need to include legs/runoff), they need to be resubmitted as a single Abdomen/Pelvis CTA, using CPT Code 74174 (to avoid unbundling). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen OR Pelvis) that includes the area of concern.

Evaluation of known or suspected pelvic vascular disease

Abdominal Aortic Aneurysm (AAA) (needs to be resubmitted as CTA Abdomen and Pelvis unless there is a specific finding limited to the pelvis)

Other vascular abnormalities seen on prior imaging studies limited to the pelvis:

- Initial evaluation of inconclusive vascular findings on prior imaging
- Follow-up of known visceral vascular conditions in the pelvis (such as aneurysm, dissection, compression syndromes, arteriovenous malformations (AVMs), fistulas, intramural hematoma, and vasculitis)
- Vascular invasion or displacement by tumor (conventional CT or MRI also appropriate)¹
- For known iliac vascular disease, e.g., aneurysm, dissection, arteriovenous malformations (AVMs), and fistulas, intramural hematoma, and vasculitis²⁻⁴ when ultrasound is inconclusive (See background for ultrasound screening intervals). CTA/MRA rather than CT/MRI is needed for non-aortic disease when ultrasound is inconclusive.⁵
- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of pelvic pain

Vascular ischemia or hemorrhage needs to be resubmitted as CTA Abdomen and Pelvis unless there is a specific finding limited to the pelvis)

For patients at increased risk for vascular abnormalities (CTA or MRA): (needs to be resubmitted as CTA Abdomen and Pelvis unless there is a specific finding limited to the pelvis)

Venous

- For evaluation of suspected pelvic vascular disease or pelvic congestive syndrome when findings on ultrasound are indeterminate (MR or CT venography (CTV) may be used as the initial study for pelvic thrombosis or thrombophlebitis)^{6, 7}
- For unexplained lower extremity edema (typically unilateral or asymmetric) with negative or inconclusive ultrasound⁸
- For evaluation of venous thrombosis in the inferior vena cava⁹
- Venous thrombosis if previous studies have not resulted in a clear diagnosis¹⁰
- Vascular invasion or displacement by tumor (Conventional CT or MRI also appropriate)^{1, 11}
- For suspected May-Thurner Syndrome (iliac vein compression syndrome) (can include abdomen CTA)^{12, 13}

Other vascular indications

- For evaluation of erectile dysfunction when a vascular cause is suspected and Doppler ultrasound is inconclusive¹⁴

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Pre-operative evaluation^{15, 16}

- Evaluation of interventional vascular procedures prior to endovascular aneurysm repair (EVAR), or for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Imaging of the deep inferior epigastric arteries for surgical planning (breast reconstruction surgery), if abdomen CTA is also needed, resubmit as abdomen and pelvis CTA¹⁶
- Prior to uterine artery embolization for fibroids (MRA preferred)¹⁷
- Prior to solid organ transplantation when vascular anatomy is needed

Post-operative or post-procedural evaluation

- Evaluation of post-operative complications of renal transplant allograft¹⁸
- Evaluation of endovascular/interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms related to surgical bypass grafts, vascular stents, and stent-grafts in the pelvis
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA)⁵ or abdominal extent of iliac artery aneurysms. **CT preferred** unless MRA/CTA is needed for procedural planning or to evaluate complex anatomy. (Needs to be resubmitted as CTA Abdomen and Pelvis unless there is a specific finding limited to the pelvis)

When Pelvis CTA is requested in combination with Chest CTA, the Pelvis CTA needs to be resubmitted as an Abdomen/Pelvis CTA (see Abdomen/Pelvis CTA Guidelines for approvable combo indications)

BACKGROUND

Computed tomographic angiography (CTA) is used in the evaluation of many conditions affecting the veins and arteries of the pelvis or lower extremities. It is not appropriate as a screening tool for asymptomatic patients without a previous diagnosis.

OVERVIEW

CT/MRI and acute hemorrhage: MRI is not indicated. MRA/MRV is rarely indicated for evaluation of intraperitoneal or retroperitoneal hemorrhage, particularly in the acute setting.

CT is the study of choice due to its availability, speed of the study and less susceptibility to artifact from patient motion. Advances in technology have allowed conventional CT to not just detect hematomas but to also identify the source of acute vascular extravasation. In special cases, finer vascular detail to assess the specific vessel responsible for hemorrhage may require the use of CTA. CTA in diagnosis of lower gastrointestinal bleeding is such an example.¹⁹ MRA/MRV can be utilized in non-acute situations to assess vascular structure involved in atherosclerotic disease and its complications, such as vasculitis, venous thrombosis, vascular congestion, or tumor invasion. Although some of these conditions may be associated with hemorrhage, bleeding is usually not the primary reason why MRI/MRA/MRV is selected for the evaluation. A special condition where MRI may be superior to CT for evaluating hemorrhage is to detect an underlying neoplasm as the cause of bleeding.²⁰

Follow-up of asymptomatic, incidentally detected iliac artery aneurysms: The definition of an iliac artery aneurysm (IAA) is dilatation to more than 1.5 times its normal diameter; in general, a common iliac artery ≥ 18 mm in men and ≥ 15 mm in women; an internal iliac artery (IIA) > 8 mm is considered aneurysmal.

Iliac aneurysm ultrasound screening intervals:

- Aneurysm size 2.0 -2.9 cm, every 3 years
- Aneurysm size 3.0-3.4 cm, annually
- Aneurysm size > 3.5 cm, every 6 months⁵

REFERENCES

1. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa*. 2015/04/01/ 2015;57(2):e95-e100. doi:<https://doi.org/10.1016/j.crvasa.2015.02.015>
2. Thakur V, Inampudi P, Pena CS. Imaging of mesenteric ischemia. *Applied Radiol* 2018;47(2):13-18.
3. Harvin HJ, Verma N, Nikolaidis P, et al. ACR Appropriateness Criteria[®] Renovascular Hypertension. *J Am Coll Radiol*. Nov 2017;14(11s):S540-s549. doi:10.1016/j.jacr.2017.08.040
4. American College of Radiology. ACR Appropriateness Criteria[®] Noncerebral Vasculitis. American College of Radiology (ACR). Updated 2021. Accessed November 20, 2022. <https://acsearch.acr.org/docs/3158180/Narrative/>
5. Wanhainen A, Verzini F, Van Herzelee I, et al. Editor's Choice - European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *Eur J Vasc Endovasc Surg*. Jan 2019;57(1):8-93. doi:10.1016/j.ejvs.2018.09.020
6. Bookwalter CA, VanBuren WM, Neisen MJ, Bjarnason H. Imaging Appearance and Nonsurgical Management of Pelvic Venous Congestion Syndrome. *Radiographics*. Mar-Apr 2019;39(2):596-608. doi:10.1148/rg.2019180159
7. Knuttinen MG, Xie K, Jani A, Palumbo A, Carrillo T, Mar W. Pelvic venous insufficiency: imaging diagnosis, treatment approaches, and therapeutic issues. *AJR Am J Roentgenol*. Feb 2015;204(2):448-58. doi:10.2214/ajr.14.12709
8. Hoshino Y, Machida M, Shimano Si, et al. Unilateral Leg Swelling: Differential Diagnostic Issue Other than Deep Vein Thrombosis. *Journal of General and Family Medicine*. 2016;17(4):311-314.
9. Aw-Zoretic J, Collins JD. Considerations for Imaging the Inferior Vena Cava (IVC) with/without IVC Filters. *Semin Intervent Radiol*. Jun 2016;33(2):109-21. doi:10.1055/s-0036-1583207
10. Hanley M, Steigner ML, Ahmed O, et al. ACR Appropriateness Criteria[®] Suspected Lower Extremity Deep Vein Thrombosis. *J Am Coll Radiol*. Nov 2018;15(11s):S413-s417. doi:10.1016/j.jacr.2018.09.028
11. Smillie RP, Shetty M, Boyer AC, Madrazo B, Jafri SZ. Imaging Evaluation of the Inferior Vena Cava. *RadioGraphics*. 2015/03/01 2015;35(2):578-592. doi:10.1148/rg.352140136
12. Shammas NW, Jones-Miller S, Kovach T, et al. Predicting Significant Iliac Vein Compression Using a Probability Scoring System Derived From Minimal Luminal Area on Computed Tomography Angiography in Patients 65 Years of Age or Younger. *J Invasive Cardiol*. Jan 2021;33(1):E16-e18.
13. Kalu S, Shah P, Natarajan A, Nwankwo N, Mustafa U, Hussain N. May-thurner syndrome: a case report and review of the literature. *Case Rep Vasc Med*. 2013;2013:740182. doi:10.1155/2013/740182
14. Shindel AW, Brandt WO, Bochinski D, Bella AJ, Leu TF. Medical and Surgical Therapy of Erectile Dysfunction. In: Feingold KR, Anawalt B, Boyce A, et al, eds. *Endotext*. MDText.com, Inc. Copyright © 2000-2021, MDText.com, Inc.; 2000.

15. American College of Radiology. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm: Interventional Planning and Follow-up. American College of Radiology. Updated 2017. Accessed November 16, 2022. <https://acsearch.acr.org/docs/70548/Narrative/>
16. American College of Radiology. ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery). American College of Radiology. Updated 2022. Accessed November 16, 2022. <https://acsearch.acr.org/docs/3101591/Narrative/>
17. Maciel C, Tang YZ, Sahdev A, Madureira AM, Vilares Morgado P. Preprocedural MRI and MRA in planning fibroid embolization. *Diagn Interv Radiol*. Mar-Apr 2017;23(2):163-171. doi:10.5152/dir.2016.16623
18. Bultman EM, Klaers J, Johnson KM, et al. Non-contrast enhanced 3D SSFP MRA of the renal allograft vasculature: a comparison between radial linear combination and Cartesian inflow-weighted acquisitions. *Magn Reson Imaging*. Feb 2014;32(2):190-5. doi:10.1016/j.mri.2013.10.004
19. Clerc D, Grass F, Schäfer M, Denys A, Demartines N, Hübner M. Lower gastrointestinal bleeding-Computed Tomographic Angiography, Colonoscopy or both? *World J Emerg Surg*. 2017;12:1. doi:10.1186/s13017-016-0112-3
20. Abe T, Kai M, Miyoshi O, Nagaie T. Idiopathic Retroperitoneal Hematoma. *Case Rep Gastroenterol*. Sep 11 2010;4(3):318-322. doi:10.1159/000320590

POLICY HISTORY

Date	Summary
March 2023	<ul style="list-style-type: none">• Redirected vascular requests for abdomen alone or pelvis imaging alone to resubmit as abdomen and pelvis CTA required unless condition limited to pelvis• Other vascular abnormalities: clarified indication for non-aortic vascular conditions• Transplant: added section• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Added statement regarding further evaluation of indeterminate findings on prior imaging• Aligned sections across body imaging guidelines
April 2022	<ul style="list-style-type: none">• Removed follow-up intervals for EVAR and AAA since Abdomen Pelvis CTA is usually appropriate study

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***



EVOLENT CLINICAL GUIDELINE 036 FOR PELVIS CT

Guideline or Policy Number: Evolent_CG_036	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR PELVIS CT	3
PELVIC PAIN FOR UNKNOWN ETIOLOGY	3
EVALUATION OF	4
INFLAMMATION AND	4
INFECTION	4
SUSPECTED OR KNOWN HERNIA	4
MUSCULOSKELETAL INDICATIONS	5
<i>When MRI is Contraindicated or Cannot Be Performed</i>	5
OTHER INDICATIONS	5
<i>When MRI is Contraindicated or Cannot Be Performed</i>	6
EVALUATION OF KNOWN OR SUSPECTED NON-AORTIC VASCULAR DISEASE	7
EVALUATION OF SUSPICIOUS OR KNOWN MASS/TUMORS	7
PRE-OPERATIVE EVALUATION	8
POST-OPERATIVE/PROCEDURAL EVALUATION	8
COMBINATION STUDIES	8
<i>Pelvis CTA (or MRA) and Pelvis CT</i>	8
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
CODING AND STANDARDS	9
CODING	9
<i>CPT Codes</i>	9
APPLICABLE LINES OF BUSINESS	9
BACKGROUND	9
*CONSERVATIVE THERAPY	9
**HOME EXERCISE PROGRAM (HEP)	9
CONTRAINDICATIONS AND PREFERRED STUDIES	10
POLICY HISTORY	10
<i>Summary</i>	10



LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL.....	11
<i>Committee</i>	11
DISCLAIMER.....	11
REFERENCES	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Pelvis Computed Tomography (CT) uses radiation to generate images of the organs and structures in the pelvis. Pelvic imaging begins at the umbilicus or iliac crests and extends to the level of the lesser trochanters.

Special Note

Note: PELVIS CT ALONE SHOULD ONLY BE APPROVED WHEN DISEASE PROCESS IS SUSPECTED TO BE LIMITED TO THE PELVIS. CT Abdomen/Pelvis Combo (CPT Codes: 74176, 74177, 74178) is the correct study when the indication(s) include both the abdomen **AND** pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease or neoplasm.

When separate requests for CT abdomen and CT Pelvis are encountered for processes involving both the abdomen and pelvis, they need to be resubmitted as a single Abdomen/Pelvis CT (to avoid unbundling). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen **OR** Pelvis) which includes the specific organ, area of known disease/abnormality, or the area of concern.

INDICATIONS FOR PELVIS CT

Pelvic Pain for Unknown Etiology

- CT allowed after initial workup is inconclusive and must include results of the following:⁽¹⁾
 - Initial imaging, such as ultrasound, scope study, or x-ray **AND**
 - Appropriate laboratory testing (chemistry profile, complete blood count, and urinalysis)

- For acute pelvic pain in a patient over the age of 65⁽²⁾

Evaluation of Inflammation and Infection ^(3,4)

- Fistula
 - Suspected perianal fistula or occult anorectal abscess⁽⁵⁾
 - For patients with recurrent fistula in anal or perianal Crohn's disease when MRI is contraindicated or cannot be performed⁽⁶⁾
 - Any history of fistula limited to the pelvis that requires re-evaluation or is suspected to have recurred
- Infection
 - Suspected infection in the pelvis (based on elevated WBC, fever, anorexia, or nausea and vomiting)
 - Complications of diverticulitis limited to the pelvis (prior imaging study is not required for diverticulitis diagnosis) with severe abdominal pain or severe tenderness or mass, not responding to antibiotic treatment
 - Any known infection to have created an abscess in the pelvis that requires re-evaluation
- Stricture
 - Suspected urethral stricture or periurethral pathology after initial evaluation with cystoscopy or urethroscopy and additional imaging is needed (such as for suspected malignancy, diverticula, fistula or extensive fibrosis **OR** for preoperative planning)
- Fluid Collection
 - Abnormal fluid collection seen on prior imaging that needs follow-up evaluation and limited to the pelvis

Suspected or Known Hernia ⁽⁷⁾

- For pelvic pain due to a suspected occult, spigelian, or incisional hernia when physical exam and prior imaging are non-diagnostic or equivocal or if requested as a preoperative study
- For confirming the diagnosis of a recurrent hernia when ultrasound is negative or non-diagnostic
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain), physical exam (guarding, rebound) or prior imaging

- Deep pelvic hernia is suspected (obturator, sciatic or perineal); does not require US first but this type of hernia needs to be specified in notes (if CT Abdomen is also needed, resubmit as CT Abdomen and Pelvis)

Musculoskeletal Indications

When MRI is Contraindicated or Cannot Be Performed

- Known or suspected aseptic/avascular necrosis of hip(s) after completion of initial x-ray⁽⁸⁾ (CT or MRI can be approved for surgical planning)
- Sacroiliitis (infectious or inflammatory, such as Ankylosing Spondylitis/Spondyloarthropathies) after completion of x-ray and rheumatology workup⁽⁹⁾
- Sacroiliac joint dysfunction (after initial x-ray) when there is:⁽¹⁰⁾
 - Persistent back and/or sacral pain unresponsive to four (4) weeks of conservative treatment, received within the past six (6) months, including physical therapy or physician-supervised home exercise plan (HEP)
- Persistent Pain:
 - Evaluation of persistent pain unresponsive to four (4) weeks of conservative treatment received within the past six (6) months
 - Suspected piriformis syndrome after failure of 4 weeks conservative treatment⁽¹¹⁾
- Evaluation of both hips when the patient meets hip CT guidelines (x-ray + persistent pain unresponsive to conservative treatment) for both the right and left hip, Pelvis CT is the preferred study
 - If labral tear is suspected due to a positive anterior impingement sign or posterior impingement sign, then bilateral hip CTs are the preferred studies (not Pelvis CT)
 - If bilateral hip arthrograms are requested and otherwise meet guidelines, bilateral hip MRIs are the preferred studies (not Pelvis CT)
- When non-diagnostic imaging is requested for anatomic guidance for hip surgery, a CT Pelvis is approvable since measurements of both hips may be needed (only one non-diagnostic request can be approved and should include the surgical site)
- Further evaluation of congenital anomalies of the sacrum and pelvis after initial imaging has been performed
- Evaluation of physical or radiological evidence of complex or occult pelvic fracture or for pre-operative planning of complex pelvic fractures

Other Indications

- Persistent pelvic pain not explained by previous imaging

- Diffuse, unexplained lower extremity edema with negative or inconclusive ultrasound⁽¹²⁾
- Suspected May-Thurner syndrome (CTV/MRV preferred)⁽¹³⁾
- Further evaluation of a new onset or non-reducible varicocele⁽¹⁴⁾
- Assessment of pelvic congestion syndrome when findings on ultrasound are indeterminate (CTA/MRA preferred)⁽¹⁵⁾
- To locate an intrauterine device after ultrasound and plain x-ray are equivocal or non-diagnostic (imaging of the abdomen may also be indicated)⁽¹⁶⁾
- Diagnosis or to guide treatment of urachal anomalies when ultrasound is non-diagnostic⁽¹⁷⁾
- Prior to solid organ transplantation

When MRI is Contraindicated or Cannot Be Performed

- Follow-up of an indeterminate or inconclusive finding on ultrasound limited to the pelvis
- Location or evaluation of undescended testes in adults and in children, including determination of location of testes, if ordered by a specialist⁽¹⁸⁾
- Evaluation and characterization of uterine and adnexal masses, (e.g., fibroids, ovaries, tubes, and uterine ligaments) or congenital uterine or renal abnormality where ultrasound has been done previously⁽¹⁹⁾
- Evaluation of abnormal uterine bleeding when ultrasound findings are indeterminate⁽²⁰⁾
 - Age ≤ 50 – Vascular stalk or focal doppler signal on US
 - Age > 50 – Thickened endometrium, vascular stalk or focal doppler signal on US
- Evaluation of uterus prior to and after embolization (CTA may be approved in addition to CT for preprocedural planning)⁽²¹⁾
- Evaluation of endometriosis when preliminary imaging has been completed or to follow up known endometriosis⁽²²⁾
- Further evaluation of suspected adenomyosis when ultrasound is inconclusive,⁽²³⁾ such as the following:
 - Uterine abnormality on US
 - Anechoic spaces/cysts in myometrium
 - Heterogeneous echotexture
 - Obscured endometrial/myometrial border
 - Sub-endometrial echogenic linear striations
 - Thickening of the transition zone

- Uterine wall thickening
- Prior to uterine surgery if there is abnormality suspected on prior ultrasound
- Suspected placenta accreta or percreta when ultrasound is indeterminate⁽²⁴⁾
- Further assessment of a scrotal or penile mass when ultrasound is inconclusive⁽²⁵⁾
- Investigation of a malfunctioning penile prosthesis
- Suspected urethral diverticula and other imaging is inconclusive⁽²⁶⁾
- Suspected patent urachus or other urachal abnormalities when ultrasound is non-diagnostic⁽¹⁷⁾
- Transient or episodic hematospermia and age ≥ 40 with negative or inconclusive ultrasound
- Persistent hematospermia (duration > 1 month, any age) with negative or inconclusive ultrasound⁽²⁷⁾

Evaluation of Known or Suspected Non-Aortic Vascular Disease

- Follow-up for post-endovascular repair (EVAR) or open repair of iliac artery aneurysms^(28,29,30)
 - Routine, baseline study (post-op/intervention) after EVAR:
 - Within the first month of the procedure
 - Continued follow-up at the following intervals:
 - If no endoleak or sac enlargement is seen:
 - ◆ Annually monitor with ultrasound
 - ◇ When US is abnormal or insufficient CT/MR can be used to monitor annually
 - ◆ Every 5 years monitor with CT/MR
 - If type II endoleak is seen at any point in time:
 - ◆ Every 6 months x 2 years, then annually (does not require US)
- If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed

Evaluation of Suspicious or Known Mass/Tumors

- Initial evaluation of suspicious pelvic masses/tumors found only in the pelvis by physical exam and ultrasound has been performed

- Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the pelvis. No further surveillance CT unless tumor(s) are specified as highly suspicious, or change was found on exam or last follow-up imaging
- For abnormal incidental pelvic lymph nodes when follow-up is recommended based on prior imaging (initial 3-month follow-up)⁽³¹⁾

Pre-Operative Evaluation

- For diagnostic purposes prior to pelvic surgery or procedure

Post-Operative/Procedural Evaluation

- Follow-up of known or suspected post-operative complication involving the hips or the pelvis⁽³²⁾ within six months
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Combination Studies

Pelvis CTA (or MRA) and Pelvis CT

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)
- Prior to uterine artery embolization for fibroids

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

72192, 72193, 72194, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

***Conservative Therapy**

This should include a multimodality approach consisting of a combination of active and inactive components. Inactive components, such as rest, ice, heat, modified activities, medical devices, acupuncture and/or stimulators, medications, injections (epidural, facet, bursal, and/or joint, not including trigger point), and diathermy can be utilized. Active modalities may consist of physical therapy, a physician-supervised home exercise program**, and/or chiropractic care.

****Home Exercise Program (HEP)**

The following elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan AND

- Follow-up with member with documentation provided regarding lack of improvement (failed) after completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises. (Patient inconvenience or noncompliance without explanation does not constitute “inability to complete” HEP).
- Dates and duration of failed PT, physician-supervised HEP, or chiropractic treatment should be documented in the original office notes or an addendum to the notes.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> ● Revised the purpose ● Clarified contraindications vs MRI and CT use ● Combination studies were aligned across other guidelines
March 2023	<ul style="list-style-type: none"> ● Prostate cancer: updated guidance based on new NCCN criteria ● IBD: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication ● Hernia: added indication for deep pelvic hernia ● Aneurysm: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication, updated guidance for imaging intervals post-repair ● Musculoskeletal: additional guidance provided for hip imaging, non-diagnostic requests added, corrected statement requiring abnormal x-ray to requiring prior x-ray ● Transplant: added section ● (added section from MRI if CI to MRI provided)

	<ul style="list-style-type: none"> • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Brook O R, Dadour J R, Robbins J B, Wasnik A P, Akin E A et al. ACR Appropriateness Criteria® Acute Pelvic Pain in the Reproductive Age Group: 2023 Update. *Journal of the American College of Radiology*. 2024; 21: S3 - S20. 10.1016/j.jacr.2024.02.014.
2. Henrichsen T L, Maturen K E, Robbins J B, Akin E A, Ascher S M et al. ACR Appropriateness Criteria® Postmenopausal Acute Pelvic Pain. *Journal of the American College of Radiology*. 2021; 18: S119 - S125. 10.1016/j.jacr.2021.02.003.
3. Cartwright S, Knudson M. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician*. Apr 1, 2015; 91: 452-9.
4. Frickenstein A N, Jones M A, Behkam B, McNally L R. Imaging Inflammation and Infection in the Gastrointestinal Tract. *International journal of molecular sciences*. 2019; 21: 10.3390/ijms21010243.
5. Levy A D, Liu P S, Kim D H, Fowler K J, Bharucha A E et al. ACR Appropriateness Criteria® Anorectal Disease. *Journal of the American College of Radiology*. 2021; 18: S268 - S282. 10.1016/j.jacr.2021.08.009.
6. Steinhart A H, Panaccione R, Targownik L, Bressler B, Khanna R et al. Clinical Practice Guideline for the Medical Management of Perianal Fistulizing Crohns Disease: The Toronto Consensus. *Inflammatory bowel diseases*. 2019; 25: 1-13. 10.1093/ibd/izy247.
7. Garcia E M, Pietryga J A, Kim D H, Fowler K J, Chang K J et al. ACR Appropriateness Criteria® Hernia. *Journal of the American College of Radiology*. 2022; 19: S329 - S340. 10.1016/j.jacr.2022.09.016.
8. Ha A S, Chang E Y, Bartolotta R J, Bucknor M D, Chen K C et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
9. Czuczman G J, Mandell J C, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. *Journal of the American College of Radiology*. 2021; 18: S340 - S360. 10.1016/j.jacr.2021.08.003.
10. Falowski S, Sayed D, Pope J, Patterson D, Fishman M et al. A Review and Algorithm in the Diagnosis and Treatment of Sacroiliac Joint Pain. *Journal of pain research*. 2020; 13: 3337-3348. 10.2147/JPR.S279390.
11. Hicks B L, Lam J C, Varacallo M. Piriformis Syndrome [Updated 2023 Aug 4]. *StatPearls Publishing (Internet)*. 2023; Accessed May 2024:
12. Gasparis A P, Kim P S, Dean S M, Khilnani N M, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. 2020; 35: 650-655. 10.1177/0268355520938283.
13. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164. 10.21037/cdt.2017.10.14.
14. Schlegel P, Sigman M, Collura B, De Jonge C, Eisenberg M et al. Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline Part I. *J Urol*. Jan 2021; 205: 36-43. 10.1097/ju.0000000000001521.
15. Bookwalter C, VanBuren W, Neisen M, Bjarnason H. Imaging Appearance and Nonsurgical Management of Pelvic Venous Congestion Syndrome. *Radiographics*. Mar-Apr 2019; 39: 596-608. 10.1148/rg.2019180159.
16. Verstraeten V, Vossaert K, Van den Bosch T. Migration of Intra-Uterine Devices. *Open access journal of contraception*. 2024; 15: 41-47. 10.2147/OAJC.S458156.

17. Briggs K B, Rentea R M. Patent Urachus [Updated 2023 Apr 10]. StatPearls Publishing [Internet]. 2023; Accessed May 2024:
18. Kolon T, Herndon C, Baker L, Baskin L, Baxter C et al. Evaluation and treatment of cryptorchidism: AUA guideline. J Urol. Aug 2014; 192: 337-45. 10.1016/j.juro.2014.05.005.
19. Brook O , Dadour J, Robbins J, Wasnik A, Akin E et al. ACR Appropriateness Criteria® Acute Pelvic Pain in the Reproductive Age Group. American College of Radiology®. 2023; 2022:
20. Robbins J B, Sadowski E A, Maturen K E, Akin E A, Ascher S M et al. ACR Appropriateness Criteria® Abnormal Uterine Bleeding. Journal of the American College of Radiology. 2020; 17: S336 - S345. 10.1016/j.jacr.2020.09.008.
21. Kubik-Huch R A, Weston M, Nougaret S, Leonhardt H, Thomassin-Naggara I et al. European Society of Urogenital Radiology (ESUR) Guidelines: MR Imaging of Leiomyomas. European radiology. 2018; 28: 3125-3137. 10.1007/s00330-017-5157-5.
22. Wall D J, Reinhold C, Akin E A, Ascher S M, Brook O R et al. ACR Appropriateness Criteria® Female Infertility. Journal of the American College of Radiology. 2020; 17: S113 - S124. 10.1016/j.jacr.2020.01.018.
23. Cunningham R, Horrow M, Smith R, Springer J. Adenomyosis: A Sonographic Diagnosis. Radiographics. Sep-Oct 2018; 38: 1576-1589. 10.1148/rg.2018180080.
24. Kilcoyne A, Shenoy-Bhangle A, Roberts D, Sisodia R, Gervais D. MRI of Placenta Accreta, Placenta Increta, and Placenta Percreta: Pearls and Pitfalls. AJR Am J Roentgenol. Jan 2017; 208: 214-221. 10.2214/ajr.16.16281.
25. Parker R 3, Menias C, Quazi R, Hara A, Verma S et al. MR Imaging of the Penis and Scrotum. Radiographics. Jul-Aug 2015; 35: 1033-50. 10.1148/rg.2015140161.
26. Greiman A K, Rolef J, Rovner E S. Urethral diverticulum: A systematic review. Arab journal of urology. 2019; 17: 49-57. 10.1080/2090598X.2019.1589748.
27. Hosseinzadeh K, Oto A, Allen B, Coakley F, Friedman B et al. ACR Appropriateness Criteria(®) Hematospermia. J Am Coll Radiol. May 2017; 14: S154-s159. 10.1016/j.jacr.2017.02.023.
28. Chaikof E L, Dalman R L, Eskandari M K, Jackson B M, Lee W A et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. Journal of vascular surgery. 2018; 67: 2-77.e2. 10.1016/j.jvs.2017.10.044.
29. Isselbacher E M, Preventza O, Hamilton Black Iii J, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. Journal of the American College of Cardiology. 2022; 80: e223-e393. 10.1016/j.jacc.2022.08.004.
30. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. European journal of vascular and endovascular surgery : the official journal of. 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
31. Bjurlin M A, Carroll P R, Eggener S, Fulgham P F, Margolis D J et al. Update of the Standard Operating Procedure on the Use of Multiparametric Magnetic Resonance Imaging for the Diagnosis, Staging and Management of Prostate Cancer. J Urol. 2020; 203: 706-712. 10.1097/ju.0000000000000617.
32. Davis D, Morrison J. Hip Arthroplasty Pseudo tumors: Pathogenesis, Imaging, and Clinical Decision Making. J Clin Imaging Sci. 2016; 6: 17. 10.4103/2156-7514.181493.



EVOLENT CLINICAL GUIDELINE 037 FOR PELVIS MRI

Guideline or Policy Number: Evolent_CG_037	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR PELVIC MRI	3
INFLAMMATORY BOWEL DISEASE	3
EVALUATION OF INFLAMMATION AND INFECTION	4
<i>Fistula and Stricture</i>	<i>4</i>
<i>Known or Suspected Infection When CT is Contraindicated or Cannot Be Performed</i>	<i>4</i>
EVALUATION OF SUSPECTED/KNOWN HERNIA	4
MUSCULOSKELETAL INDICATIONS	5
OTHER INDICATIONS FOR PELVIC MRI	6
<i>When CT is Inconclusive, Contraindicated or Cannot be Completed</i>	<i>7</i>
SUSPECTED MALIGNANCY	8
<i>Suspected Prostate Cancer</i>	<i>8</i>
KNOWN MALIGNANCY	8
<i>Initial Staging</i>	<i>8</i>
<i>Restaging</i>	<i>9</i>
<i>Surveillance</i>	<i>9</i>
PRE-OPERATIVE EVALUATION	9
POST-OPERATIVE/PROCEDURAL EVALUATION	10
<i>When not otherwise addressed in the guideline</i>	<i>10</i>
GENETIC SYNDROMES AND RARE DISEASES	10
<i>Surveillance Screening Pelvis MRI for the following KNOWN Genetic Syndromes</i>	<i>10</i>
COMBINATION STUDIES	10
<i>Abdomen/Pelvis MRI</i>	<i>10</i>
<i>Brain/Chest/Abdomen/Pelvis MRI</i>	<i>10</i>
<i>Neck/Abdomen/Pelvis MRI and Chest CT</i>	<i>11</i>
<i>Pelvis MRI and Pelvis MRA</i>	<i>11</i>
<i>Pelvis MRI and Fetal MRI</i>	<i>11</i>
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	<i>11</i>
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	11
CODING AND STANDARDS	12

CODING	12
<i>CPT Codes</i>	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
PI-RADS ASSESSMENT CATEGORIES FOR PROSTATE CANCER	12
*CONSERVATIVE THERAPY	12
**HOME EXERCISE PROGRAM (HEP)	13
MRI AND LUMBOSACRAL PLEXOPATHY	13
ELEVATED CA-125 AND PELVIC IMAGING	13
FEVER OF UNKNOWN ORIGIN	13
PARANEOPLASTIC SYNDROMES	14
WEIGHT LOSS	14
CONTRAINDICATIONS AND PREFERRED STUDIES	15
POLICY HISTORY	15
<i>Summary</i>	15
LEGAL AND COMPLIANCE	16
GUIDELINE APPROVAL	16
<i>Committee</i>	16
DISCLAIMER	16
REFERENCES	17

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Pelvis Magnetic Resonance Imaging (MRI) generates images of the organs and structures within the pelvis without the use of ionizing radiation.

Special Note

- There is no MRI Abdomen/Pelvis combo (comparable to a CT Abdomen/Pelvis) such that if imaging of both the abdomen and pelvis are indicated, two separate exams (and authorization) are required (i.e., MRI Abdomen and MRI Pelvis)
- For evaluating the placenta or imaging the maternal pelvis without need for fetal assessment, use the Pelvic MRI guideline. When assessment of the fetus is needed, see Fetal MRI (Evolent_CG_110) Guideline for indications.

INDICATIONS FOR PELVIC MRI

Inflammatory Bowel Disease

- For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis (includes MR Enterography)^(1,2)
 - For suspected inflammatory bowel disease after complete work up including physical exam, labs, and recent colonoscopy
 - Known inflammatory bowel disease with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy

Evaluation of Inflammation and Infection ^(3,4,5)

Fistula and Stricture

- For history of fistula in the pelvis that requires re-evaluation or is suspected to have recurred
- Suspected perianal fistula⁽⁶⁾
- For patients with recurrent fistula or perianal Crohn's disease⁽⁷⁾
- Suspected urethral stricture or periurethral pathology after initial evaluation with cystoscopy or urethroscopy and additional imaging is needed (such as for suspected malignancy, diverticula, fistula or extensive fibrosis OR in the setting of a pelvic fracture)⁽⁸⁾

Known or Suspected Infection When CT is Contraindicated or Cannot Be Performed

- Any known infection that is clinically suspected to have created an abscess in the pelvis
- Abnormal fluid collection limited to the abdomen seen on prior imaging that needs follow-up evaluation
- Suspected peritonitis when abdominal pain and tenderness to palpation are present, **and** at LEAST one of the following:⁽⁵⁾
 - Rebound, guarding or rigid abdomen, **OR**
 - Severe tenderness to palpation over the entire abdomen
- Complications of diverticulitis (diagnosed either clinically or by imaging) with severe abdominal pain or severe tenderness or mass, not responding to antibiotic treatment)

Evaluation of Suspected/Known Hernia ⁽⁹⁾

- For pelvic pain due to a suspected occult, spigelian, or incisional hernia when physical exam and prior imaging (ultrasound **AND** CT) are non-diagnostic or equivocal and limited to the pelvis
- Hernia with suspected complications, such as strangulation or incarceration, and CT is inconclusive, contraindicated or cannot be performed
- Suspected athletic pubalgia (sports hernia) in a patient with persistent groin pain that occurs with exertion, who has not responded to conservative treatment for four weeks, when prior imaging (ultrasound or CT) is inconclusive
- Deep pelvic hernia is suspected (obturator, sciatic or perineal) (does not require US first but this type of hernia needs to be specified in notes)

Musculoskeletal Indications

- Initial evaluation of suspicious mass/tumor of the bones, muscles or soft tissues of the pelvis found on an imaging study, and needing clarification, or found by physical exam and after x-ray or ultrasound is completed
- Evaluation of suspected fracture and/or injury when initial imaging is completed or for confirmed stress (fatigue) fracture for “return to play” evaluation⁽¹⁰⁾
- For evaluation of known or suspected aseptic/avascular necrosis of hip(s) after completion of initial x-ray⁽¹¹⁾
- Known or suspected sacroiliitis (infectious or inflammatory) after completion of x-ray and rheumatologic workup⁽¹²⁾
- Sacroiliac Joint Dysfunction (after initial X-ray) when there is:⁽¹³⁾
 - Persistent back and/or sacral pain unresponsive to four (4) weeks of conservative treatment, received within the past six (6) months, including physical therapy or physician supervised home exercise plan (HEP)
- For evaluating the lumbosacral plexus:⁽¹⁴⁾
 - Confirm involvement in symptomatic patients with known tumor
 - Assess extent of injuries in the setting of pelvic trauma
 - Exclude the presence of masses in patients with unilateral changes, or inconclusive or abnormal findings on EMG when there are persistent symptoms
 - Evaluation when lumbar spine MRI is suspicious or indeterminate
- Suspicion of pudendal neuralgia in the setting of chronic pelvic pain with genital numbness and erectile dysfunction when other causes have been ruled out (see Background regarding diagnosis)⁽¹⁵⁾
- Suspicion of meralgia paresthetica when prior testing is inconclusive (diagnostic nerve block; electrodiagnostic testing; AND somatosensory evoked potentials)⁽¹⁶⁾
- Persistent Pain:
 - Evaluation of persistent pain unresponsive to four (4) weeks of conservative treatment received within the past six (6) months
 - Suspected piriformis syndrome after failure of 4 weeks conservative treatment⁽¹⁷⁾
- Evaluation of both hips when the patient meets hip MRI guidelines (x-ray + persistent pain unresponsive to conservative treatment) for both the right and left hip, Pelvis MRI is the preferred study.
 - If labral tear is suspected due to a positive anterior impingement sign or posterior impingement sign, then bilateral hip MRIs are the preferred studies (not Pelvis MRI)
 - If bilateral hip arthrograms are requested and otherwise meet guidelines, bilateral hip MRIs are the preferred studies (not Pelvis MRI)

- For further evaluation of congenital anomalies of the sacrum and pelvis and initial imaging has been performed

Other Indications for Pelvic MRI

- Pelvic pain when a gynecologic cause is suspected after initial imaging (ultrasound and/or CT) and laboratory evaluation has been completed⁽¹⁸⁾
- Chronic pelvic pain syndrome
- Location or evaluation of undescended testes in adults and in children, including determination of location of testes, if ordered by a specialist⁽¹⁹⁾
- Evaluation and characterization of uterine and adnexal masses, (e.g., fibroids, ovaries, tubes, and uterine ligaments) or congenital uterine or renal abnormality where ultrasound has been done previously⁽¹⁸⁾
- Evaluation of abnormal uterine bleeding when ultrasound findings are indeterminate⁽²⁰⁾
 - Age ≤ 50 – Vascular stalk or focal doppler signal on US
 - Age > 50 – Thickened endometrium, vascular stalk or focal doppler signal on US
- Evaluation of uterus prior to and after embolization⁽²¹⁾
- Evaluation of endometriosis when preliminary imaging has been completed or to follow up known endometriosis⁽²²⁾
- Further evaluation of suspected adenomyosis when ultrasound is inconclusive, such as the following:⁽²³⁾
 - Uterine abnormality on US
 - Anechoic spaces/cysts in myometrium
 - Heterogeneous echotexture
 - Obscured endometrial/myometrial border
 - Sub-endometrial echogenic linear striations
 - Thickening of the transition zone
 - Uterine enlargement
 - Uterine wall thickening
- Prior to uterine surgery if there is abnormality suspected on prior ultrasound
- Suspected placenta accreta or percreta when ultrasound is indeterminate⁽²⁴⁾
- Further assessment of a scrotal or penile mass when ultrasound is inconclusive⁽²⁵⁾
- Investigation of a malfunctioning penile prosthesis
- Suspected urethral diverticulum and other imaging (ultrasound) is inconclusive **OR** for surgical planning **OR** with findings on exam or cystoscopy that are highly

suggestive of urethral diverticulum (i.e., ostia on cystoscopy or tender cystic lesion on anterior vaginal wall overlying the urethra)⁽²⁶⁾

- Suspected pelvic congestion syndrome in women with chronic pelvic pain when other imaging is non-diagnostic⁽²⁷⁾
- Suspected patent urachus or other urachal abnormalities when ultrasound is non-diagnostic⁽²⁸⁾
- MR defecography for suspected structural cause of defecatory outlet obstruction to confirm diagnosis if other testing is equivocal (anorectal manometry and balloon expulsion testing)⁽²⁹⁾
- Evaluation of enlargement of organ abnormality seen on previous imaging - to provide an alternative to an indeterminate or inconclusive ultrasound
- Transient or episodic hematospermia and age ≥ 40 with negative or inconclusive ultrasound
- Persistent hematospermia (duration > 1 month, any age) with negative or inconclusive ultrasound⁽³⁰⁾

When CT is Inconclusive, Contraindicated or Cannot be Completed

- Persistent abdominal/pelvic pain after initial laboratory evaluation and either ultrasound and/or scope has been completed and does not reveal a cause
- Fever of unknown origin (temperature of ≥ 101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see **Background**)
- Any B-symptoms of fevers more than 101° F, drenching night sweats, or unexplained weight loss of more than 10% of body weight over 6 months with documented concern for lymphoma/malignancy⁽³¹⁾
- Weight loss:
 - Clinically significant unintentional weight loss i.e., $\geq 5\%$ of body weight in less than 12 months (or $\geq 2\%$ in one month), with signs or symptoms suggestive of an abdominal or pelvic cause (see **Background**) **OR**
 - Ongoing unexplained clinically significant weight loss i.e., $\geq 5\%$ of body weight in less than 12 months (or $\geq 2\%$ in one month)⁽³²⁾ after initial workup (see **Background**) has been completed, no cause identified, and second visit documenting further decline in weight⁽³³⁾
- Suspected or known retroperitoneal fibrosis after complete workup and ultrasound to determine extent of disease⁽³⁴⁾
- Suspected paraneoplastic syndrome (including dermatomyositis) with high suspicion of abdominal malignancy and appropriate workup has been done (see Background for details)

- Diffuse, unexplained lower extremity edema with negative or inconclusive ultrasound⁽³⁵⁾
- Suspected May-Thurner syndrome (CTV/MRV preferred)⁽³⁶⁾
- Further evaluation of a new onset or non-reducible varicocele⁽³⁷⁾
- Prior to Bone Marrow Transplant (BMT)^(38, 39)
- Follow-up of abnormal lymph nodes with no prior history of malignancy
 - Follow-up imaging at 3 months⁽⁴⁰⁾

Suspected Malignancy

Suspected Prostate Cancer ^(41,42,43,44,45,46)

Prior to prostate biopsy when notes indicate that biopsy is planned⁽⁴⁷⁾

- In individuals with previous negative biopsy and ongoing concerns of increased risk of prostate cancer (i.e., rising or persistently elevated PSA **OR** suspicious digital rectal exam (DRE))
- For evaluation of elevated PSA (on two separate levels) when PI-RADS classification needed to make decision on whether or not to perform a biopsy when ALL of the following has been provided:⁽⁴⁸⁾
 - Digital rectal examination (DRE) findings
 - PSA elevation not attributed to benign disease
 - Biopsy has been discussed with the patient (Typically, this request would be from the person performing the biopsy (i.e., urologist) and imaging done at the facility where the fusion biopsy would be performed should a higher risk lesion be identified.)
- For evaluation of a very suspicious prostate nodule on exam when biopsy is under consideration⁽⁴⁸⁾
- Follow up MRI can be approved at the following intervals:^(49,50)
 - PI-RADS 3-5 lesions: 12-month interval
 - PI-RADS 1-2 lesions: 24-month interval
 - Earlier for PI-RADS 1-2 if biopsy is clearly planned, progressive rise in PSA or other risk factors exist

Known Malignancy

Initial Staging

- Pelvis MRI is indicated (if not previously done) for the following malignancies:

- Anal Carcinoma
- Cervical Cancer
- Gestational Trophoblastic Neoplasia
- Ovarian Cancer
- Pediatric Solid Tumors
- Prostate Cancer
- Rectal Cancer
- Uterine Neoplasms
- Vulvar Cancer
- For all other malignancies, Pelvis MRI is indicated to clarify indeterminate findings on CT

Restaging ⁽⁵¹⁾

- Pelvis MRI is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the following malignancies:
 - Prostate Cancer:
 - Annually if on active surveillance
 - When recurrence is suspected and PSMA PET is not planned (see CG_070-1 PET for further detail)
 - Rectal Cancer

Surveillance ⁽⁵²⁾

- Pelvis MRI is not typically used during surveillance, however, for the cancers listed above, can be considered on a case to case basis **OR** when CT is contraindicated and cannot be performed

Pre-operative Evaluation

- For diagnostic purposes prior to pelvic surgery or procedure

Post-Operative/Procedural Evaluation

When not otherwise addressed in the guideline

- Follow-up of known or suspected post-operative complication (within 6 months) involving the hips or the pelvis ⁽⁵³⁾
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed.

Genetic Syndromes and Rare Diseases

Surveillance Screening Pelvis MRI for the following KNOWN Genetic Syndromes

- FAP (Familial Adenomatous Polyposis, annual screening of abdomen and pelvis with MRI or CT for one or more of the following: personal history of desmoid tumor, family history of desmoid tumor or abdominal symptoms suggestive of desmoid tumor⁽⁵⁴⁾)
- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **NOT** available ⁽⁵⁵⁾ (see CG_063 Unlisted Studies)
- Multiple Endocrine Neoplasia type 1 (MEN1): annually⁽⁵⁶⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Abdomen/Pelvis MRI

- As a dedicated CPT code does not exist for Abdomen and Pelvis MRI (unlike CT), when a disease process is reasonably expected to involve both the abdomen and pelvis **AND** the guideline criteria have been met, two separate authorizations are required: Abdomen MRI (CPT 74181, 74182, 74183) and Pelvis MRI (CPT 72195, 72196, 72197).

Brain/Chest/Abdomen/Pelvis MRI

- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1)
 - Chest/Abdomen/Pelvis annually
 - Brain/Chest/Abdomen/Pelvis every 3 years

Neck/Abdomen/Pelvis MRI and Chest CT

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **not** available⁽⁵⁵⁾ (see Unlisted Studies Evolent_CG_063)⁽⁵⁷⁾

Pelvis MRI and Pelvis MRA

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)
- Prior to uterine artery embolization for fibroids

Pelvis MRI and Fetal MRI

- When medical necessity has been met for Pelvis MRI (such as for suspected placenta accreta or percreta when ultrasound is indeterminate⁽²⁴⁾ **AND** medical necessity has been met for Fetal MRI (such as suspected fetal abnormality after ultrasound has been performed), two separate authorizations are required: Pelvis MRI (CPT 72195) and Fetal MRI (CPT 74712).

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

72195, 72196, 72197, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

PI-RADS Assessment Categories for Prostate Cancer

The assignment of a PI-RADS category is based on mpMRI findings only and does not incorporate other factors, including PSA testing, DRE (digital rectal exam), or clinical history.

- PI-RADS 1 – Very low (clinically significant cancer is highly unlikely to be present)
- PI-RADS 2 – Low (clinically significant cancer is unlikely to be present)
- PI-RADS 3 – Intermediate (the presence of clinically significant cancer is equivocal)
- PI-RADS 4 – High (clinically significant cancer is likely to be present)
- PI-RADS 5 – Very high (clinically significant cancer is highly likely to be present)

*Conservative Therapy

Conservative therapy should include a multimodality approach consisting of a combination of active and inactive components. Inactive components, such as rest, ice, heat, modified activities, medical devices, acupuncture and/or stimulators, medications, injections (epidural, facet, bursal, and/or joint, not including trigger point), and diathermy can be utilized. Active modalities may consist of physical therapy, a physician-supervised home exercise program**, and/or chiropractic care.

****Home Exercise Program (HEP)**

The following elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan **AND**
- Follow up with member with documentation provided regarding lack of improvement (failed) after completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises. (Patient inconvenience or noncompliance without explanation does not constitute "inability to complete" HEP).
- Dates and duration of failed PT, physician-supervised HEP, or chiropractic treatment should be documented in the original office notes or an addendum to the notes.

MRI and Lumbosacral Plexopathy

Complete lumbar (L1-L4) or sacral plexopathy (L5-S3) may present with weakness, sensory loss, and flaccid loss of tendon reflexes. Clinical diagnosis is confirmed by EMG. Acute and chronic plexopathies may be caused by nerve sheath tumors; infectious, autoimmune, hereditary, or idiopathic neuropathies; extrinsic compression; or trauma. There is no CPT® code specifically for imaging of the LS plexus.

Pudendal neuralgia may be considered in chronic pain patients who meet the Nantes criteria: pain in the area innervated by the pudendal nerve, pain more severe with sitting, pain that does not awaken the patient from sleep, pain with no objective sensory impairment, and pain relieved by pudendal block. All five criteria must be met for diagnosis.

Elevated CA-125 and Pelvic Imaging

There is no evidence that isolated levels of CA-125 with no other clinical or radiologic evidence of pathology is sensitive or specific and should not be performed as an isolated test as it can lead to unnecessary studies and anxiety. It is elevated in most cases of epithelial ovarian cancer and is used in monitoring response to treatment as an adjunct to pelvic US. CA-125 has been shown to be increased in many conditions such as fibroids, adenomyosis, pancreatic cancer, endometriosis, tuberculosis, and interstitial lung disease. MRI is not indicated as a first-line test.

Fever of Unknown Origin

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test. Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can

Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

Paraneoplastic Syndromes

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For **SIADH** (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.

For **hypercalcemia** (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen and pelvis imaging as appropriate.

For **Cushing syndrome** (hypokalemia, normal-high midnight serum ACTH NOT suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test DOES suppress ACTH, pituitary MRI is reasonable.

For **hypoglycemia**, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-peptide and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrants CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrants chest and abdominal imaging.

When a **paraneoplastic neurologic syndrome** is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Weight Loss

Unintentional weight loss is considered clinically significant if the amount of weight lost over 12 months is $\geq 5\%$. Older age and higher percentage of weight loss correlates with higher likelihood of malignancy. A targeted evaluation is recommended when there are signs or symptoms suggestive of a specific source. For example, when there is clinically significant weight loss with abdominal pain that prompts an evaluation for an abdominal source of the weight loss; CXR and labs such as TSH would not be needed prior to abdominal imaging. Conversely a smoker with a cough and weight loss would not start with abdominal imaging, a chest x-ray (CXR) would be the first test to start with. When there is no suspected diagnosis, initial evaluation includes CXR, age-appropriate cancer screening (such as

colonoscopy and mammography) and labs (including CBC, CMP, HbA1C, TSH, stool hemocult, ESR/CRP, HIV, Hepatitis C). If this initial evaluation fails to identify a cause of weight loss, then the patient is monitored and if progressive weight loss is seen on subsequent visits/weights, then CT Abdomen/Pelvis is reasonable (MRI if there is a contraindication to CT such as contrast allergy or impaired renal function). Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Revised the purpose • Clarified when to use Fetal MRI and Pelvis MRI • Made Inflammation and Infection section to re-organize information • Clarified gynecologic reasons of why MRI vs CT • Prostate Cancer condensed in the suspected section • Known Malignancy was adjusted to follow same organization as other guidelines • Genetics and Rare Diseases was adjusted/added • Combination studies were adjusted to align across Guidelines
March 2023	<ul style="list-style-type: none"> • Prostate cancer: updated guidance based on new NCCN criteria • IBD: clarified indications • Hernia: added indication for deep pelvic hernia • Musculoskeletal: additional guidance provided for hip imaging, non-diagnostic requests added, corrected statement requiring abnormal x-ray to requiring prior x-ray • Other: specified guidance for weight loss, paraneoplastic syndrome, edema; added indications for thrombocytopenia,

	<p>gestational trophoblastic disease, cancer predisposition syndromes</p> <ul style="list-style-type: none"> • Aneurysm: added section about non-aortic vascular disease • Transplant: added section • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Lichtenstein G R, Loftus E V, Isaacs K L, Regueiro M D, Gerson L B. AACG Clinical Guideline: Management of Crohns Disease in Adults. Am J Gastroenterol. 2018; 113: 481-517. 10.1038/ajg.2018.27.
2. Rubin D T, Ananthakrishnan A N, Siegel C A, Sauer B G, Long M D. ACG Clinical Guideline: Ulcerative Colitis in Adults. Am J Gastroenterol. 2019; 114: 384-413. 10.14309/ajg.000000000000152.
3. Cartwright S, Knudson M. Diagnostic imaging of acute abdominal pain in adults. Am Fam Physician. 2015; 91: 452-9.
4. Frickenstein A N, Jones M A, Behkam B, McNally L R. Imaging Inflammation and Infection in the Gastrointestinal Tract. International journal of molecular sciences. 2019; 21: 10.3390/ijms21010243.
5. Weinstein S, Kim D H, Fowler K J, Birkholz J H, Cash B D et al. ACR Appropriateness Criteria® Left Lower Quadrant Pain: 2023 Update. Journal of the American College of Radiology. 2023; 20: S471 - S480. 10.1016/j.jacr.2023.08.013.
6. Levy A D, Liu P S, Kim D H, Fowler K J, Bharucha A E et al. ACR Appropriateness Criteria® Anorectal Disease. Journal of the American College of Radiology. 2021; 18: S268 - S282. 10.1016/j.jacr.2021.08.009.
7. Steinhart A H, Panaccione R, Targownik L, Bressler B, Khanna R et al. Clinical Practice Guideline for the Medical Management of Perianal Fistulizing Crohn's Disease: The Toronto Consensus. Inflammatory bowel diseases. 2019; 25: 1-13. 10.1093/ibd/izy247.
8. Abdeen B, Leslie S, Badreldin A. Urethral Strictures. [Updated 2023 Nov 13]. StatPearls Publishing [Internet]. 2023; Accessed May 2024.
9. Garcia E M, Pietryga J A, Kim D H, Fowler K J, Chang K J et al. ACR Appropriateness Criteria® Hernia. Journal of the American College of Radiology. 2022; 19: S329 - S340. 10.1016/j.jacr.2022.09.016.
10. Bencardino J T, Stone T J, Roberts C C, Appel M, Baccei S J et al. ACR Appropriateness Criteria® Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. Journal of the American College of Radiology. 2017; 14: S293 - S306. 10.1016/j.jacr.2017.02.035.
11. Ha A S, Chang E Y, Bartolotta R J, Bucknor M D, Chen K C et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. Journal of the American College of Radiology. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
12. Bernard S A, Kransdorf M J, Beaman F D, Adler R S, Amini B et al. ACR Appropriateness Criteria® Chronic Back Pain Suspected Sacroiliitis-Spondyloarthritis. Journal of the American College of Radiology. 2017; 14: S62 - S70. 10.1016/j.jacr.2017.01.048.
13. Falowski S, Sayed D, Pope J, Patterson D, Fishman M et al. A Review and Algorithm in the Diagnosis and Treatment of Sacroiliac Joint Pain. Journal of pain research. 2020; 13: 3337-3348. 10.2147/JPR.S279390.
14. Boulter D J, Job J, Shah L M, Wessell D E, Lenchik L et al. ACR Appropriateness Criteria® Plexopathy: 2021 Update. Journal of the American College of Radiology. 2021; 18: S423 - S441. 10.1016/j.jacr.2021.08.014.
15. Wadhwa V, Hamid A, Kumar Y, Scott K, Chhabra A. Pudendal nerve and branch neuropathy: magnetic resonance neurography evaluation. Acta Radiol. Jun 2017; 58: 726-733. 10.1177/0284185116668213.

16. Ally R, Velleman M, Suleman F. Meralgia paresthetica: Now showing on 3T magnetic resonance neurography. *SA J Radiol.* 2019; 23: 1745. 10.4102/sajr.v23i1.1745.
17. Hicks B L, Lam J C, Varacallo M. Piriformis Syndrome [Updated 2023 Aug 4]. StatPearls Publishing [Internet]. 2024.
18. Brook O, Dadour J, Robbins J, Wasnik A, Akin E et al. ACR Appropriateness Criteria® Acute Pelvic Pain in the Reproductive Age Group. American College of Radiology®. 2023.
19. Kolon T, Herndon C, Baker L, Baskin L, Baxter C et al. Evaluation and treatment of cryptorchidism: AUA guideline. *J Urol.* Aug 2014; 192: 337-45. 10.1016/j.juro.2014.05.005.
20. Robbins J B, Sadowski E A, Maturen K E, Akin E A, Ascher S M et al. ACR Appropriateness Criteria® Abnormal Uterine Bleeding. *Journal of the American College of Radiology.* 2020; 17: S336 - S345. 10.1016/j.jacr.2020.09.008.
21. Kubik-Huch R A, Weston M, Nougaret S, Leonhardt H, Thomassin-Naggara I et al. European Society of Urogenital Radiology (ESUR) Guidelines: MR Imaging of Leiomyomas. *European radiology.* 2018; 28: 3125-3137. 10.1007/s00330-017-5157-5.
22. Wall D J, Reinhold C, Akin E A, Ascher S M, Brook O R et al. ACR Appropriateness Criteria® Female Infertility. *Journal of the American College of Radiology.* 2020; 17: S113 - S124. 10.1016/j.jacr.2020.01.018.
23. Cunningham R, Horrow M, Smith R, Springer J. Adenomyosis: A Sonographic Diagnosis. *Radiographics.* Sep-Oct 2018; 38: 1576-1589. 10.1148/rg.2018180080.
24. Kilcoyne A, Shenoy-Bhangle A, Roberts D, Sisodia R, Gervais D. MRI of Placenta Accreta, Placenta Increta, and Placenta Percreta: Pearls and Pitfalls. *AJR Am J Roentgenol.* Jan 2017; 208: 214-221. 10.2214/ajr.16.16281.
25. Parker R 3, Menias C, Quazi R, Hara A, Verma S et al. MR Imaging of the Penis and Scrotum. *Radiographics.* Jul-Aug 2015; 35: 1033-50. 10.1148/rg.2015140161.
26. Greiman A K, Rolef J, Rovner E S. Urethral diverticulum: A systematic review. *Arab journal of urology.* 2019; 17: 49-57. 10.1080/2090598X.2019.1589748.
27. Knuttinen M, Xie K, Jani A, Palumbo A, Carrillo T. Pelvic venous insufficiency: imaging diagnosis, treatment approaches, and therapeutic issues. *AJR Am J Roentgenol.* Feb 2015; 204: 448-58. 10.2214/ajr.14.12709.
28. Briggs K, Rentea R. Patent Urachus [Updated 2023 Apr 10]. StatPearls Publishing [Internet]. 2023; Accessed May 2024.
29. Wald A, Bharucha A, Cosman B, Whitehead W. ACG clinical guideline: management of benign anorectal disorders. *Am J Gastroenterol.* Aug 2014; 109: 1141-57; (Quiz) 1058. 10.1038/ajg.2014.190.
30. Hosseinzadeh K, Oto A, Allen B, Coakley F, Friedman B et al. ACR Appropriateness Criteria(®) Hematospermia. *J Am Coll Radiol.* May 2017; 14: S154-s159. 10.1016/j.jacr.2017.02.023.
31. Brown I, Finnigan N. Fever of Unknown Origin. [Updated 2023 Aug 14]. In: StatPearls Publishing [Internet]. 2023; Accessed May 2024.
32. Gaddey H L, Holder K K. Unintentional Weight Loss in Older Adults. *American family physician.* 2021; 104: 34-40.
33. Gupta R, Evans A. Unintentional Weight Loss in Older Adults [Updated Oct 24, 2023]. UpToDate [Internet]. 2023; Accessed May 2024.
34. Engelskjerd J, LaGrange C. Retroperitoneal Fibrosis. [Updated 2022 Sep 12]. In: StatPearls Publishing [Internet]. 2022.

35. Hoshino Y, Machida M, Shimano S, Taya T, Imai S et al. Unilateral Leg Swelling: Differential Diagnostic Issue Other than Deep Vein Thrombosis. *Journal of General and Family Medicine*. 2016; 17: 311-314.
36. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164.
37. Schlegel P, Sigman M, Collura B, De Jonge C, Eisenberg M et al. Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline Part I. *J Urol*. Jan 2021; 205: 36-43. 10.1097/ju.0000000000001521.
38. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation*. 2014/11/01/; 20: 1852-1856. <https://doi.org/10.1016/j.bbmt.2014.06.029>.
39. Kaste S, Kaufman R, Sunkara A, Kang G, Morris C et al. Routine pre- and post-hematopoietic stem cell transplant computed tomography of the abdomen for detecting invasive fungal infection has limited value. *Biol Blood Marrow Transplant*. Jun 2015; 21: 1132-5. 10.1016/j.bbmt.2015.02.023.
40. Smereka P, Doshi A, Ream J, Rosenkrantz A. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol*. May 2017; 24: 603-608. 10.1016/j.acra.2016.12.009.
41. Bjurlin M, Carroll P, Eggner S, Fulgham P, Margolis D et al. Update of the Standard Operating Procedure on the Use of Multiparametric Magnetic Resonance Imaging for the Diagnosis, Staging and Management of Prostate Cancer. *J Urol*. Apr 2020; 203: 706-712. 10.1097/ju.0000000000000617.
42. Borofsky S, George A, Gaur S, Bernardo M, Greer M et al. What Are We Missing? False-Negative Cancers at Multiparametric MR Imaging of the Prostate. *Radiology*. Jan 2018; 286: 186-195. 10.1148/radiol.2017152877.
43. Cornford P, van den Bergh R, Briers E, Van den Broeck T, Cumberbatch M et al. EAU-EANM-ESTRO-ESUR-SIOG Guidelines on Prostate Cancer. Part II-2020 Update: Treatment of Relapsing and Metastatic Prostate Cancer. *Eur Urol*. Feb 2021; 79: 263-282. 10.1016/j.eururo.2020.09.046.
44. Elkhoury F, Felker E, Kwan L, Sisk A, Delfin M et al. Comparison of Targeted vs Systematic Prostate Biopsy in Men Who Are Biopsy Naive: The Prospective Assessment of Image Registration in the Diagnosis of Prostate Cancer (PAIREDCAP) Study. *JAMA Surg*. 2019; 154: 811-818. 10.1001/jamasurg.2019.1734.
45. Fulgham P, Rukstalis D, Rubenstein J, Taneja S, Carroll P et al. Standard Operating Procedure for Multiparametric Magnetic Resonance Imaging in the Diagnosis, Staging and Management of Prostate Cancer: A Collaborative Initiative by the American Urological Association and the Society of Abdominal Radiology Prostate Disease Focus Panel. May 2019; 2022.
46. Mottet N, Bellmunt J, Briers E, Bolla M, Bourke L et al. EAU–ESTRO–ESUR–SIOG guidelines on prostate cancer. *European Association of Urology*. 2022; 2022.
47. Alexander L F, Oto A, Allen B C, Akin O, Chong J et al. ACR Appropriateness Criteria® Lower Urinary Tract Symptoms-Suspicion of Benign Prostatic Hyperplasia. *J Am Coll Radiol*. 2019; 16: S378-s383. 10.1016/j.jacr.2019.05.031.
48. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Prostate Cancer Early Detection Version 2.2024. National Comprehensive Cancer Network®. 2024.
49. Boschheidgen M, Schimmöller L, Doerfler S, Al-Monajjed R, Morawitz J et al. Single center analysis of an advisable control interval for follow-up of patients with PI-RADS category 3 in multiparametric MRI of the prostate. *Sci Rep*. 2022; 12: 6746. 10.1038/s41598-022-10859-9.

50. Schoots I. MRI in early prostate cancer detection: how to manage indeterminate or equivocal PI-RADS 3 lesions? *Transl Androl Urol*. Feb 2018; 7: 70-82. 10.21037/tau.2017.12.31.
51. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Prostate Cancer Version 3.2024. National Comprehensive Cancer Network®. 2023.
52. ACR-SABI-SAR-SPR. ACR–SABI–SAR–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF COMPUTED TOMOGRAPHY (CT) OF THE ABDOMEN AND COMPUTED TOMOGRAPHY (CT) OF THE PELVIS. American College of Radiology. 2021.
53. Davis D, Morrison J. Hip Arthroplasty Pseudotumors: Pathogenesis, Imaging, and Clinical Decision Making. *J Clin Imaging Sci*. 2016; 6: 17. 10.4103/2156-7514.181493.
54. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colon Cancer Version 3.2024. National Comprehensive Cancer Network®. 2024; Accessed May 2024.
55. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. 2008 May 21 [Updated 2023 Sep 21]. *GeneReviews®* [Internet]. 2023.
56. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors V1.2023. National Comprehensive Cancer Network®. 2023; Version 1.2023.
57. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer V3.2024. National Comprehensive Cancer Network®. 2024; 1,23.



EVOLENT CLINICAL GUIDELINE 039 FOR PELVIS MRA/MRV (ANGIOGRAPHY/VENOGRAPHY)

Guideline or Policy Number: Evolent_CG_039	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 2008 - 2025 Evolent. All rights Reserved.</i>		
Original Date: May 2008	Last Revised Date: April 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR PELVIS MR ANGIOGRAPHY/MR VENOGRAPHY (MRA/MRV)	3
ABDOMINAL AORTIC DISEASE.....	3
<i>Abdominal Aortic Aneurysm</i>	<i>3</i>
<i>Aortic Syndromes.....</i>	<i>4</i>
<i>Postoperative Follow-up of Aortic Repair.....</i>	<i>4</i>
ISCHEMIA OR HEMORRHAGE	5
OTHER VASCULAR ABNORMALITIES	5
VENOUS DISEASE	5
EVALUATION OF TUMOR	5
PRE-OPERATIVE EVALUATION AND/OR PRE-PROCEDURAL EVALUATION	6
POST-OPERATIVE EVALUATION AND/OR POST-PROCEDURAL EVALUATION	6
GENETIC SYNDROME AND RARE DISEASES	6
COMBINATION STUDIES	7
<i>Abdomen/Pelvis MRA</i>	<i>7</i>
<i>Brain/Neck/Chest/Abdomen/Pelvis MRA</i>	<i>7</i>
<i>Chest/Abdomen/Pelvis MRA</i>	<i>8</i>
<i>Neck/Chest/Abdomen/Pelvis MRA.....</i>	<i>8</i>
<i>Pelvis MRA and Pelvis MRI (or CT).....</i>	<i>8</i>
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
CODING AND STANDARDS	9
CODING	9
<i>CPT Codes</i>	<i>9</i>
APPLICABLE LINES OF BUSINESS	9
BACKGROUND	9
ABDOMINAL ANEURYSMS AND GENERAL GUIDELINES FOR FOLLOW-UP	9
ILIAC ANEURYSM ULTRASOUND SCREENING INTERVALS.....	9
MRI/CT AND ACUTE HEMORRHAGE.....	10

CONTRAINDICATIONS AND PREFERRED STUDIES	10
POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL.....	11
<i>Committee</i>	11
DISCLAIMER.....	11
REFERENCES.....	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance angiography (MRA) and (MRV) generates images of the blood vessels that can be evaluated for evidence of stenosis, occlusion, or aneurysms without use of ionizing radiation. It is used to evaluate the blood vessels of the pelvis.

Special Note

When the criteria for imaging of peripheral vascular disease are met (see relevant guidelines), two separate authorizations are required: Abdomen MRA (CPT 74185) and one Lower Extremity MRA (CPT 73725). This will provide imaging of the abdomen, pelvis and both legs. A separate Pelvis MRA authorization is **NOT** required. Only one Lower Extremity MRA is required (not two).

INDICATIONS FOR PELVIS MR ANGIOGRAPHY/MR VENOGRAPHY (MRA/MRV)

Abdominal Aortic Disease

Abdominal Aortic Aneurysm

- **Asymptomatic** known or suspected abdominal aortic aneurysms when prior ultrasound is inconclusive or insufficient **AND** when CT/CTA is **contraindicated or cannot be performed**
- **Symptomatic** known or suspected Abdominal Aortic Aneurysm^(1,2)
 - Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Acute abdominal or back pain with a pulsatile or epigastric mass

- Acute abdominal or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve)⁽³⁾

Aortic Syndromes

For initial diagnosis of suspected and follow-up of known aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer

- Frequency for follow up is as clinically indicated

Postoperative Follow-up of Aortic Repair

Follow-up for post-endovascular repair (EVAR) or open repair of AAA⁽¹⁾ or abdominal extent of iliac artery aneurysms at the following intervals:

- Routine, baseline post-EVAR study when CT/CTA is **contraindicated or cannot be performed**:
 - Within one month of procedure
 - Continued follow up imaging at the following intervals:
 - If no endoleak or sac enlargement is seen:
 - Annually monitor with ultrasound
 - ◆ When US is abnormal or insufficient CT/MR can be using to monitor annually
 - Every 5 years monitor with CT/MR
 - If type II endoleak or sac enlargement is seen at any point in time (US not needed):
 - Monitor every 6 months x 2 years, then annually (does not require US)
- Routine follow up after open repair of AAA when CT/CTA is **contraindicated or cannot be performed**:⁽²⁾
 - Within 1 year postoperatively then
 - Annually monitor with ultrasound
 - When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR
- If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed as clinically indicated
- Suspected complication such as: new-onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair

Ischemia or Hemorrhage

- To determine the vascular source of retroperitoneal hematoma or hemorrhage when CT is insufficient to determine the source and CTA is **contraindicated or cannot be performed**; (CT rather than MRA/CTA is the modality of choice for diagnosing hemorrhage)⁽⁴⁾
- Evaluation of known or suspected mesenteric ischemia/ischemic colitis when CTA is **contraindicated or cannot be performed**⁽⁵⁾

Other Vascular Abnormalities

- Initial evaluation of inconclusive vascular findings on prior imaging
- For evaluation or monitoring of pelvic vascular disease when ultrasound is inconclusive^(3,6,7,8)
 - Includes abnormalities such as aneurysm, dissection, arteriovenous malformations (AVM), vascular fistula, intramural hematoma, compression syndromes and vasculitis involving any of the following: inferior vena cava, iliac arteries/veins and/or other pelvic blood vessels
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽⁹⁾
- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of pelvic pain

Venous Disease

- Evaluation of suspected pelvic vascular disease or pelvic congestive syndrome when findings on ultrasound are indeterminate^(10,11)
- Unexplained lower extremity edema (typically unilateral or asymmetric) with negative or inconclusive Abdomen and/or Pelvis CT⁽¹²⁾
- Venous thrombosis (including inferior vena cava thrombosis) if previous studies (such as ultrasound) have not resulted in a clear diagnosis^(13,14)
- Known/suspected May-Thurner Syndrome (iliac vein compression syndrome) when CTV is **contraindicated or cannot be performed**^(15,16)
- For pregnant women with suspected deep venous thrombosis (DVT) (including suspected extension to the iliac vein) after compression ultrasound⁽¹⁷⁾

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor⁽¹⁸⁾

- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery

Pre-Operative Evaluation and/or Pre-Procedural Evaluation (19,20,21)

- Evaluation prior to interventional vascular for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) CTA is **contraindicated or cannot be performed**⁽²²⁾
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery
- Evaluation of vascular anatomy prior to solid organ transplantation
- Prior to uterine artery embolization for fibroids⁽²³⁾
- For evaluation of erectile dysfunction when a vascular cause is confirmed by doppler ultrasound, revascularization is planned and there is a contraindication to selective internal pudendal angiography (SIPA)⁽²⁴⁾

Post-Operative Evaluation and/or Post-Procedural Evaluation

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Endovascular/interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Post-operative complications (e.g., pseudoaneurysms related to surgical bypass grafts, vascular stents, and stent-grafts in the pelvis)
- Post-operative complications of renal transplant allograft⁽²⁵⁾

Genetic Syndrome and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):^(26,27)
 - One-time vascular study from brain to pelvis

- Vascular Ehlers-Danlos syndrome:^(28,29)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Marfan syndrome:⁽³⁰⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(2,31)
- Loeys-Dietz:
 - At diagnosis and then every two years
 - More frequently if abnormalities are found⁽³²⁾
- Williams Syndrome:⁽³³⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Neurofibromatosis Type 1 (NF-1):⁽³⁴⁾
 - Development of hypertension (including concern for renal artery stenosis)
- Takayasu's Arteritis:⁽³⁵⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Abdomen/Pelvis MRA

- As a dedicated CPT code does not exist for Abdomen and Pelvis MRA, when a disease process is reasonably expected to involve both the abdomen and pelvis **AND** the guideline criteria have been met, two separate authorizations are required: Abdomen MRA (CPT code 74185) and Pelvis MRA (CPT 72198)

Brain/Neck/Chest/Abdomen/Pelvis MRA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis^(26,27)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found^(28,29)

- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found⁽³²⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽⁹⁾

Chest/Abdomen/Pelvis MRA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) when CTA is **contraindicated or cannot be performed**⁽²²⁾
- Marfan syndrome:⁽³⁰⁾
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(2,31)
- Williams Syndrome⁽³³⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection⁽³⁶⁾
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Neck/Chest/Abdomen/Pelvis MRA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated⁽³⁵⁾

Pelvis MRA and Pelvis MRI (or CT)

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)⁽¹⁸⁾
- Prior to uterine artery embolization for fibroids⁽²³⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

72198

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Abdominal Aneurysms and General Guidelines for Follow-Up

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilation of the infrarenal aorta is defined as diameter \geq 3.0 cm or dilatation of the aorta \geq 1.5x the normal diameter.

Iliac Aneurysm Ultrasound Screening Intervals

- Aneurysm size 2.0-2.9 cm, every 3 years
- Aneurysm size 3.0-3.4 cm, annually
- Aneurysm size $>$ 3.5 cm, every 6 months⁽³⁾

MRI/CT and Acute Hemorrhage

MRI is not indicated and MRA/MRV (MR Angiography/Venography) is rarely indicated for evaluation of intraperitoneal or retroperitoneal hemorrhage, particularly in the acute setting. CT is the study of choice due to its availability, speed of the study, and less susceptibility to artifact from patient motion. Advances in technology have allowed conventional CT to detect hematomas and the source of acute vascular extravasation. In special cases, finer vascular detail to assess the specific source vessel responsible for hemorrhage may require the use of CTA (e.g., for the diagnosis of lower gastrointestinal bleeding).⁽³⁷⁾

MRA/MRV is often utilized in non-acute situations to assess vascular structure involved in atherosclerotic disease with associated complications, vasculitis, venous thrombosis, vascular congestion, or tumor invasion. Although some may be associated with hemorrhage, it is usually not the primary reason why MRI/MRA/MRV is selected for the evaluation. A special condition where MRI may be superior to CT for evaluating hemorrhage is to detect an underlying neoplasm as the cause of bleeding.⁽⁴⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
April 2024	<ul style="list-style-type: none"> • Separated out aortic syndromes to be more clear • EVAR studies clarified order of which studies would be ordered • Renal artery stenosis: updated per new clinical guidance • Added Genetic Syndromes and Tumors Section • Statement put in all Guidelines for contraindications put in indications and background sections • Combo section adjusted and made uniform • Updated references and background sections
March 2023	<ul style="list-style-type: none"> • Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging

	<ul style="list-style-type: none"> • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information. .

REFERENCES

1. Chaikof E, Dalman R, Eskandari M, Jackson B, Lee W et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg*. 2018; 67: 2-77.e2. 10.1016/j.jvs.2017.10.044.
2. Isselbacher E, Preventza O, Hamilton Black J, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 146: e334-e482. 10.1161/CIR.0000000000001106.
3. Wanhainen A, Verzini F, Van Herzelee I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *Eur J Vasc Endovasc Surg*. 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
4. Verma N, Steigner M, Aghayev A, Azene E, Chong S et al. ACR Appropriateness Criteria® Suspected Retroperitoneal Bleed. *Journal of the American College of Radiology*. 2021; 18: S482 - S487. <https://doi.org/10.1016/j.jacr.2021.09.003>.
5. Lam A, Kim Y, Fidelman N, Higgins M, Cash B et al. ACR Appropriateness Criteria® Radiologic Management of Mesenteric Ischemia: 2022. *Journal of the American College of Radiology : JACR*. 2022; 19: S433-S444. 10.1016/j.jacr.2022.09.006.
6. Juntermanns B, Bernheim J, Karaindros K, Walensi M, Hoffmann J N. Visceral artery aneurysms. *Gefasschirurgie : Zeitschrift fur vaskulare und endovaskulare Chirurgie : Organ*. 2018; 23: 19-22. 10.1007/s00772-018-0384-x.
7. Knuttinen M, Xie K, Jani A, Palumbo A, Carrillo T. Pelvic venous insufficiency: imaging diagnosis, treatment approaches, and therapeutic issues. *AJR Am J Roentgenol*. 2015; 204: 448-58. 10.2214/ajr.14.12709.
8. Makazu M, Koizumi K, Masuda S, Jinushi R, Shionoya K. Spontaneous retroperitoneal hematoma with duodenal obstruction with diagnostic use of endoscopic ultrasound: A case series and literature review. *Clinical journal of gastroenterology*. 2023; 16: 377-386. 10.1007/s12328-023-01780-3.
9. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine*. 2021; 10: 10.3390/jcm10245925.
10. Kashef E, Evans E, Patel N, Agrawal D, Hemingway A. Pelvic venous congestion syndrome: female venous congestive syndromes and endovascular treatment options. *CVIR endovascular*. 2023; 6: 25. 10.1186/s42155-023-00365-y.
11. Rezaei-Kalantari K, Fahrni G, Rotzinger D, Qanadli S. Insights into pelvic venous disorders. *Frontiers in Cardiovascular Medicine*. 2023; 10: 10.3389/fcvm.2023.1102063.
12. Gasparis A, Kim P, Dean S, Khilnani N, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. 2020; 35: 650 - 655. 10.1177/0268355520938283.
13. Aw-Zoretic J, Collins J. Considerations for Imaging the Inferior Vena Cava (IVC) with/without IVC Filters. *Semin Intervent Radiol*. 2016; 33: 109-21. 10.1055/s-0036-1583207.
14. Hanley M, Steigner M, Ahmed O, Azene E, Bennett S et al. ACR Appropriateness Criteria (®) Suspected Lower Extremity Deep Vein Thrombosis. *Journal of the American College of Radiology : JACR*. 2018; 15: S413-S417. 10.1016/j.jacr.2018.09.028.
15. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: true. 10.21037/cdt.2017.10.14.

16. Shammam N, Jones-Miller S, Kovach T, Radaideh Q, Patel N et al. Predicting Significant Iliac Vein Compression Using a Probability Scoring System Derived from Minimal Luminal Area on Computed Tomography Angiography in Patients 65 Years of Age or Younger. *J Invasive Cardiol.* 2021; 33: E16-E18.
17. Bates S, Rajasekhar A, Middeldorp S, McLintock C, Rodger M et al. American Society of Hematology 2018 guidelines for management of venous thromboembolism: venous thromboembolism in the context of pregnancy. *Blood advances.* 2018; 2: 3317-3359. 10.1182/bloodadvances.2018024802.
18. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa.* 2015; 57: e95-e100. <https://doi.org/10.1016/j.crvasa.2015.02.015>.
19. Francois C, Skulborstad E, Majdalany B, Chandra A, Collins J et al. ACR Appropriateness Criteria (®) Abdominal Aortic Aneurysm: Interventional Planning and Follow-Up. *Journal of the American College of Radiology : JACR.* 2018; 15: S2-S12. 10.1016/j.jacr.2018.03.008.
20. Leipsic J, Blanke P, Hanley M, Batlle J, Bolen M et al. ACR Appropriateness Criteria(®) Imaging for Transcatheter Aortic Valve Replacement. *Journal of the American College of Radiology : JACR.* 2017; 14: S449-S455. 10.1016/j.jacr.2017.08.046.
21. Singh N, Aghayev A, Ahmad S, Azene E, Ferencik M et al. ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery): 2022 Update. *Journal of the American College of Radiology : JACR.* 2022; 19: S357-S363. 10.1016/j.jacr.2022.09.004.
22. Hedgire S, Saboo S, Galizia M, Aghayev A, Bolen M et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic Valve Replacement: 2023 Update. *Journal of the American College of Radiology.* 2023; 20: S501 - S512. 10.1016/j.jacr.2023.08.009.
23. Maciel C, Tang Y, Sahdev A, Madureira A, Vilares Morgado P. Preprocedural MRI and MRA in planning fibroid embolization. *Diagn Interv Radiol.* 2017; 23: 163-171. 10.5152/dir.2016.16623.
24. Burnett A, Nehra A, Breau R, Culkin D, Faraday M et al. Erectile Dysfunction: AUA Guideline. *The Journal of urology.* 2018; 200: 633-641. 10.1016/j.juro.2018.05.004.
25. Serhal A, Aouad P, Serhal M, Pathrose A, Lombardi P et al. Evaluation of Renal Allograft Vasculature Using Non-contrast 3D Inversion. *Exploratory research and hypothesis in medicine.* 2021; 6: 90-98. 10.14218/ERHM.2021.00011.
26. Gornik H, Persu A, Adlam D, Aparicio L, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine.* 2019; 24: 164 - 189. 10.1177/1358863X18821816.
27. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management.* 2023; 19: 543-556. 10.2147/VHRM.S388257.
28. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European Journal of Human Genetics.* 2023; 31: 749 - 760. 10.1038/s41431-023-01343-7.
29. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. *GeneReviews® [Internet].* 2019;
30. Dietz H. FBN1-Related Marfan Syndrome. [Updated 2022 Feb 17]. *GeneReviews® [Internet].* 2022; Accessed May 2024:

31. Weinrich J, Lenz A, Schön G, Behzadi C, Molwitz L et al. Magnetic resonance angiography derived predictors of progressive dilatation and. PloS one. 2022; 17: e0262826. 10.1371/journal.pone.0262826.
32. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 March 1]. GeneReviews® [Internet]. 2018;
33. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. GeneReviews® [Internet]. 2023;
34. Friedman J. Neurofibromatosis 1. [Updated 2022 Apr 21]. GeneReviews® [Internet]. 2022;
35. Maz M, Chung S, Abril A, Langford C, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. Arthritis & rheumatology (Hoboken, N.J.). 2021; 73: 1349-1365.
36. Kicska G, Hurwitz Kowek L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. Journal of the American College of Radiology. 2021; 18: S474 - S481. 10.1016/j.jacr.2021.09.004.
37. Clerc D, Grass F, Schäfer M, Denys A, Demartines N. Lower gastrointestinal bleeding-Computed Tomographic Angiography, Colonoscopy or both? World J Emerg Surg. 2017; 12: 1. 10.1186/s13017-016-0112-3.



EVOLENT CLINICAL GUIDELINE 057-1 FOR UPPER EXTREMITY CT

Guideline or Policy Number: Evolent_CG_057-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR UPPER EXTREMITY CT	3
JOINT OR MUSCLE PAIN.....	3
JOINT SPECIFIC PROVOCATIVE EXAM TESTS AND SUSPECTED INJURIES	4
<i>Shoulder</i>	4
<i>Elbow</i>	5
<i>Wrist</i>	5
TENDON OR MUSCLE RUPTURE	6
SHOULDER DISLOCATIONS.....	6
BONE FRACTURE OR LIGAMENT INJURY	6
FRACTURE NONUNION	7
OSTEOCHONDRAL LESIONS	7
LOOSE BODY OR SYNOVIAL CHONDROMATOSIS	7
OSTEONECROSIS	7
JOINT PROSTHESIS/REPLACEMENT	7
EXTREMITY MASS	8
KNOWN PRIMARY CANCER OF THE EXTREMITY	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
INFECTION OF BONE, JOINT, OR SOFT TISSUE ABSCESS	9
PRE-OPERATIVE/PROCEDURAL EVALUATION	9
POST-OPERATIVE/PROCEDURAL EVALUATION	9
ARTHROPATHY.....	9
<i>Evaluation of Known or Suspected Auto-immune Diseases</i>	9
<i>Crystalline Arthropathy</i>	10
FOREIGN BODY	10
PERIPHERAL NERVE ENTRAPMENT.....	10
BRACHIAL PLEXOPATHY	11
PEDIATRICS (UP TO AGE 18)	11
CODING AND STANDARDS	11

CODING	11
<i>CPT Codes</i>	11
APPLICABLE LINES OF BUSINESS.....	11
BACKGROUND	12
*CONSERVATIVE THERAPY.....	12
**HOME EXERCISE PROGRAM (HEP)	12
CONTRAINDICATIONS AND PREFERRED STUDIES.....	12
POLICY HISTORY	12
<i>Summary</i>	12
LEGAL AND COMPLIANCE	13
GUIDELINE APPROVAL	13
<i>Committee</i>	13
DISCLAIMER.....	13
REFERENCES	14

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography (CT) may be used for the diagnosis, evaluation, and management of conditions of the hand, wrist, elbow, and shoulder. CT is not usually the initial imaging test, but it is performed after standard radiographs. CT may be used for preoperative evaluation or to evaluate specific abnormalities of the bones, joints, and soft tissues of the upper extremities.

Special Note

- Plain radiographs must precede CT evaluation, unless otherwise indicated
- Some indications are for MRI, CT, or MR or CT Arthrogram. More than one should not be approved at the same time.
- If a CT Arthrogram fits approvable criteria below, approve as CT

INDICATIONS FOR UPPER EXTREMITY CT

Joint or Muscle Pain (1,2)

Negative Findings on Orthopedic Exam and after X-Ray Completed and when MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

NOTE: Does not apply to young children (up to age 12)

- Persistent joint or musculotendinous pain unresponsive to **conservative treatment***, within the last 6 months, which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician supervised **exercise****) of at least four (4) weeks

- With progression or worsening of symptoms during the course of conservative treatment

Joint Specific Provocative Exam Tests and Suspected Injuries

NOTE: when MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

NOTE: With a positive orthopedic sign, an initial x-ray is always preferred. However, it is not required to approve advanced imaging. **A positive sign is weakness or pain.** Any test that suggests joint instability requires further imaging (the below list is not all inclusive)

Shoulder⁽³⁾

- Rotator cuff weakness on exam
- Subscapularis tendon tear⁽⁴⁾
 - Belly press off test
 - Napoleon test
 - Bear Hug test
 - Internal rotation lag
 - Lift-off test
- Supraspinatus tendon tear^(5,6)
 - Drop Arm
 - Full Can test
 - Empty Can (aka Jobe or Supraspinatus test)
 - Hawkins or Neer test⁷ (only when ordered by an orthopedic surgeon if there is clear documentation in the records that an actual rotator cuff tear is suspected, and **NOT** just for the evaluation of impingement)
- Infrapinatus / Teres Minor / Biceps tendon tear⁽⁷⁾
 - External rotation lag sign at 0 and 90 degrees
 - Pain or weakness with resisted external rotation testing
 - Hornblower test
 - Popeye sign (if acute finding or for evaluation of surgical correction)
- Labral tear/ Instability⁽⁸⁾
 - Grind test
 - Clunk test

- Crank test, Compression-rotation test
- O'Brien's test
- Anterior load and shift
- Apprehension test
- Posterior load and shift test
- Jerk Test
- Sulcus sign

Elbow⁽⁹⁾

- Biceps tendon⁽¹⁰⁾
 - Bicipital aponeurosis (BA) flex test
 - Biceps squeeze test
 - Hook test
 - Passive forearm pronation test
 - Reverse Popeye sign (if acute finding or for evaluation of surgical correction)
- Instability⁽⁹⁾
 - Posterolateral rotatory drawer test
 - Tabletop relocation test
 - Valgus stress
 - Varus stress
 - Milking maneuver
 - Push-up test

Wrist^(11,12,13)

- Lunotriquetral ligament
 - Derby relocation test
 - Reagan test (lunotriquetral ballotement test)
- Triangular Fibrocartilage Complex (TFCC) tear
 - Press test
 - Ulnar foveal sign/test
 - Ulnocarpal stress test
- Scaphoid ligament

- Watson test (scaphoid shift test)
- Scapholunate ballottement test

Tendon or Muscle Rupture ⁽¹⁴⁾

After X-Ray and/ or ultrasound and not Listed Above

If MRI is contraindicated or cannot be performed

High clinical suspicion of specific tendon rupture based on mechanism of injury and physical findings (i.e., triceps or pectorals tendon rupture)

Shoulder Dislocations ^(15,16,17,18)

If MRI is contraindicated or cannot be performed, unless requested as CT arthrogram or to evaluate glenoid bone stock or size of Hill-Sachs lesion.

- Recurrent
- First time in any of the situations below that increase the risk of repeated dislocation
 - Anterior glenoid or humeral(Hill-Sachs lesion) bone loss on x-ray
 - Bony ankart lesion on radiographs
 - 14-40 year-old
 - > 40 with exam findings concerning for rotator cuff tear (i.e., weakness on exam)

NOTE: Glenoid bone loss occurs in anterior shoulder dislocation. Severe degrees of glenoid bone loss are shown on axial radiography, but it can be quantified more definitively using CT. This information is important to confirm that an "off-track" lesion is not present, as it helps to predict the likelihood of further dislocation and the need for bone augmentation (Latarjet) or additional soft tissue (Remplissage) surgery. The number of dislocations cannot reliably predict the degree of glenoid bone loss; it is important to quantify glenoid bone loss, initially by arthroscopy and later by CT.

Bone Fracture or Ligament Injury ⁽¹⁹⁾

If MRI is contraindicated or cannot be performed

- Suspected occult scaphoid fracture with snuffbox pain after initial x-ray
- Non scaphoid suspected occult, stress or insufficiency fracture with a negative initial x-ray
 - Repeat x-rays in 10-14 days if negative or non-diagnostic
- Pathologic fracture on x-ray or CT

- Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery

Fracture Nonunion (20)

Nonunion or delayed union as demonstrated by no healing between two sets of x-rays. If a fracture has not healed by 4-6 months, there is delayed union. Incomplete healing by 6-8 months is nonunion.

Osteochondral Lesions (21,22)

Defects, Fractures, Osteochondritis Dissecans

In the setting of joint pain or mechanical symptoms

NOTE: X-ray completed

Loose Body or Synovial Chondromatosis (23)

After X-Ray or Ultrasound Completed

In the setting of joint pain or mechanical symptoms

Osteonecrosis (24)

When MRI is contraindicated or cannot be performed

- To further characterize a prior abnormal x-ray
- Normal x-rays but symptomatic and high-risk (e.g. glucocorticosteroid use, renal transplant recipient, glycogen storage disease, alcohol abuse, sickle cell anemia)
- Known osteonecrosis to evaluate a contralateral joint after initial x-rays

e.g., Avascular Necrosis (AVN)

Joint Prosthesis/Replacement (25)

- Suspected joint prosthesis loosening, infection, or dysfunction, after initial x-rays

Extremity Mass (26,27)

- Mass or lesion after non-diagnostic x-ray or ultrasound. (MRI is preferred, CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI)
 - If superficial mass, then ultrasound is the initial study
 - If deep mass, then x-ray is the initial study
- Vascular malformations
 - After initial evaluation with ultrasound, and results will change management
 - Inconclusive ultrasound
 - Preoperative planning
 - CTA is also approvable
 - Follow up after treatment/embolization

Known Primary Cancer of the Extremity (28,29,30,31)

- Initial staging primary extremity tumor
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Further Evaluation of Indeterminate Findings on Prior Imaging

When MRI cannot be performed, or CT is preferred (i.e. tumor matrix) unless follow-up is otherwise specified within the guideline.

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e. x-ray, ultrasound or MRI) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Infection of Bone, Joint, or Soft Tissue Abscess (32,33)

MRI and nuclear medicine studies are recommended for acute infection as they are more sensitive in detecting early changes of osteomyelitis. CT is better at demonstrating findings of chronic osteomyelitis (sequestra, involucrum, cloaca, sinus tracts) as well as detecting soft tissue gas and foreign bodies.

- Abnormal x-ray or ultrasound
- Negative x-ray or ultrasound but with a clinical suspicion of infection based on either of the following:
 - Signs and symptoms of joint or bone infection include:
 - Pain and swelling
 - Decreased range of motion
 - Fevers
 - Laboratory findings of infection include any of the following:
 - Elevated ESR or CRP
 - Elevated white blood cell count
 - Positive joint aspiration
- Ulcer (diabetic, pressure, ischemic, traumatic) with signs of infection (redness, warmth, swelling, pain, discharge which may range from white to serosanguineous) that is not improving despite treatment and bone, or deep infection is suspected
 - Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell

Pre-Operative/Procedural Evaluation

Pre-operative evaluation for a planned surgery or procedure

Post-Operative/Procedural Evaluation

- When imaging, physical examination or laboratory findings indicate joint infection, delayed or non-healing or other surgical/procedural complications

Arthropathy

Evaluation of Known or Suspected Auto-immune Diseases (34,35)

When MRI is contraindicated or cannot be performed

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging

- Initial imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR)
- To determine change in treatment or when diagnosis is uncertain prior to start of treatment
- Follow-up to determine treatment efficacy in the following:
 - Early rheumatoid arthritis
 - Advanced rheumatoid arthritis if x-ray and ultrasound are equivocal or noncontributory

Known or suspected inflammatory myopathies (If MRI contraindicated or cannot be performed): (such as polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis)

- For diagnosis
- For biopsy planning

e.g., Rheumatoid Arthritis

Crystalline Arthropathy ⁽³⁶⁾

- Dual-energy CT can be used to characterize crystal deposition disease (i.e., gout) after
 - Appropriate rheumatological work up and initial x-rays and/or ultrasound AND
 - After inconclusive joint aspiration or when joint aspiration cannot be performed**OR**
 - In the setting of extra-articular crystal deposits (i.e., tendons or bursa)

Foreign Body ⁽³⁷⁾

Indeterminate x-ray and ultrasound

Peripheral Nerve Entrapment

When MRI is contraindicated or cannot be performed

- Abnormal electromyogram or nerve conduction study
- Abnormal x-ray or ultrasound
- Clinical suspicion and failed 4 weeks conservative treatment including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat

- Splinting or orthotics
- Medication

NOTE: e.g., carpal tunnel

Brachial Plexopathy ^(38,39)

When MRI is contraindicated or cannot be performed

- **Traumatic** Brachial Plexopathy: If mechanism of injury is highly suspicious for brachial plexopathy (such as mid-clavicular fracture, shoulder dislocation, contact injury to the neck (burner or stinger syndrome) or penetrating injury) ⁽⁴⁰⁾
- **Non-traumatic** Brachial Plexopathy when Electromyography/Nerve Conduction Velocity (EMG/NCV) studies are suggestive of brachial plexopathy

NOTE: Either Neck MRI, Shoulder MRI or Chest MRI may be appropriate depending on the location of the injury/plexopathy. Only **one** of these three studies is indicated.

Pediatrics (Up to Age 18) ⁽⁴¹⁾

Osteoid Osteoma after an x-ray is done

CODING AND STANDARDS

Coding

CPT Codes

73200, 73201, 73202, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Therapy

Musculoskeletal therapy should include a multimodality approach consisting of a combination of active and inactive components.

Inactive components such as rest, ice, heat, modified activities, medical devices, (including crutches, immobilizer, metal braces, orthotics, rigid stabilizer, or splints, etc. and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized.

Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or chiropractic care.

**Home Exercise Program (HEP)

The following two elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan AND
- Follow-up with member with information provided regarding completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises.

NOTE: Patient inconvenience or noncompliance without explanation does not constitute “inability to complete” HEP

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Updated references • Added Contraindications and Preferred Studies section

	<ul style="list-style-type: none"> • Updated language on conservative care and home exercise programs
May 2023	<ul style="list-style-type: none"> • Updated orthopedic signs • Modified background sections • Modified dual energy CT • Added known AVN to evaluate contralateral side • Added vascular malformations • Added indeterminate findings on prior imaging and follow up surveillance • Added Popeye sign and Reverse Popeye sign • Updated References • Removed Additional Resources • Added statement regarding clinical indications not addressed in the guideline. • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Pieters L, Lewis J, Kuppens K, Jochems J, Bruijstens T et al. An Update of Systematic Reviews Examining the Effectiveness of Conservative Physical Therapy Interventions for Subacromial Shoulder Pain. *J Orthop Sports Phys Ther*. 2020; 50: 131-141. 10.2519/jospt.2020.8498.
2. Park V, Kim E, Kim M, Moon H, Yoon J. Breast magnetic resonance imaging for surveillance of women with a personal history of breast cancer: outcomes stratified by interval between definitive surgery and surveillance MR imaging. *BMC Cancer*. 2018; 18: true. 10.1186/s12885-018-3998-1.
3. Varacallo M, El Bitar Y, Mair S. Comprehensive Shoulder Evaluation Strategies. [Updated 2023 Aug 4]. StatPearls Publishing. 2023; Accessed Feb 26, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK538309/>.
4. Ghasemi S A, McCahon J A, Yoo J C, Toussaint B, McFarland E G et al. Subscapularis tear classification implications regarding treatment and outcomes: consensus decision-making. *JSES Reviews, Reports & Techniques*. 2023; 3: 201 - 208. 10.1016/j.xrrt.2022.12.004.
5. Katepun S, Boonsun P, Boonsaeng W S, Apivatgaroon A. Reliability of the Single-Arm and Double-Arm Jobe Test for the Diagnosis of Full-Thickness Supraspinatus Tendon Tear. *Orthopaedic Journal of Sports Medicine*. 2023; 11: 10.1177/23259671231187631.
6. Anauate Nicolao F, Yazigi Junior J, Matsunaga F, Archetti Netto N, Belloti J. Comparing shoulder maneuvers to magnetic resonance imaging and arthroscopic. *World journal of orthopedics*. 2022; 13: 102-111. 10.5312/wjo.v13.i1.102.
7. Diplock B, Hing W, Marks D. The long head of biceps at the shoulder: a scoping review. *BMC Musculoskeletal Disorders*. 2023; 24: true. 10.1186/s12891-023-06346-5.
8. Dean R S, Onsen L, Lima J, Hutchinson M R. Physical Examination Maneuvers for SLAP Lesions: A Systematic Review and Meta-analysis of Individual and Combinations of Maneuvers. *The American Journal of Sports Medicine*. 2022; 51: 3042 - 3052. 10.1177/03635465221100977.
9. Karbach L, Elfar J. Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing. *The Journal of hand surgery*. 2017; 42: 118-126. 10.1016/j.jhsa.2016.11.025.
10. Vishwanathan K, Soni K. Distal biceps rupture: Evaluation and management. *Journal of Clinical Orthopaedics & Trauma*. 2021; 19: 132 - 138. 10.1016/j.jcot.2021.05.012.
11. Margulies I, Xu H, Gopman J, Freeman M, Dayan E et al. Narrative Review of Ligamentous Wrist Injuries. *Journal of hand and microsurgery*. 2021; 13: 55-64. 10.1055/s-0041-1724224.
12. Pandey T, Slaughter A, Reynolds K, Jambhekar K, David R. Clinical orthopedic examination findings in the upper extremity: correlation with imaging studies and diagnostic efficacy. *Radiographics*. Mar-Apr 2014; 34: e24-40. 10.1148/rg.342125061.
13. Ruston J, Konan S, Rubinraut E, Sorene E. Diagnostic accuracy of clinical examination and magnetic resonance imaging for common articular wrist pathology. *Acta Orthop Belg*. Aug 2013; 79: 375-80.
14. Shamrock A, Dreyer M, Varacallo M. Achilles Tendon Rupture. [Updated 2023 Aug 17]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK430844/>.
15. Doehrmann R, Frush T. Posterior Shoulder Instability. [Updated 2023 July 10]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK557648/>.
16. Nunna Jr B, Parihar P, Wanjari M, Shetty N, Bora N. High-Resolution Imaging Insights into Shoulder Joint Pain: A Comprehensive Review. *Cureus*. 2023; 15: e48974. 10.7759/cureus.48974.

17. Tupe R, Tiwari V. Anteroinferior Glenoid Labrum Lesion (Bankart Lesion). [Updated 2023 Aug 3]. StatPearls Publishing. 2023; <https://pubmed.ncbi.nlm.nih.gov/36508533/>.
18. White A, Patel N, Hadley C, Dodson C. An Algorithmic Approach to the Management of Shoulder Instability. *Journal of the American Academy of Orthopaedic Surgeons, Global Research and Reviews*. 2019; 3: 10.5435/JAAOSGlobal-D-19-00168.
19. Bencardino J T, Stone T J, Roberts C, Appel M, Baccei S J et al. ACR Appropriateness Criteria® Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. *J Am Coll Radiol*. 2017; 14: S293-s306. 10.1016/j.jacr.2017.02.035.
20. Thomas J, Kehoe J. Bone Nonunion. [Updated 2023 Mar 6]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK554385/>.
21. van Bergen C, van den Ende K, Ten Brinke B, Eygendaal D. Osteochondritis dissecans of the capitellum in adolescents. *World J Orthop*. Feb 18, 2016; 7: 102-8. 10.5312/wjo.v7.i2.102.
22. Anderson M W, Chung C B. Elbow Imaging with an Emphasis on MRI. In: Hodler, J., Kubik-Huch, R.A., von Schulthess, G.K. (eds) *Musculoskeletal Diseases 2021-2024*. IDKD Springer Series. Springer, Cham. 2021; 23 - 39. 10.1007/978-3-030-71281-5_3.
23. Habusta S, Mabrouk A, Tuck J. Synovial Chondromatosis. [Updated 2023 Apr 22]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470463/>.
24. Ha A S, Chang E Y, Bartolotta R J, Bucknor M D, Chen K C et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
25. Ong N, Zailan I, Tandon A. Imaging update in arthroplasty. *Journal of clinical orthopaedics and trauma*. 2021; 23: 101649. 10.1016/j.jcot.2021.101649.
26. Kransdorf M J, Murphey M D, Wessell D E, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Soft-Tissue Masses. *J Am Coll Radiol*. 2018; 15: S189-s197. 10.1016/j.jacr.2018.03.012.
27. Obara P, McCool J, Kalva S P, Majdalany B S, Collins J D et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *Journal of the American College of Radiology*. 2019; 16: S340 - S347. 10.1016/j.jacr.2019.05.013.
28. National Comprehensive Cancer Network. Bone Cancer (Version 1.2024). Accessed February 22, 2024. 2023; https://www.nccn.org/professionals/physician_gls/pdf/bone.pdf.
29. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
30. Murphey M D, Kransdorf M J. Staging and Classification of Primary Musculoskeletal Bone and Soft-Tissue Tumors According to the 2020 WHO Update, From the AJR Special Series on Cancer Staging. *American Journal of Roentgenology*. 2021; 217: 1038 - 1052. 10.2214/AJR.21.25658.
31. Stanborough R, Demertzis J L, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Malignant or Aggressive Primary Musculoskeletal Tumor-Staging and Surveillance: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S374 - S389. 10.1016/j.jacr.2022.09.015.
32. Wu Y, Wang C, Cheng N, Lin H, Huang H et al. 2024 TSOC/TSPS Joint Consensus: Strategies for Advanced Vascular Wound Management. *Acta Cardiologica Sinica*. 2024; 40: 1-44. 10.6515/ACS.202401_40(1).20231220A.
33. Pierce J L, Perry M T, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic

- Foot): 2022 Update. Journal of the American College of Radiology. 2022; 19: S473 - S487. 10.1016/j.jacr.2022.09.013.
34. Nagy H, Veerapaneni K. Myopathy. [Updated 2023 Aug 14]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK562290/>.
35. Radu A, Bungau S. Management of Rheumatoid Arthritis: An Overview. Cells. 2021; 10: 10.3390/cells10112857.
36. Shang J, Zhou L, Wang H, Liu B. Diagnostic Performance of Dual-energy CT Versus Ultrasonography in Gout: A . Academic radiology. 2022; 29: 56-68.
37. Campbell E, Wilbert C. Foreign Body Imaging. [Updated 2023 Jul 30]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470294/>.
38. Szaro P, Geijer M, Ciszek B, McGrath A. Magnetic resonance imaging of the brachial plexus. Part 2: Traumatic injuries. European Journal of Radiology Open. 2022; 9: 10.1016/j.ejro.2022.100397.
39. Szaro P, McGrath A, Ciszek B, Geijer M. Magnetic resonance imaging of the brachial plexus. Part 1: Anatomical considerations, magnetic resonance techniques, and non-traumatic lesions. European Journal of Radiology Open. 2022; 9: 10.1016/j.ejro.2021.100392.
40. Sinn C. Brachial Plexopathy: Differential Diagnosis and Treatment. PM&R Knowledge NOW. 2022;
41. Iyer R, Chapman T, Chew F. Pediatric bone imaging: diagnostic imaging of osteoid osteoma. AJR Am J Roentgenol. May 2012; 198: 1039-52. 10.2214/ajr.10.7313.



EVOLENT CLINICAL GUIDELINE 061-2 FOR UPPER EXTREMITY CTA/CTV

Guideline or Policy Number: Evolent_CG_061-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 2008 - 2025. All rights Reserved.</i>		
Original Date: July 2008	Last Revised Date: April 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
CTA/CTV	3
SPECIAL NOTE	3
Imaging Request	3
INDICATIONS	3
HAND ISCHEMIA	3
DEEP VENOUS THROMBOSIS OR EMBOLISM	4
CLINICAL SUSPICION OF VASCULAR DISEASE	4
HEMODIALYSIS GRAFT DYSFUNCTION	4
VASCULAR MALFORMATION	4
TRAUMATIC INJURIES	5
EVALUATION OF TUMOR	5
PRE-OPERATIVE/PROCEDURAL EVALUATIONS	5
POST-OPERATIVE/PROCEDURAL EVALUATIONS	5
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	5
GENETIC SYNDROMES AND RARE DISEASES	5
CODING AND STANDARDS	6
CODING	6
CPT Codes	6
APPLICABLE LINES OF BUSINESS	6
BACKGROUND	6
Contraindications and Preferred Studies	6
POLICY HISTORY	7
Summary	7
LEGAL AND COMPLIANCE	7
GUIDELINE APPROVAL	7



<i>Committee</i>	7
DISCLAIMER	7
REFERENCES	8

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

CTA/CTV

Computed tomography angiography (CTA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms. It is used to evaluate the arteries of the abdominal aorta and the renal arteries. CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function. Upper Extremity CTA is not used as a screening tool, e.g., evaluation of asymptomatic patients, without a previous diagnosis.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

Special Note

Imaging Request

When a separate CTA and CT exam is requested, documentation requires a medical reason that clearly indicates why additional CT imaging of the upper extremity is needed.

INDICATIONS

Hand Ischemia ^(1,2)

- Acute symptoms (including):
 - Ischemic ulceration without segmental temperature change
 - Ischemic ulceration with painful ischemia
 - Acute sustained loss of perfusion with or without acral ulceration

- Imminent loss of digit

NOTE: Does not require prior arterial Doppler

- For clinical symptoms, following abnormal arterial Doppler, when CTA results will change management
 - Includes Raynaud's (can be associated with scleroderma), Buerger disease, and other vasculopathies ⁽³⁾
- Clinical concern for vascular cause of ulcers with abnormal or indeterminate ultrasound ⁽⁴⁾
- After stenting or surgery with signs of recurrence or indeterminate ultrasound ⁽⁵⁾

Deep Venous Thrombosis or Embolism

- After abnormal ultrasound of arm veins if it will change management
- After negative or indeterminate ultrasound to rule out other causes
- For evaluation of central veins
- Clinical suspicion of upper arterial emboli ^(6,7)

Clinical Suspicion of Vascular Disease

With abnormal or indeterminate ultrasound ^(6,7), for suspicion of:

- Tumor invasion ^(8,9)
- Trauma ⁽¹⁰⁾
- Vasculitis ^(1,11)
- Aneurysm ⁽¹¹⁾
- Stenosis/occlusions ⁽¹²⁾

Hemodialysis Graft Dysfunction

If Doppler ultrasound was not adequate for treatment decisions ⁽¹³⁾

Vascular Malformation

NOTE: (MRA preferred however CTA useful in delineating some high flow lesions such as an arteriovenous malformation)

- After initial evaluation with ultrasound

- Preoperative planning

A concurrent CT is also approvable for initial evaluation and/or preoperative planning if MRI is contraindicated or cannot be performed, or per surgeon preference.

Traumatic Injuries

Clinical findings suggestive of arterial injury ⁽¹⁰⁾

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging (may be approved in combination with CT or MRI of tumor)

Pre-Operative/Procedural Evaluations

Pre-operative evaluation for a planned surgery or procedure ⁽¹⁴⁾

Post-Operative/Procedural Evaluations

A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery ^(15,16). Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetic Syndromes and Rare Diseases

- Known vascular EDS (vEDS) with acute extremity pain and concern for dissection/rupture ^(17,18)

- Vascular EDS (vEDS) surveillance imaging: with inconclusive ultrasound or ultrasound suggestive of vascular pathology ^(17,18)
- Known Williams Syndrome: when there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis) ⁽¹⁹⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

CODING AND STANDARDS

Coding

CPT Codes

73206

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
April 2024	<ul style="list-style-type: none"> • Updated references • Added Evaluation of Tumor, Genetics Syndromes and Rare Diseases, and Contraindications and Preferred Studies sections.
April 2023	<ul style="list-style-type: none"> • Updated references • Modified background section • Added vascular malformations • Added indeterminate prior imaging findings • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Hotchkiss R, Marks T. Management of acute and chronic vascular conditions of the hand. *Curr Rev Musculoskelet Med*. Mar 2014; 7: 47-52. 10.1007/s12178-014-9202-6.
2. Wong V, Major M, Higgins J. Nonoperative Management of Acute Upper Limb Ischemia. *Hand (N Y)*. Jun 2016; 11: 131-43. 10.1177/1558944716628499.
3. McMahan Z H, Wigley F M. Raynauds phenomenon and digital ischemia: a practical approach to risk stratification, diagnosis and management. *Int J Clin Rheumtol*. 2010; 5: 355-370. 10.2217/ijr.10.17.
4. Rosyid F. Etiology, pathophysiology, diagnosis and management of diabetics' foot ulcer. *Int J Res Med Sci*. 2017; 5: 4206-13. <http://dx.doi.org/10.18203/2320-6012.ijrms20174548>.
5. Pollak A, Norton P, Kramer C. Multimodality imaging of lower extremity peripheral arterial disease: current role and future directions. *Circ Cardiovasc Imaging*. Nov 2012; 5: 797-807. 10.1161/circimaging.111.970814.
6. Bozlar U, Ogur T, Khaja M, All J, Norton P. CT angiography of the upper extremity arterial system: Part 2- Clinical applications beyond trauma patients. *AJR Am J Roentgenol*. Oct 2013; 201: 753-63. 10.2214/ajr.13.11208.
7. Bozlar U, Ogur T, Norton P, Khaja M, All J. CT angiography of the upper extremity arterial system: Part 1-Anatomy, technique, and use in trauma patients. *AJR Am J Roentgenol*. Oct 2013; 201: 745-52. 10.2214/ajr.13.11207.
8. Garner H W, Wessell D E, Lenchik L, Ahlawat S, Baker J C et al. ACR Appropriateness Criteria: Soft Tissue Masses: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S234 - S245. 10.1016/j.jacr.2023.02.009.
9. Jin T, Wu G, Li X, Feng X. Evaluation of vascular invasion in patients with musculoskeletal tumors of lower extremities: use of time-resolved 3D MR angiography at 3-T. *Acta Radiol*. May 2018; 59: 586-592. 10.1177/0284185117729185.
10. Wani M, Ahangar A, Ganie F, Wani S, Wani N. Vascular injuries: trends in management. *Trauma Mon*. Summer 2012; 17: 266-9. 10.5812/traumamon.6238.
11. Seitz L, Seitz P, Pop R, Lötscher F. Spectrum of Large and Medium Vessel Vasculitis in Adults: Primary Vasculitides, Arthritides, Connective Tissue, and Fibroinflammatory Diseases. *Current Rheumatology Reports*. 2022; 24: 352 - 370. 10.1007/s11926-022-01086-2.
12. Conte M S, Pomposelli F B, Clair D G, Geraghty P J, McKinsey J F et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: Management of asymptomatic disease and claudication. *Journal of Vascular Surgery*. 2015; 61: 2S - 41S.e1. 10.1016/j.jvs.2014.12.009.
13. Murphy E, Ross R, Jones R, Gandy S, Aristokleous N et al. Imaging in Vascular Access. *Cardiovasc Eng Technol*. Sep 2017; 8: 255-272. 10.1007/s13239-017-0317-y.
14. Azene E M, Steigner M L, Aghayev A, Ahmad S, Clough R E et al. ACR Appropriateness Criteria: Lower Extremity Arterial Claudication-Imaging Assessment for Revascularization: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S364 - S373. 10.1016/j.jacr.2022.09.002.
15. Conte M S, Bradbury A W, Kolh P, White J V, Dick F et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. *J Vasc Surg*. 2019; 69: 3S-125S.e40. 10.1016/j.jvs.2019.02.016.

16. Cooper K, Majdalany B S, Kalva S P, Chandra A, Collins J D et al. ACR Appropriateness Criteria® Lower Extremity Arterial Revascularization-Post-Therapy Imaging. J Am Coll Radiol. 2018; 15: S104-s115. 10.1016/j.jacr.2018.03.011.
17. Byers P. Vascular Ehlers-Danlos Syndrome. GeneReviews [Internet]. 2019;
18. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. European Journal of Human Genetics. 2023; 31: 749 - 760. 10.1038/s41431-023-01343-7.
19. Morris C. Williams Syndrome. GeneReviews [Internet]. 2023;



EVOLENT CLINICAL GUIDELINE 057-3 FOR UPPER EXTREMITY MRI

Guideline or Policy Number: Evolent_CG_057-3	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
MRI	3
SPECIAL NOTE	3
INDICATIONS FOR UPPER EXTREMITY MRI.....	3
JOINT OR MUSCLE PAIN	3
JOINT SPECIFIC PROVOCATIVE EXAM TESTS AND SUSPECTED INJURIES	4
Shoulder	4
Elbow	5
Wrist	5
TENDON OR MUSCLE RUPTURE.....	6
SHOULDER DISLOCATIONS.....	6
BONE FRACTURE OR LIGAMENT INJURY	6
FRACTURE NONUNION	6
OSTEOCHONDRAL LESIONS	6
LOOSE BODIES OR SYNOVIAL CHONDROMATOSIS.....	7
OSTEONECROSIS.....	7
JOINT PROSTHESIS/REPLACEMENT.....	7
EXTREMITY MASS.....	7
KNOWN PRIMARY CANCER OF THE EXTREMITY	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
INFECTION OF BONE, JOINT, OR SOFT TISSUE ABSCESS	8
PRE-OPERATIVE/PROCEDURAL EVALUATION	9
EVALUATION OF TUMOR	9
POST-OPERATIVE/PROCEDURAL EVALUATION	9
EVALUATION OF KNOWN OR SUSPECTED AUTOIMMUNE DISEASE	9
FOREIGN BODY	9
PERIPHERAL NERVE ENTRAPMENT	9
BRACHIAL PLEXOPATHY	10
PEDIATRICS (UP TO AGE 18)	10

CODING AND STANDARDS	10
CODING	10
<i>CPT Codes</i>	10
APPLICABLE LINES OF BUSINESS	11
BACKGROUND	11
*CONSERVATIVE THERAPY	11
**HOME EXERCISE PROGRAM (HEP).....	11
CONTRAINDICATION AND PREFERRED STUDIES.....	11
POLICY HISTORY	12
<i>Summary</i>	12
LEGAL AND COMPLIANCE	12
GUIDELINE APPROVAL.....	12
<i>Committee</i>	12
DISCLAIMER.....	12
REFERENCES.....	14

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRI

Magnetic resonance imaging shows the soft tissues and bones. With its multiplanar capabilities, high contrast, and high spatial resolution, it is an accurate diagnostic tool for conditions affecting the joint and adjacent structures.

Special Note

- Plain radiographs must precede MRI evaluation unless otherwise indicated
- Some indications are for MRI, CT, or MR or CT Arthrogram (more than one should not be approved at the same time)
- If an MR Arthrogram fits approvable criteria below, approve as MRI

INDICATIONS FOR UPPER EXTREMITY MRI

Joint or Muscle Pain ^(1,2)

Negative Findings on Orthopedic Exam and after X-Ray Completed

NOTE: Does not apply to young children (up to age 12)

- Persistent joint or musculotendinous pain unresponsive to **conservative treatment***, within the last 6 months which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician supervised **exercise****) of at least four (4) weeks

- With progression or worsening of symptoms during the course of conservative treatment

Joint Specific Provocative Exam Tests and Suspected Injuries

Approvable Orthopedic Test

With a positive orthopedic sign, an initial x-ray is always preferred; however, it is not required to approve advanced imaging. A positive sign is weakness or pain. In addition, any test that suggests joint instability requires further imaging (the below list is not all inclusive)

Shoulder ⁽³⁾

- Rotator cuff weakness on exam
- Subscapularis tendon tear⁽⁴⁾
 - Belly press off test
 - Napoleon test
 - Bear Hug test
 - Internal rotation lag
 - Lift-off test
- Supraspinatus tendon tear^(5,6)
 - Drop Arm
 - Full Can test
 - Empty Can (aka Jobe or Supraspinatus test)
 - Hawkins or Neer test (only when ordered by an orthopedic surgeon if there is clear documentation in the records that an actual rotator cuff tear is suspected, and **NOT** just for the evaluation of impingement)
- Infrapinatus / Teres Minor / Biceps tendon tear⁽⁷⁾
 - External rotation lag sign at 0 and 90 degrees
 - Pain or weakness with resisted external rotation testing
 - Hornblower test
 - Popeye sign (if acute finding or for evaluation of surgical correction)
- Labral tear/ Instability⁽⁸⁾
 - Grind test
 - Clunk test
 - Crank test, Compression-rotation test

- O'Brien's test
- Anterior load and shift
- Apprehension test
- Posterior load and shift test
- Jerk Test
- Sulcus sign

Elbow ^(9,10)

- Biceps tendon⁽¹¹⁾
 - Bicipital aponeurosis (BA) flex test
 - Biceps squeeze test
 - Hook test
 - Passive forearm pronation test
 - Reverse Popeye sign (if acute finding or for evaluation of surgical correction)
- Instability⁽¹²⁾
 - Posterolateral rotatory drawer test
 - Tabletop relocation test
 - Valgus stress
 - Varus stress
 - Milking maneuver
 - Push-up test

Wrist ^(13,14,15)

- Lunotriquetral ligament
 - Derby relocation test
 - Reagan test (lunotriquetral ballotement test)
- Triangular Fibrocartilage Complex (TFCC) tear
 - Press test
 - Ulnar foveal sign/test
 - Ulnocarpal stress test
- Scaphoid ligament
 - Watson test (scaphoid shift test)

- Scapholunate ballottement test

Tendon or Muscle Rupture

After X-Ray and/ or ultrasound not Listed Above

High clinical suspicion of specific tendon rupture based on mechanism of injury and physical findings (i.e., triceps or pectorals tendon rupture)

Shoulder Dislocations (16,17,18,19)

- Recurrent
- First time in any of the situations below that increase the risk of repeated dislocation
 - Anterior glenoid or humeral(Hill-Sachs lesion) bone loss on x-ray
 - Bony Bankart lesion on radiographs
 - 14-40 year-old
 - > 40 with exam findings concerning for rotator cuff tear (i.e., weakness on exam)

Bone Fracture or Ligament Injury (20)

- Suspected occult scaphoid fracture with snuffbox pain after initial x-ray
- Non scaphoid suspected occult, stress or insufficiency fracture with a negative initial x-ray
 - Repeat x-rays in 10-14 days if negative or non-diagnostic
- Pathologic fracture on x-ray or CT
- Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery

Fracture Nonunion (21)

Nonunion or delayed union as demonstrated by no healing between two sets of x-rays. If a fracture has not healed by 4-6 months, there is delayed union. Incomplete healing by 6-8 months is nonunion. CT is the preferred study

Osteochondral Lesions (22,23)

Defects, Fractures, Osteochondritis Dissecans

In the setting of joint pain or mechanical symptoms

NOTE: X-ray completed

Loose Bodies or Synovial Chondromatosis ⁽²⁴⁾

After X-Ray or Ultrasound Completed

In the setting of joint pain or mechanical symptoms

Osteonecrosis ⁽²⁵⁾

To further characterize a prior abnormal x-ray or CT suggesting osteonecrosis

- Normal x-rays but symptomatic and high-risk (e.g., glucocorticosteroid use, renal transplant recipient, glycogen storage disease, alcohol abuse, sickle cell anemia)
- Known osteonecrosis to evaluate a contralateral joint after initial x-rays

e.g., Avascular Necrosis (AVN)

Joint Prosthesis/Replacement ⁽²⁶⁾

Suspected joint prosthesis loosening, infection, or dysfunction, after initial x-rays

Extremity Mass ⁽²⁷⁾

- Mass or lesion after non-diagnostic x-ray or ultrasound CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI
 - Superficial mass, then ultrasound is the initial study
 - Deep mass, then x-ray is the initial study
- Vascular malformations⁽²⁸⁾
 - After initial evaluation with ultrasound and results will change management
 - Inconclusive ultrasound
 - Preoperative planning
 - MRA is also approvable
 - Follow up after treatment/embolization

Known Primary Cancer of the Extremity (29,30,31,32)

- Initial staging primary extremity tumor
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Infection of Bone, Joint, or Soft Tissue Abscess (33)

- Abnormal x-ray or ultrasound
- Negative x-ray or ultrasound but with a clinical suspicion of infection based on either of the following:
 - Signs and symptoms of joint or bone infection such as:
 - Pain and swelling
 - Decreased range of motion
 - Fevers
 - Laboratory findings of infection include any of the following:
 - Elevated ESR or CRP
 - Elevated white blood cell count
 - Positive joint aspiration
- Ulcer (diabetic, pressure, ischemic, traumatic) with signs of infection (redness, warmth, swelling, pain, discharge which may range from white to serosanguineous) that is not improving despite treatment and bone, or deep infection is suspected⁽³⁴⁾
 - Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell

Pre-Operative/Procedural Evaluation

Pre-operative evaluation for a planned surgery or procedure

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging.

Post-Operative/Procedural Evaluation

When imaging, physical examination, or laboratory findings indicate joint infection, delayed or non-healing or other surgical/procedural complications.

Evaluation of Known or Suspected Autoimmune Disease

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging
- Initial imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR)
- To determine change in treatment or when diagnosis is uncertain prior to start of treatment
- Follow-up to determine treatment efficacy in the following:
 - Early rheumatoid arthritis
 - Advanced rheumatoid arthritis if x-ray and ultrasound are equivocal or non-contributory
- **Known or suspected inflammatory myopathies** (such as polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis)
 - For diagnosis
 - For biopsy planning

e.g., Rheumatoid Arthritis

Foreign Body ⁽³⁷⁾

Indeterminate x-ray and ultrasound

Peripheral Nerve Entrapment ^(38,39)

- Abnormal electromyogram or nerve conduction study

- Abnormal x-ray or ultrasound
- Clinical suspicion and failed 4 weeks conservative treatment including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat
 - Splinting or orthotics
 - Medication

NOTE: e.g., carpal tunnel

Brachial Plexopathy^(40,41)

- **Traumatic** Brachial Plexopathy: If mechanism of injury is highly suspicious for brachial plexopathy (such as mid-clavicular fracture, shoulder dislocation, contact injury to the neck (burner or stinger syndrome) or penetrating injury)⁽⁴²⁾
- **Non-traumatic** Brachial Plexopathy when Electromyography/Nerve Conduction Velocity (EMG/NCV) studies are suggestive of brachial plexopathy

NOTE: Either Neck MRI, Shoulder MRI or Chest MRI may be appropriate depending on the location of the injury/plexopathy. Only **ONE** of these three studies is indicated.

Pediatrics (Up to Age 18)

- Chronic Recurrent Multifocal Osteomyelitis after initial work-up (labs (i.e., CRP/ESR and x-ray)^(43,44)
 - Whole body Bone Marrow MRI is more appropriate when multiple joints requested see **Evolent_CG_059 Bone Marrow MRI**

CODING AND STANDARDS

Coding

CPT Codes

73218, 73219, 73220, 73221, 73222, 73223, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Therapy

Musculoskeletal should include a multimodality approach consisting of a combination of active and inactive components.

Inactive components such as rest, ice, heat, modified activities, medical devices, (including crutches, immobilizer, metal braces, orthotics, rigid stabilizer, or splints, etc. and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized.

Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or chiropractic care.

**Home Exercise Program (HEP)

The following two elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan **AND**
- Follow-up with member with information provided regarding completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises.

NOTE: Patient inconvenience or noncompliance without explanation does not constitute "inability to complete" HEP

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-



compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none">• Contraindications and preferred studies section added to the background• Background and references updated
May 2023	<ul style="list-style-type: none">• Updated:<ul style="list-style-type: none">○ Orthopedic signs○ References• Added:<ul style="list-style-type: none">○ Indeterminate findings on prior imaging and follow up surveillance○ Vascular malformations○ Known AVN to evaluate contralateral side○ Statement regarding clinical indications not addressed in the guideline○ Popeye sign, reverse Popeye sign• Modified:<ul style="list-style-type: none">○ Background sections○ CRMO• Removed:<ul style="list-style-type: none">○ Additional Resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs



may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Park J Y, Park H K, Choi J H, Moon E S, Kim B S et al. Prospective evaluation of the effectiveness of a home-based program of isometric strengthening exercises: 12-month follow-up. *Clin Orthop Surg*. 2010; 2: 173-8. 10.4055/cios.2010.2.3.173.
2. Pieters L, Lewis J, Kuppens K, Jochems J, Bruijstens T et al. An Update of Systematic Reviews Examining the Effectiveness of Conservative Physical Therapy Interventions for Subacromial Shoulder Pain. *J Orthop Sports Phys Ther*. 2020; 50: 131-141. 10.2519/jospt.2020.8498.
3. Varacallo M, El Bitar Y, Mair S. Comprehensive Shoulder Evaluation Strategies. [Updated 2023 Aug 4]. StatPearls Publishing. 2023; Accessed Feb 26, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK538309/>.
4. Ghasemi S, McCahon J, Yoo J, Toussaint B, McFarland E et al. Subscapularis tear classification implications regarding treatment and outcomes: consensus decision-making. *JSES*. 2023; 3: 201 - 208. 10.1016/j.xrrt.2022.12.004.
5. Anauate Nicolao F, Yazigi Junior J, Matsunaga F, Archetti Netto N, Belloti J. Comparing shoulder maneuvers to magnetic resonance imaging and arthroscopic. *World journal of orthopedics*. 2022; 13: 102-111. 10.5312/wjo.v13.i1.102.
6. Katepun S, Boonsun P, Boonsaeng W, Apivatgaroon A. Reliability of the Single-Arm and Double-Arm Jobe Test for the Diagnosis of Full-Thickness Supraspinatus Tendon Tear. *Orthopaedic Journal of Sports Medicine*. 2023; 11: 10.1177/23259671231187631.
7. Diplock B, Hing W, Marks D. The long head of biceps at the shoulder: a scoping review. *BMC Musculoskeletal Disorders*. 2023; 24: true. 10.1186/s12891-023-06346-5.
8. Dean R, Onsen L, Lima J, Hutchinson M. Physical Examination Maneuvers for SLAP Lesions: A Systematic Review and Meta-analysis of Individual and Combinations of Maneuvers. *The American Journal of Sports Medicine*. 2022; 51: 3042 - 3052. 10.1177/03635465221100977.
9. Kane S F, Lynch J H, Taylor J. Evaluation of elbow pain in adults. *Am Fam Physician*. 2014; 89: 649-57.
10. Karbach L E, Elfar J. Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing. *J Hand Surg Am*. 2017; 42: 118-126. 10.1016/j.jhsa.2016.11.025.
11. Vishwanathan K, Soni K. Distal biceps rupture: Evaluation and management. *Journal of Clinical Orthopaedics*. 2021; 19: 132 - 138. 10.1016/j.jcot.2021.05.012.
12. Karbach L, Elfar J. Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing. *The Journal of hand surgery*. 2017; 42: 118-126. 10.1016/j.jhsa.2016.11.025.
13. Margulies I, Xu H, Gopman J, Freeman M, Dayan E et al. Narrative Review of Ligamentous Wrist Injuries. *Journal of hand and microsurgery*. 2021; 13: 55-64. 10.1055/s-0041-1724224.
14. Pandey T, Slaughter A J, Reynolds K A, Jambhekar K, David R M. Clinical orthopedic examination findings in the upper extremity: correlation with imaging studies and diagnostic efficacy. *Radiographics*. 2014; 34: e24-40. 10.1148/rg.342125061.
15. Ruston J, Konan S, Rubinraut E, Sorene E. Diagnostic accuracy of clinical examination and magnetic resonance imaging for common articular wrist pathology. *Acta Orthop Belg*. 2013; 79: 375-80.
16. Doehrmann R, Frush T. Posterior Shoulder Instability. [Updated 2023 July 10]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK557648/>.
17. Nunna Jr B, Parihar P, Wanjari M, Shetty N, Bora N. High-Resolution Imaging Insights into Shoulder Joint Pain: A Comprehensive Review. *Cureus*. 2023; 15: e48974. 10.7759/cureus.48974.

18. Tupe R, Tiwari V. Anteroinferior Glenoid Labrum Lesion (Bankart Lesion). [Updated 2023 Aug 3]. StatPearls Publishing. 2023; <https://pubmed.ncbi.nlm.nih.gov/36508533/>.
19. White A, Patel N, Hadley C, Dodson C. An Algorithmic Approach to the Management of Shoulder Instability. *Journal of the American Academy of Orthopaedic Surgeons*. Global research &&& 2019; 3: 10.5435/JAAOSGlobal-D-19-00168.
20. Bencardino J T, Stone T J, Roberts C, Appel M, Baccei S J et al. ACR Appropriateness Criteria® Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. *J Am Coll Radiol*. 2017; 14: S293-s306. 10.1016/j.jacr.2017.02.035.
21. Thomas J, Kehoe J. Bone Nonunion. [Updated 2023 Mar 6]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK554385/>.
22. Anderson M, Chung C. Elbow Imaging with an Emphasis on MRI. IDKD Springer Series. Springer, Cham Musculoskeletal Diseases 2021-2024. 2021; 23 - 39. 10.1007/978-3-030-71281-5_3.
23. van Bergen C J, van den Ende K I, Ten Brinke B, Eygendaal D. Osteochondritis dissecans of the capitellum in adolescents. *World J Orthop*. 2016; 7: 102-8. 10.5312/wjo.v7.i2.102.
24. Habusta S, Mabrouk A, Tuck J. Synovial Chondromatosis. [Updated 2023 Apr 22]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470463/>.
25. Ha A, Chang E, Bartolotta R, Bucknor M, Chen K et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
26. Ong N, Zailan I, Tandon A. Imaging update in arthroplasty. *Journal of clinical orthopaedics and trauma*. 2021; 23: 101649. 10.1016/j.jcot.2021.101649.
27. Kransdorf M J, Murphey M D, Wessell D E, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Soft-Tissue Masses. *J Am Coll Radiol*. 2018; 15: S189-s197. 10.1016/j.jacr.2018.03.012.
28. Obara P, McCool J, Kalva S, Majdalany B, Collins J et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *Journal of the American College of Radiology*. 2019; 16: S340 - S347. 10.1016/j.jacr.2019.05.013.
29. Bestic J, Wessell D, Beaman F, Cassidy R, Czuczman G et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology*. 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.
30. Murphey M, Kransdorf M. Staging and Classification of Primary Musculoskeletal Bone and Soft-Tissue Tumors According to the 2020 WHO Update, From the AJR Special Series on Cancer Staging. *American Journal of Roentgenology*. 2021; 217: 1038 - 1052. 10.2214/AJR.21.25658.
31. National Comprehensive Cancer Network. Bone Cancer (Version 1.2024). Accessed February 22, 2024. 2023; https://www.nccn.org/professionals/physician_gls/pdf/bone.pdf.
32. Stanborough R, Demertzis J, Wessell D, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Malignant or Aggressive Primary Musculoskeletal Tumor-Staging and Surveillance: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S374 - S389. 10.1016/j.jacr.2022.09.015.
33. Pierce J, Perry M, Wessell D, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot): 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S473 - S487. 10.1016/j.jacr.2022.09.013.

34. Wu Y, Wang C, Cheng N, Lin H, Huang H et al. 2024 TSOC/TSPS Joint Consensus: Strategies for Advanced Vascular Wound Management. *Acta Cardiologica Sinica*. 2024; 40: 1-44. 10.6515/ACS.202401_40(1).20231220A.
35. Nagy H, Veerapaneni K. Myopathy. [Updated 2023 Aug 14]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK562290/>.
36. Radu A, Bungau S. Management of Rheumatoid Arthritis: An Overview. *Cells*. 2021; 10: 10.3390/cells10112857.
37. Campbell E, Wilbert C. Foreign Body Imaging. [Updated 2023 Jul 30]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470294/>.
38. Fortier L, Markel M, Thomas B, Sherman W, Thomas B. An Update on Peroneal Nerve Entrapment and Neuropathy. *Orthopedic reviews*. 2021; 13: 24937. 0.52965/001c.24937.
39. Griffith J, Guggenberger R. Peripheral Nerve Imaging. *Musculoskeletal Diseases 2021-2024: Diagnostic Imaging [Internet]*. Cham (CH): Springer; 2021. Chapter 18. 2021; doi: 10.1007/978-3-030-71281-5_18.
40. Szaro P, Geijer M, Ciszek B, McGrath A. Magnetic resonance imaging of the brachial plexus. Part 2: Traumatic injuries. *European journal of radiology open*. 2022; 9: 100397. 10.1016/j.ejro.2022.100397.
41. Szaro P, McGrath A, Ciszek B, Geijer M. Magnetic resonance imaging of the brachial plexus. Part 1: Anatomical. *European journal of radiology open*. 2022; 9: 100392. 10.1016/j.ejro.2021.100392.
42. Sinn C. Brachial Plexopathy: Differential Diagnosis and Treatment. *American Academy of Physical Medicine and Rehabilitation*. 2022; Updated June 8, 2022:
43. Roderick M R, Shah R, Rogers V, Finn A, Ramanan A. Chronic recurrent multifocal osteomyelitis (CRMO) - advancing the diagnosis. *Pediatr Rheumatol Online J*. 2016; 14: 47. 10.1186/s12969-016-0109-1.
44. Zhao D Y, McCann L, Hahn G, Hedrich C. Chronic nonbacterial osteomyelitis (CNO) and chronic recurrent multifocal osteomyelitis (CRMO). *J Transl Autoimmun*. 2021; 4: 100095. 10.1016/j.jtauto.2021.100095.



EVOLENT CLINICAL GUIDELINE 058-2 FOR UPPER EXTREMITY MRA/MRV

Guideline or Policy Number: Evolent_CG_058-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 2008 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 2008	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
MRA/MRV	3
SPECIAL NOTE	3
Imaging Request	3
INDICATIONS	3
HAND ISCHEMIA	3
DEEP VENOUS THROMBOSIS OR EMBOLISM	4
CLINICAL SUSPICION OF VASCULAR DISEASE	4
HEMODIALYSIS GRAFT DYSFUNCTION	4
VASCULAR MALFORMATION	4
TRAUMATIC INJURIES	5
EVALUATION OF TUMOR	5
PRE-OPERATIVE/PROCEDURAL EVALUATIONS	5
POST-OPERATIVE/PROCEDURAL EVALUATIONS	5
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	5
GENETIC SYNDROME AND RARE DISEASES	5
CODING AND STANDARDS	6
CODING	6
CPT Codes	6
APPLICABLE LINES OF BUSINESS	6
BACKGROUND	6
CONTRAINDICATIONS AND PREFERRED STUDIES	6
POLICY HISTORY	6
Summary	6
LEGAL AND COMPLIANCE	7
GUIDELINE APPROVAL	7
Committee	7
DISCLAIMER	7

REFERENCES.....	8
-----------------	---

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRA/MRV

Magnetic resonance angiography (MRA) and (MRV) generates images of the blood vessels that can be evaluated for evidence of stenosis, occlusion, or aneurysms without use of ionizing radiation. It is used to evaluate the blood vessels of the lower extremities.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

Special Note

Imaging Request

When a separate MRA and MRI exam is requested, documentation requires a medical reason that clearly indicates why additional MRI imaging of the upper extremity is needed.

INDICATIONS

Hand Ischemia ^(1,2,3)

- Acute symptoms including:
 - Ischemic ulceration without segmental temperature change
 - Ischemic ulceration with painful ischemia
 - Acute sustained loss of perfusion with or without acral ulceration
 - Imminent loss of digit
 - **NOTE:** Does not require prior arterial Doppler



- For clinical symptoms, following abnormal arterial Doppler, when MRA results will change management
 - Includes Raynaud's (can be associated with scleroderma), Buerger disease, and other vasculopathies⁽⁴⁾
- Clinical concern for vascular cause of ulcers with abnormal or indeterminate ultrasound⁽⁵⁾
- After stenting or surgery with signs of recurrence or indeterminate ultrasound⁽⁶⁾

Deep Venous Thrombosis or Embolism ^(7,8)

- After abnormal ultrasound of arm veins if it will change management
- After negative or indeterminate ultrasound to rule out other causes
- Evaluation of central veins
- Clinical suspicion of upper arterial emboli^(9,10)

Clinical Suspicion of Vascular Disease

Abnormal or indeterminate ultrasound or other imaging^(9,10), for suspicion of:

- Tumor invasion^(11,12)
- Trauma⁽¹³⁾
- Vasculitis^(2,14)
- Aneurysm^(11,14)
- Stenosis/occlusions⁽¹⁵⁾

Hemodialysis Graft Dysfunction

If Doppler ultrasound was not adequate⁽¹⁶⁾ for treatment decisions⁽¹⁷⁾

Vascular Malformation ^(18,19)

- After initial evaluation with ultrasound
- Preoperative planning

A concurrent MRI is also approvable for initial evaluation and/or preoperative planning

Traumatic Injuries

Clinical findings suggestive of arterial injury (CTA preferred emergently)⁽¹³⁾

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging (may be approved in combination with CT or MRI of tumor).

Pre-Operative/Procedural Evaluations

Pre-operative evaluation for a planned surgery or procedure⁽²⁰⁾

Post-Operative/Procedural Evaluations

A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery.⁽²¹⁾ Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Genetic Syndrome and Rare Diseases

- Known vascular EDS (vEDS) with acute extremity pain and concern for dissection/rupture^(22,23)
- Vascular EDS (vEDS) surveillance imaging: with inconclusive ultrasound or ultrasound suggestive of vascular pathology^(22,23)
- Known Williams Syndrome: when there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)⁽²⁴⁾

- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

CODING AND STANDARDS

Coding

CPT Codes

73225

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Content clarified without change to clinical indications • Added Genetics Syndrome and Rare Diseases section • Added Contraindications and Preferred Studies section in background • Updated References

April 2023	<ul style="list-style-type: none">• Updated references• Modified background section• Added vascular malformations• Added indeterminate prior imaging findings
------------	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bae M, Chung S, Lee C, Choi J, Song S. Upper Limb Ischemia: Clinical Experiences of Acute and Chronic Upper Limb Ischemia in a Single Center. *Korean J Thorac Cardiovasc Surg.* 2015; 48: 246-51. 10.5090/kjtc.2015.48.4.246.
2. Hotchkiss R, Marks T. Management of acute and chronic vascular conditions of the hand. *Curr Rev Musculoskelet Med.* 2014; 7: 47-52. 10.1007/s12178-014-9202-6.
3. Wong V, Major M, Higgins J. Nonoperative Management of Acute Upper Limb Ischemia. *Hand (N Y).* 2016; 11: 131-43. 10.1177/1558944716628499.
4. McMahan Z, Wigley F. Raynauds phenomenon and digital ischemia: a practical approach to risk stratification, diagnosis and management. *Int J Clin Rheumtol.* 2010; 5: 355-370. 10.2217/ijr.10.17.
5. Rosyid F. Etiology, pathophysiology, diagnosis and management of diabetics' foot ulcer. *Int J Res Med Sci.* 2017; 5: 4206-13. <http://dx.doi.org/10.18203/2320-6012.ijrms20174548>.
6. Pollak A, Norton P, Kramer C. Multimodality imaging of lower extremity peripheral arterial disease: current role and future directions. *Circ Cardiovasc Imaging.* 2012; 5: 797-807. 10.1161/circimaging.111.970814.
7. Desjardins B, Hanley M, Steigner M, Aghayev A, Azene E et al. ACR Appropriateness Criteria® Suspected Upper Extremity Deep Vein Thrombosis. *Journal of the American College of Radiology.* 2020; 17: S315 - S322. 10.1016/j.jacr.2020.01.020.
8. Heil J, Miesbach W, Vogl T, Bechstein W, Reinisch A. Deep Vein Thrombosis of the Upper Extremity. *Dtsch Arztebl Int.* 2017; 114: 244-249. 10.3238/arztebl.2017.0244.
9. Bozlar U, Ogur T, Khaja M, All J, Norton P. CT angiography of the upper extremity arterial system: Part 2- Clinical applications beyond trauma patients. *AJR Am J Roentgenol.* 2013; 201: 753-63. 10.2214/ajr.13.11208.
10. Bozlar U, Ogur T, Norton P, Khaja M, All J. CT angiography of the upper extremity arterial system: Part 1-Anatomy, technique, and use in trauma patients. *AJR Am J Roentgenol.* 2013; 201: 745-52. 10.2214/ajr.13.11207.
11. Garner H, Wessell D, Lenchik L, Ahlawat S, Baker J et al. ACR Appropriateness Criteria® Soft Tissue Masses: 2022 Update. *Journal of the American College of Radiology : JACR.* 2023; 20: S234-S245. 10.1016/j.jacr.2023.02.009.
12. Jin T, Wu G, Li X, Feng X. Evaluation of vascular invasion in patients with musculoskeletal tumors of lower extremities: use of time-resolved 3D MR angiography at 3-T. *Acta Radiol.* 2018; 59: 586-592. 10.1177/0284185117729185.
13. Wani M, Ahangar A, Ganie F, Wani S, Wani N. Vascular injuries: trends in management. *Trauma Mon.* 2012; 17: 266-9. 10.5812/traumamon.6238.
14. Seitz L, Seitz P, Pop R, Lötscher F. Spectrum of Large and Medium Vessel Vasculitis in Adults: Primary Vasculitides, Arthritides, Connective Tissue, and Fibroinflammatory Diseases. *Current rheumatology reports.* 2022; 24: 352-370. 10.1007/s11926-022-01086-2.
15. Conte M, Pomposelli F, Clair D, Geraghty P, McKinsey J et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: management of asymptomatic disease and claudication. *Journal of vascular surgery.* 2015; 61: 2S-41S. 10.1016/j.jvs.2014.12.009.
16. Richarz S, Isaak A, Aschwanden M, Partovi S, Staub D. Pre-procedure imaging planning for dialysis access in patients with end-stage renal disease using ultrasound and upper extremity

computed tomography angiography: a narrative review. *Cardiovascular Diagnosis and Therapy*. 2022; 13: 122-132.

17. Murphy E, Ross R, Jones R, Gandy S, Aristokleous N et al. Imaging in Vascular Access. *Cardiovasc Eng Technol*. 2017; 8: 255-272. 10.1007/s13239-017-0317-y.

18. Madani H, Farrant J, Chhaya N, Anwar I, Marmery H et al. Peripheral limb vascular malformations: an update of appropriate imaging and treatment options of a challenging condition. *Br J Radiol*. 2015; 88: 20140406. 10.1259/bjr.20140406.

19. Obara P, McCool J, Kalva S, Majdalany B, Collins J et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *J Am Coll Radiol*. 2019; 16: S340-S347. 10.1016/j.jacr.2019.05.013.

20. Azene E, Steigner M, Aghayev A, Ahmad S, Clough R et al. ACR Appropriateness Criteria® Lower Extremity Arterial Claudication-Imaging. *Journal of the American College of Radiology : JACR*. 2022; 19: S364-S373. 10.1016/j.jacr.2022.09.002.

21. Conte M, Bradbury A, Kolh P, White J, Dick F et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. *Journal of vascular surgery*. 2019; 69: 10.1016/j.jvs.2019.02.016.

22. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European journal of human genetics : EJHG*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.

23. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. *GeneReviews®* [Internet]. 2019;

24. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. *GeneReviews®* [Internet]. 2023;

EVOLENT CLINICAL GUIDELINE 057-2 FOR LOWER EXTREMITY CT

Guideline or Policy Number: Evolent_CG_057-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
MRI	3
SPECIAL NOTE	3
INDICATIONS FOR LOWER EXTREMITY CT (FOOT, ANKLE, KNEE, LEG, OR HIP)	3
<i>Pre-condition</i>	3
JOINT OR MUSCLE PAIN	4
JOINT SPECIFIC PROVOCATIVE EXAM TESTS AND SUSPECTED INJURIES	4
<i>Ankle</i>	4
<i>Knee</i>	5
<i>Hip</i>	6
TENDON RUPTURE	6
TRAUMA	7
<i>Bone Fracture</i>	7
OSTEOCHONDRAL LESIONS	7
JOINT PROSTHESIS/REPLACEMENT	7
EXTREMITY MASS	8
KNOWN PRIMARY CANCER OF THE EXTREMITY	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
OSTEONECROSIS	8
LOOSE BODIES OR SYNOVIAL CHONDROMATOSIS	9
INFECTION OF BONE, JOINT, OR SOFT TISSUE ABSCESS	9
PRE-OPERATIVE/PROCEDURAL EVALUATION	10
EVALUATION OF TUMOR	10
POST-OPERATIVE/PROCEDURAL EVALUATION	10
EVALUATION OF KNOWN OR SUSPECTED AUTOIMMUNE DISEASE	10
KNOWN OR SUSPECTED INFLAMMATORY MYOPATHIES	10
CRYSTALLINE ARTHROPATHY	11
PERIPHERAL NERVE ENTRAPMENT	11
FOREIGN BODY	11
PAINFUL ACQUIRED OR CONGENITAL FLATFOOT DEFORMITY	11



<i>Adult</i>	11
PEDIATRICS (UP TO AGE 18)	12
CODING AND STANDARDS	12
CODING	12
<i>CPT Codes</i>	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
*CONSERVATIVE THERAPY	12
**HOME EXERCISE PROGRAM (HEP).....	13
JOINT IMPLANTS AND HARDWARE	13
CT AND OSTEOLYSIS	13
CONTRAINDICATION AND PREFERRED STUDIES.....	13
POLICY HISTORY	14
<i>Summary</i>	14
LEGAL AND COMPLIANCE	14
GUIDELINE APPROVAL.....	14
<i>Committee</i>	14
DISCLAIMER	14
REFERENCES	15

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRI

Plain radiographs are typically used as the first-line modality for assessment of lower extremity conditions. Computed tomography (CT) is used for evaluation of tumors, metastatic lesions, infection, fractures, and other problems. Magnetic resonance imaging (MRI) is the first-line choice for imaging of many conditions, but CT may be used in these cases if MRI is contraindicated or unable to be performed.

Special Note

- Plain radiographs must precede CT evaluation unless otherwise indicated
- Some indications are for MRI, CT, or MR or CT Arthrogram (more than one should not be approved at the same time)
- If an CT Arthrogram fits approvable criteria below, approve as CT
- MRI is usually the preferred study

INDICATIONS FOR LOWER EXTREMITY CT (FOOT, ANKLE, KNEE, LEG, OR HIP)

Pre-condition

Plain radiographs must precede CT evaluation.

Joint or Muscle Pain (1,2,3)

Negative Findings on Orthopedic Exam and after X-Ray Completed

NOTE: Does not apply to young children (up to age 12). If MRI contraindicated or cannot be performed or requested as a CT arthrogram.

- Persistent joint or musculotendinous pain unresponsive to **conservative treatment***, within the last 6 months which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician supervised **exercise****) of at least four (4) weeks
- With progression or worsening of symptoms during the course of conservative treatment

Joint Specific Provocative Exam Tests and Suspected Injuries (4)

Approvable Orthopedic Test:

With a positive orthopedic sign, an initial x-ray is always preferred; however, it is not required to approve advanced imaging **UNLESS** otherwise specified in **bold** below. Any test that suggests joint instability requires further imaging (the below list is not all inclusive)

NOTE: If MRI contraindicated or cannot be performed or requested as a CT arthrogram

Ankle (5,6)

If MRI contraindicated or cannot be performed;

- Syndesmotic injury (high ankle injury) with tenderness to palpation over the syndesmosis (AITFL – anterior inferior tibiofibular ligament) and any of the following:^(7,8)
 - Positive stress X-rays
 - Squeeze test
 - Cotton test
 - Dorsiflexion external rotation test
- Unstable lateral injury to ATFL (anterior talofibular ligament) with suspicion of a possible associated fracture around the ankle or a possible osteochondral injury of the talus and any **ONE** of the following:⁽⁹⁾
 - Positive stress x-rays
 - Positive anterior drawer test with non-diagnostic or inconclusive X-rays
 - Positive posterior drawer test with non-diagnostic or inconclusive X-rays
- Achilles tendon tear⁽¹⁰⁾

- Thompson test or palpable partial or complete Achilles tendon defect on physical examination

Knee ^(11,12)

If MRI contraindicated or cannot be performed;

- Anterior cruciate ligament (ACL) Injury⁽¹³⁾
 - Positive testing:
 - Anterior drawer
 - Lachman's
 - Pivot shift test
- Suspected ACL Rupture - acute knee injury with physical exam limited by pain and swelling **AFTER** initial x-ray completed with any of the following ⁽¹⁴⁾
 - Based on mechanism of injury, i.e., twisting, blunt force
 - Normal x-ray:

OR

 - Anyone one of the following:
 - Extreme pain,
 - Instability, to stand
 - Audible pop at time of injury
 - Very swollen joint with inability to perform the physical exam

OR

 - Abnormal x-ray:
 - Large knee effusion on x-ray
- Acute mechanical locking of the knee not due to guarding⁽¹⁵⁾
- Meniscal injury/tear (A positive test is denoted by pain or audible/palpable clunk)⁽¹⁶⁾
 - McMurray's Compression
 - Apley's
 - Thessaly test
- Patellar dislocation (acute or recurrent)⁽¹⁷⁾
 - Positive patellofemoral apprehension test
 - Radiographic findings compatible with a history of patellar dislocation (i.e., lipohemarthrosis or osteochondral fracture)
- Posterior cruciate ligament (PCL) injury

- Posterior drawer
- Posterior tibial sag (Godfrey or step-off test)
- Medial collateral ligament tear
 - Positive valgus stress testing/laxity
- Lateral Collateral ligament tear
 - Positive Varus stress testing/laxity

Hip

If MRI contraindicated or cannot be performed;

- Femoroacetabular impingement (FAI) / Labral tear^(18,19,20)
 - Anterior Impingement sign (aka FADIR test) (Hip or groin pain with hip flexion, adduction, and internal rotation)
 - Posterior Impingement sign (Pain with hip extension and external rotation on exam)
 - Persistent hip mechanical symptoms (after initial radiographs completed) including clicking, locking, catching, giving way or hip instability with a clinical suspicion of labral tear and/or radiographic findings suggestive of FAI (i.e., cross over sign, pistol grip deformity, alpha angle over 50 degrees) and suspected labral tear
 - Determine candidacy for hip preservation surgery for known FAI

NOTE: For evaluation of both hips when the patient meets hip MRI guidelines (x-ray + persistent pain unresponsive to conservative treatment) for both the right and left hip, Pelvis MRI (**Evolent_CG_037**) is the preferred study.

- Labral tear is suspected and fulfills above criteria, then bilateral hip MRIs are the preferred studies (not Pelvis MRI)
- Bilateral hip arthrograms are requested and otherwise meet guidelines, bilateral hip MRIs are the preferred studies (not Pelvis MRI)

Tendon Rupture ^(21,22)

After X-Ray and not Listed Above

High clinical suspicion of specific tendon rupture based on mechanism of injury and physical findings (i.e., palpable defect in quadriceps or patellar tendon rupture)

Trauma

Bone Fracture

- Hip and Femur⁽²³⁾
 - Suspected occult, stress or insufficiency fracture with a negative or non-diagnostic initial x-ray
 - Approve an immediate CT if contraindication to MRI or MRI cannot be performed (no follow up radiographs required)
 - Suspicion of a hip fracture in a pregnant patient does not require an initial x-ray
- Non-hip extremities: suspected occult, stress, or insufficiency fracture⁽²⁴⁾
 - If x-rays, taken 10-14 days after the injury or clinical assessment, are negative or non-diagnostic
 - If at high risk for a complete fracture with conservative therapy (e.g., navicular bone), then immediate CT is warranted
- Pathologic or concern for impending fracture on x-ray or CT⁽²⁴⁾ – approve immediate CT
- Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery

Osteochondral Lesions ^(12,25,26)

Defects, Fractures, Osteochondritis Dissecans

Clinical suspicion based on mechanism of injury and physical findings

NOTE: X-ray completed

Joint Prosthesis/Replacement ⁽²⁷⁾

Suspected joint prosthesis loosening, infection, or dysfunction, (i.e., pseudotumor formation) after initial x-rays

- Suspected Metallosis with painful metal on metal hip replacement⁽²⁸⁾ after initial x-rays
 - After initial x-rays
 - Cobalt and chromium levels $> 7_{\text{ppb}}$ ⁽²⁹⁾
 - Abnormal joint aspiration

Extremity Mass ⁽³⁰⁾

- Mass or lesion after non-diagnostic x-ray or ultrasound. CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI (MRI is preferred)
 - Baker's cyst should be initially evaluated with ultrasound
 - Superficial mass, then ultrasound is the initial study
 - Deep mass, then x-ray is the initial study
- Vascular malformations⁽³¹⁾
 - After initial evaluation with ultrasound and results will change management or preoperative planning
 - CTA is also approvable for initial evaluation
 - Follow up after treatment/embolization

Known Primary Cancer of the Extremity ^(32,33,34,35)

- Initial staging primary extremity tumor
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Osteonecrosis ⁽³⁶⁾

- When MRI is contraindicated or cannot be performed
- To further characterize a prior abnormal x-ray

- Normal or Indeterminate X-rays, but symptomatic and high risk (such as glucocorticosteroid use, renal transplant, glycogen storage disease, alcohol abuse, sickle cell anemia)
- Known osteonecrosis to evaluate a contralateral joint after initial x-rays

e.g., Avascular Necrosis (AVN), Legg-Calve-Perthes Disease

Loose Bodies or Synovial Chondromatosis ⁽³⁷⁾

(After X-Ray or Ultrasound Completed)

- In the setting of joint pain or mechanical symptoms

Infection of Bone, Joint, or Soft Tissue Abscess ⁽³⁸⁾

- Abnormal x-ray or ultrasound
- Negative x-ray or ultrasound but with a clinical suspicion of infection based on either of the following:
 - Signs and symptoms of joint or bone infection such as:
 - Pain and swelling
 - Decreased range of motion
 - Fevers
 - Laboratory findings of infection include any of the following:
 - Elevated ESR or CRP
 - Elevated white blood cell count
 - Positive joint aspiration
- Ulcer (diabetic, pressure, ischemic, traumatic) with signs of infection (redness, warmth, swelling, pain, discharge which may range from white to serosanguineous) that is not improving despite treatment and bone, or deep infection is suspected⁽³⁹⁾
 - Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell
- Neuropathic foot with friable or discolored granulation tissue, foul odor, non-purulent discharge, and delayed wound healing⁽³⁹⁾

NOTE: MRI and nuclear medicine studies are recommended for acute infection as they are more sensitive in detecting early changes of osteomyelitis. CT is better at demonstrating findings of chronic osteomyelitis (sequestra, involucrum, cloaca, sinus tracts) as well as detecting soft tissue gas and foreign bodies.

Pre-Operative/Procedural Evaluation

Pre-operative evaluation for a planned surgery or procedure

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging.

Post-Operative/Procedural Evaluation

- When imaging, physical or laboratory findings indicate joint infection, delayed or non-healing or other surgical/procedural complications.
- Trendelenburg sign⁽⁴⁰⁾ or other indication of muscle or nerve damage after recent hip surgery

Evaluation of Known or Suspected Autoimmune Disease (41,42)

MRI is contraindicated or cannot be performed:

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging
- Initial imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR)
- To determine change in treatment or when diagnosis is uncertain prior to start of treatment
- Follow-up to determine treatment efficacy of the following:
 - Early rheumatoid arthritis
 - Advanced rheumatoid arthritis if x-ray and ultrasound are equivocal or noncontributory

e.g., Rheumatoid Arthritis

Known or Suspected Inflammatory Myopathies ⁽⁴³⁾

- For diagnosis
- For biopsy planning

NOTE: If MRI is contraindicated or cannot be performed. Includes polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis.

Crystalline Arthropathy ⁽⁴⁴⁾

- Dual-energy CT can be used to characterize crystal deposition disease (i.e., gout) after:
 - Appropriate rheumatological work up and initial x-rays **AND**
 - After inconclusive joint aspiration or when joint aspiration cannot be performed **OR**
 - In the setting of extra-articular crystal deposits (i.e., tendons or bursa)

Peripheral Nerve Entrapment ^(45,46)

MRI is contraindicated or cannot be performed, including any of the following:

- Abnormal electromyogram or nerve conduction study
- Abnormal x-ray or ultrasound
- Clinical suspicion and failed 4 weeks conservative treatment including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat
 - Splinting or orthotics
 - Medication

e.g., Tarsal tunnel, Morton's neuroma

Foreign Body ⁽⁴⁷⁾

Indeterminate x-ray and ultrasound

Painful Acquired or Congenital Flatfoot Deformity ^(48,49)

Adult

- After X-ray completed
- MRI is contraindicated or cannot be performed
- After failure of active conservative therapy
 - Including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat

- Splinting or orthotics
- Medication

Pediatrics (Up to Age 18)

- Osteoid Osteoma after and x-ray is done⁽⁵⁰⁾
- Painful flatfoot (pes planus) deformity with suspected tarsal coalition, not responsive to non-active conservative care (such as orthotics, rest etc.)⁽⁵¹⁾
 - When MRI cannot be performed
 - Extra articular coalition is suspected (bony bridges around the joints)
 - Surgical planning

CODING AND STANDARDS

Coding

CPT Codes

73700, 73701, 73702, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Therapy

Musculoskeletal should include a multimodality approach consisting of a combination of active and inactive components.

Inactive components such as rest, ice, heat, modified activities, medical devices, (including crutches, immobilizer, metal braces, orthotics, rigid stabilizer, or splints, etc. and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized.



Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or chiropractic care.

****Home Exercise Program (HEP)**

The following two elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan **AND**
- Follow-up with member with information provided regarding completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises.

NOTE: Patient inconvenience or noncompliance without explanation does not constitute “inability to complete” HEP

Joint Implants and Hardware

Dual-energy CT may be useful for metal artifact reduction if available but is also imperfect as the correction is based on a projected approximation of x-ray absorption, and it does not correct for scatter.⁽⁵²⁾ Dual-energy CT can be used to characterize crystal deposition disease, such as gout versus CPPD (calcium pyrophosphate deposition).⁽⁴⁴⁾

CT and Osteolysis

Computed tomography scans show both the extent and the location of lytic lesions, they are useful to guide treatment decisions, as well as to assist in planning for surgical intervention when needed, in patients with suspected osteolysis after Total Hip Arthroplasty (THA).

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Contraindications and preferred studies section added to the background • Removed CT scanogram for leg length • Updated references and background
May 2023	<ul style="list-style-type: none"> • Updated orthopedic signs • Added: <ul style="list-style-type: none"> ○ When contraindicated to MRI where appropriate ○ Metallosis ○ Evaluation of indeterminate findings on imaging reports ○ Non-diagnostic imaging ○ CPT code for leg length ○ Statement regarding clinical indications not addressed in the guideline • Clarified hip versus pelvis imaging • Updated DECT • Modified: <ul style="list-style-type: none"> ○ References ○ Background section ○ Cancer of the extremity section

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Katz J N, Brophy R H, Chaisson C E, de Chaves L, Cole B J et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *N Engl J Med*. 2013; 368: 1675-84. 10.1056/NEJMoa1301408.
2. Mordecai S C, Al-Hadithy N, Ware H E, Gupte C M. Treatment of meniscal tears: An evidence based approach. *World J Orthop*. 2014; 5: 233-41. 10.5312/wjo.v5.i3.233.
3. Tafur M, Bencardino J, Roberts C, Appel M, Bell A et al. ACR Appropriateness Criteria® Chronic Foot Pain. *Journal of the American College of Radiology*. 2020; 17: S391 - S402. 10.1016/j.jacr.2020.09.015.
4. Fox M, Chang E, Amini B, Bernard S, Gorbachova T et al. ACR Appropriateness Criteria® Chronic Knee Pain. *Journal of the American College of Radiology*. 2018; 15: S302 - S312. 10.1016/j.jacr.2018.09.016.
5. Chen E T, Borg-Stein J, McInnis K C. Ankle Sprains: Evaluation, Rehabilitation, and Prevention. *Curr Sports Med Rep*. 2019; 18: 217-223. 10.1249/jsr.0000000000000603.
6. Jungmann P, Lange T, Wenning M, Baumann F, Bamberg F. Ankle Sprains in Athletes: Current Epidemiological, Clinical and Imaging Trends. *Open access journal of sports medicine*. 2023; 14: 29-46. 10.2147/OAJSM.S397634.
7. Netterström-Wedin F, Matthews M, Bleakley C. Diagnostic Accuracy of Clinical Tests Assessing Ligamentous Injury of the Talocrural and Subtalar Joints: A Systematic Review with Meta-Analysis. *Sports health*. 2022; 14: 336-347. 10.1177/19417381211029953.
8. de-Las-Heras Romero J, Alvarez A, Sanchez J, Garcia A, Porcel P, et al. Management of syndesmotic injuries of the ankle. *EFORT open reviews*. 2017; 2: 403-409. 10.1302/2058-5241.2.160084.
9. Chen R, Wang Q, Li M, Su X, Wang D et al. Progress in diagnosis and treatment of acute injury to the anterior talofibular. *World journal of clinical cases*. 2023; 11: 3395-3407. 10.12998/wjcc.v11.i15.3395.
10. Periasamy M, Venkatramani H, Shanmuganathan R. Management of Chronic Achilles Tendon Injuries-Review of Current Protocols and. *Indian journal of plastic surgery : official publication of the Association of*. 2019; 52: 109-116. 0.1055/s-0039-1687923.
11. Chien A, Weaver J, Kinne E, Omar I. Magnetic resonance imaging of the knee. *Polish journal of radiology*. 2020; 85: e509-e531. 10.5114/pjr.2020.99415.
12. Taljanovic M, Chang E, Ha A, Bartolotta R, Bucknor M et al. ACR Appropriateness Criteria® Acute Trauma to the Knee. *Journal of the American College of Radiology*. 2020; 17: S12 - S25. 10.1016/j.jacr.2020.01.041.
13. Kulwin R L, Schmidt G J, Snyder D A, Klitzman R G. Clinical Examination in the Diagnosis of Anterior Cruciate Ligament Injury: A Blinded, Cross-sectional Evaluation. *Journal of the American Academy of Orthopaedic Surgeons. Global research & 2023; 7: 10.5435/JAAOSGlobal-D-22-00123.*
14. Li X, Hou Q, Zhan X, Chang L, Ma X. The accuracy of MRI in diagnosing and classifying acute traumatic multiple ligament knee injuries. *BMC Musculoskeletal Disorders*. 2022; 23: 10.1186/s12891-021-04976-1.
15. Hussin P, Mawardi M, Nizlan N. The Chalky Culprit of acute locked knee. *G Chir. Sep-Oct 2014; 35: 239-40.*

16. Smoak J B, Matthews J R, Vinod A V, Kluczynski M A, Bisson L J. An Up-to-Date Review of the Meniscus Literature: A Systematic Summary of Systematic Reviews and Meta-analyses. *Orthop J Sports Med.* 2020; 8: 10.1177/2325967120950306.
17. Hayat Z, El Bitar Y, Case J. Patella Dislocation. [Updated 2023 Jul 4]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK538288/>.
18. Groh M, Herrera J. A comprehensive review of hip labral tears. *Curr Rev Musculoskelet Med.* Jun 2009; 2: 105-17. 10.1007/s12178-009-9052-9.
19. Hananouchi T, Yasui Y, Yamamoto K, Toritsuka Y, Ohzono K. Anterior impingement test for labral lesions has high positive predictive value. *Clin Orthop Relat Res.* Dec 2012; 470: 3524-9. 10.1007/s11999-012-2450-0.
20. O'Rourke R, El Bitar Y. Femoroacetabular Impingement. [Updated 2023 Jun 26]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK547699/>.
21. Hsu H, Siwiec R. Patellar Tendon Rupture. [Updated 2023 Feb 13]. StatPearls Publishing. 2023; Accessed February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK513275/>.
22. Shamrock A, Dreyer M, Varacallo M. Achilles Tendon Rupture. [Updated 2023 Aug 17]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK430844/>.
23. Ross A B, Lee K S, Chang E Y, Amini B, Bussell J K et al. ACR Appropriateness Criteria® Acute Hip Pain-Suspected Fracture. *Journal of the American College of Radiology.* 2019; 16: S18 - S25. 10.1016/j.jacr.2019.02.028.
24. Bencardino J, Stone T, Roberts C, Appel M, Baccei S et al. ACR Appropriateness Criteria(®) Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. *J Am Coll Radiol.* May 2017; 14: S293-s306. 10.1016/j.jacr.2017.02.035.
25. Mintz D N, Roberts C C, Bencardino J T, Baccei S J, Caird M S et al. ACR Appropriateness Criteria(®) Chronic Hip Pain. *J Am Coll Radiol.* 2017; 14: S90-s102. 10.1016/j.jacr.2017.01.035.
26. Pedersen M, DaCambra M, Jibri Z, Dhillion S, Jen H. Acute Osteochondral Fractures in the Lower Extremities - Approach to Identification and Treatment. *The open orthopaedics journal.* 2015; 9: 463-74. 10.2174/1874325001509010463.
27. Ong N, Zailan I, Tandon A. Imaging update in arthroplasty. *Journal of clinical orthopaedics and trauma.* 2021; 23: 101649. 10.1016/j.jcot.2021.101649.
28. Lee A, Paiement G D, Penenberg B L, Rajaei S S. Metallosis in Total Hip Arthroplasty. *JBJS reviews.* 2023; 11: 10.2106/JBJS.RVW.23.00105.
29. Tognini M, Hothi H, Tucker S, Broomfield E, Shafafy M et al. Blood titanium levels in patients with large and sliding titanium implants. *BMC musculoskeletal disorders.* 2022; 23: 783. 10.1186/s12891-022-05717-8.
30. Kransdorf M J, Murphey M D, Wessell D E, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria(®) Soft-Tissue Masses. *J Am Coll Radiol.* 2018; 15: S189-s197. 10.1016/j.jacr.2018.03.012.
31. Obara P, McCool J, Kalva S P, Majdalany B S, Collins J D et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *Journal of the American College of Radiology.* 2019; 16: S340 - S347. 10.1016/j.jacr.2019.05.013.
32. Bestic J, Wessell D, Beaman F, Cassidy R, Czuczman G et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology.* 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.

33. Murphey M D, Kransdorf M J. Staging and Classification of Primary Musculoskeletal Bone and Soft-Tissue Tumors According to the 2020 WHO Update, From the AJR Special Series on Cancer Staging. *American Journal of Roentgenology*. 2021; 217: 1038 - 1052. 10.2214/AJR.21.25658.
34. National Comprehensive Cancer Network. Bone Cancer (Version 1.2024). Accessed February 22, 2024. 2023; https://www.nccn.org/professionals/physician_gls/pdf/bone.pdf.
35. Stanborough R, Demertzis J, Wessell D, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Malignant or Aggressive Primary Musculoskeletal Tumor-Staging and Surveillance: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S374 - S389. 10.1016/j.jacr.2022.09.015.
36. Ha A, Chang E, Bartolotta R, Bucknor M, Chen K et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
37. Habusta S, Mabrouk A, Tuck J. Synovial Chondromatosis. [Updated 2023 Apr 22]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470463/>.
38. Pierce J, Perry M, Wessell D, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot): 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S473 - S487. 10.1016/j.jacr.2022.09.013.
39. Wu Y, Wang C, Cheng N, Lin H, Huang H et al. 2024 TSOC/TSPS Joint Consensus: Strategies for Advanced Vascular Wound Management. *Acta Cardiologica Sinica*. 2024; 40: 1-44. 10.6515/ACS.202401_40(1).20231220A.
40. Gogu S, Gandbhir V N. Trendelenburg Sign. StatPearls. 2022; <https://www.ncbi.nlm.nih.gov/books/NBK555987/>.
41. Colebatch A N, Edwards C J, Østergaard M, van der Heijde D, Balint P V et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis*. 2013; 72: 804-14. 10.1136/annrheumdis-2012-203158.
42. Radu A, Bungau S. Management of Rheumatoid Arthritis: An Overview. *Cells*. 2021; 10: 10.3390/cells10112857.
43. Nagy H, Veerapaneni K. Myopathy. [Updated 2023 Aug 14]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK562290/>.
44. Chou H, Chin T, Peh W. Dual-energy CT in gout - A review of current concepts and applications. *Journal of medical radiation sciences*. 2017; 64: 41-51. 10.1002/jmrs.223.
45. Fortier L, Markel M, Thomas B, Sherman W, Thomas B. An Update on Peroneal Nerve Entrapment and Neuropathy. *Orthopedic reviews*. 2021; 13: 24937. 0.52965/001c.24937.
46. Griffith J, Guggenberger R. Peripheral Nerve Imaging. *Musculoskeletal Diseases 2021-2024: Diagnostic Imaging [Internet]*. Cham (CH): Springer; 2021. Chapter 18. 2021; doi: 10.1007/978-3-030-71281-5_18.
47. Campbell E, Wilbert C. Foreign Body Imaging. [Updated 2023 Jul 30]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470294/>.
48. Abousayed M, Alley M C, Shakked R, Rosenbaum A J. Adult-Acquired Flatfoot Deformity: Etiology, Diagnosis, and Management. *JBJS Rev*. 2017; 5: e7. 10.2106/jbjs.Rvw.16.00116.
49. Arain A, Harrington M, Rosenbaum A. Adult-Acquired Flatfoot. [Updated 2023 Aug 8]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK542178/>.

50. Iyer R, Chapman T, Chew F. Pediatric bone imaging: diagnostic imaging of osteoid osteoma. *AJR Am J Roentgenol*. May 2012; 198: 1039-52. 10.2214/ajr.10.7313.
51. Raj M, Tafti D, Kiel J. Pes Planus. [Updated 2023 May 23]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK430802/>.
52. Parakh A, An C, Lennartz S, Rajiah P, Yeh B et al. Recognizing and Minimizing Artifacts at Dual-Energy CT. *Radiographics : a review publication of the Radiological Society of North*. 2021; 41: 509-523. 10.1148/rg.2021200049.

EVOLENT CLINICAL GUIDELINE 061-1 FOR LOWER EXTREMITY CTA/CTV

Guideline or Policy Number: Evolent_CG_061-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2008 - 2025 All rights Reserved		
Original Date: July 2008	Last Revised Date: April 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
CTA/CTV	3
SPECIAL NOTE	3
Imaging Request	3
INDICATIONS	3
PERIPHERAL VASCULAR DISEASE	3
POPLITEAL ARTERY ENTRAPMENT SYNDROME	4
DEEP VENOUS THROMBOSIS	4
CLINICAL SUSPICION OF VASCULAR DISEASE	4
HEMODIALYSIS GRAFT DYSFUNCTION	5
VASCULAR MALFORMATION	5
TRAUMATIC INJURIES	5
PRE-OPERATIVE/PROCEDURE EVALUATION	5
POST-OPERATIVE/PROCEDURE EVALUATION	5
EVALUATION OF TUMOR	5
GENETIC SYNDROMES AND RARE DISEASES	5
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	6
CODING AND STANDARDS	6
CODING	6
CPT Codes	6
APPLICABLE LINES OF BUSINESS	6
BACKGROUND	6
Contraindications and Preferred Studies	6
CTA and Screening: Peripheral Vascular Disease	7
POLICY HISTORY	7
Summary	7
LEGAL AND COMPLIANCE	7
GUIDELINE APPROVAL	7



<i>Committee</i>	7
DISCLAIMER	8
REFERENCES	9

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

CTA/CTV

Computed tomography angiography (CTA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms. It is used to evaluate the arteries of the abdominal aorta and the renal arteries. CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function. Lower Extremity CTA is not used as a screening tool, e.g., evaluation of asymptomatic patients without a previous diagnosis.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography

Special Note

Imaging Request

When a separate CTA and CT exam is requested, documentation requires a medical reason that clearly indicates why additional CT imaging of the lower extremity is needed.

INDICATIONS

Peripheral Vascular Disease

NOTE: When Aortograms CTA (CT Angiography) (CPT Code 75635) has not been recently approved, when aortoiliac disease is not a concern, or the state of the aorta and iliac arteries is already known.

For evaluation of known or suspected lower extremity arterial disease:

- For known or suspected peripheral arterial disease (such as claudication, or clinical concern for vascular causes of ulcers) when non-invasive studies (pulse volume recording, ankle-brachial index, toe brachial index, segmental pressures, or doppler ultrasound) are abnormal or indeterminate **OR**
- For critical Limb ischemia with **ANY** of the below clinical signs of peripheral artery disease (prior ultrasound is not needed; if done and negative, CTA should still be approved) ^(1,2)
 - Ischemic rest pain
 - Tissue loss
 - Gangrene
- After stenting or surgery with signs of recurrent symptoms, abnormal ankle/brachial index, abnormal or indeterminate arterial Doppler, or abnormal or indeterminate pulse volume recording ⁽³⁾

NOTE: When vascular imaging of the aorta and both legs, i.e., CTA aortogram and runoff is desired (sometimes incorrectly requested as Abd/Pelvis CTA & Lower Extremity CTA Runoff), only one authorization request is required, using CPT Code 75635 CTA Aortogram. This study provides for imaging of the abdomen, pelvis, and both legs. A separate authorization for Lower Extremity CTA is **NOT** needed. If **ONLY** the Extremity CTA is requested and Abdominal imaging is not needed, Lower Extremity CTA can be issued.

Popliteal Artery Entrapment Syndrome

After abnormal arterial ultrasound and when imaging will change management ⁽⁴⁾

Deep Venous Thrombosis

Clinical suspicion of lower extremity DVT (when ultrasound is abnormal or inconclusive and a positive study would change management) ^(5,6,7)

Clinical Suspicion of Vascular Disease

With abnormal or indeterminate ultrasound or other imaging

- Trauma ⁽⁸⁾
- Vasculitis ⁽⁹⁾⁽¹⁰⁾
- Aneurysm ⁽⁹⁾
- Stenosis/occlusions ⁽¹⁰⁾

Hemodialysis Graft Dysfunction

After Doppler ultrasound, if findings were not adequate for treatment decisions⁽¹¹⁾

Vascular Malformation^(12,13)

- After initial evaluation with ultrasound if:
 - Results will change management
 - Results are inconclusive on ultrasound
 - If a known or suspected high flow lesion
- A concurrent CT is also approvable for initial evaluation and/or preoperative planning if MRI is **contraindicated** or cannot be performed or surgeon preference.

Traumatic Injuries

Clinical findings suggestive of arterial injury⁽⁸⁾

Pre-operative/Procedure Evaluation

Pre-operative evaluation for a planned surgery or procedure⁽¹⁴⁾

Post-operative/Procedure Evaluation

A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested^(15,16)

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging (may be approved in combination with CT or MRI of tumor).

Genetic Syndromes and Rare Diseases

- Known vascular EDS (vEDS) with acute extremity pain and concern for dissection/rupture^(17,18)
- Vascular EDS (vEDS) surveillance imaging: with inconclusive ultrasound or ultrasound suggestive of vascular pathology^(17,18)

- Known Williams Syndrome: when there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis⁽¹⁹⁾)
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

73706

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).

- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

CTA and Screening: Peripheral Vascular Disease

The USPSTF (U.S. Preventive Services Task Force) does not recommend routine screening for peripheral vascular disease in asymptomatic patients ⁽²⁰⁾. High risk patients (e.g., diabetics) may be screened with ABI (ankle brachial index) and duplex ultrasound.

The ankle- brachial index (ABI) is the ratio of systolic blood pressure at the ankle divided by the systolic pressure of the upper arm. The normal range lies between 0.9-1.4. An ABI ⁽²¹⁾ of less than 0.9 is a reliable indicator of the presence of lower extremity PAD, indicating athero-occlusive arterial disease. The upper limit of normal ABI should not exceed 1.40. An ABI >1.40 is suggestive of arterial stiffening (i.e., medial arterial calcification) and is also associated with a higher risk of cardiovascular events and is seen in elderly patients, typically in those with diabetes or chronic kidney disease (CKD).

POLICY HISTORY

Summary

Date	Summary
April 2024	<ul style="list-style-type: none"> • Updated references • Added Genetics Syndromes and Rare Diseases, Evaluation of Tumor, and Contraindications and Preferred Studies sections
April 2023	<ul style="list-style-type: none"> • Updated references • Modified background section • Added vascular malformations • Added indeterminate prior imaging findings • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee



Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Browne W F, Sung J, Majdalany B S, Khaja M S, Calligaro K et al. ACR Appropriateness Criteria® Sudden Onset of Cold, Painful Leg: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S565 - S573. 10.1016/j.jacr.2023.08.012.
2. Shishehbor M, White C, Gray B, Menard M, Lookstein R et al. Critical Limb Ischemia: An Expert Statement. *J Am Coll Cardiol*. Nov 1, 2016; 68: 2002-2015. 10.1016/j.jacc.2016.04.071.
3. Pollak A, Norton P, Kramer C. Multimodality imaging of lower extremity peripheral arterial disease: current role and future directions. *Circ Cardiovasc Imaging*. Nov 2012; 5: 797-807. 10.1161/circimaging.111.970814.
4. Bradshaw S, Habibollahi P, Soni J, Kolber M, Pillai A. Popliteal artery entrapment syndrome. *Cardiovascular diagnosis and therapy*. 2021; 11: 1159-1167.
5. American College of Radiology. ACR Appropriateness Criteria® Suspected Lower Extremity Deep Vein Thrombosis. American College of Radiology. 2018; 2023:
6. Karande G, Hedgire S, Sanchez Y, Baliyan V, Mishra V et al. Advanced imaging in acute and chronic deep vein thrombosis. *Cardiovasc Diagn Ther*. Dec 2016; 6: 493-507. 10.21037/cdt.2016.12.06.
7. Katz D S, Fruauff K, Kranz A, Hon M. Imaging of deep venous thrombosis: A multimodality overview. *Applied Radiology*. Updated March 5, 2014; Accessed January 23, 2023:
8. Wani M, Ahangar A, Ganie F, Wani S, Wani N. Vascular injuries: trends in management. *Trauma Mon*. Summer 2012; 17: 266-9. 10.5812/traumamon.6238.
9. Seitz L, Seitz P, Pop R, Lötscher F. Spectrum of Large and Medium Vessel Vasculitis in Adults: Primary Vasculitides, Arthritides, Connective Tissue, and Fibroinflammatory Diseases. *Current Rheumatology Reports*. 2022; 24: 352 - 370. 10.1007/s11926-022-01086-2.
10. Conte M, Pomposelli F, Clair D, Geraghty P, McKinsey J et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: Management of asymptomatic disease and claudication. *Journal of Vascular Surgery*. 2015; 61: 2S - 41S.e1. 10.1016/j.jvs.2014.12.009.
11. Richarz S, Isaak A, Aschwanden M, Partovi S, Staub D. Pre-procedure imaging planning for dialysis access in patients with end-stage renal disease using ultrasound and upper extremity computed tomography angiography: a narrative review. *Cardiovascular Diagnosis and Therapy*. 2022; 13: 122-132.
12. Madani H, Farrant J, Chhaya N, Anwar I, Marmery H et al. Peripheral limb vascular malformations: an update of appropriate imaging and treatment options of a challenging condition. *Br J Radiol*. Mar 2015; 88: 20140406. 10.1259/bjr.20140406.
13. Obara P, McCool J, Kalva S P, Majdalany B S, Collins J D et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *J Am Coll Radiol*. 2019; 16: S340-s347. 10.1016/j.jacr.2019.05.013.
14. Azene E M, Steigner M L, Aghayev A, Ahmad S, Clough R E et al. ACR Appropriateness Criteria® Lower Extremity Arterial Claudication-Imaging Assessment for Revascularization: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S364 - S373. 10.1016/j.jacr.2022.09.002.
15. Conte M S, Bradbury A W, Kolh P, White J V, Dick F et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. *J Vasc Surg*. 2019; 69: 3S-125S.e40. 10.1016/j.jvs.2019.02.016.

16. Cooper K, Majdalany B S, Kalva S P, Chandra A, Collins J D et al. ACR Appropriateness Criteria® Lower Extremity Arterial Revascularization-Post-Therapy Imaging. J Am Coll Radiol. 2018; 15: S104-s115. 10.1016/j.jacr.2018.03.011.
17. Beyers P. Vascular Ehlers-Danlos Syndrome. GeneReviews [Internet]. 2019;
18. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. European Journal of Human Genetics. 2023; 31: 749 - 760. 10.1038/s41431-023-01343-7.
19. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. GeneReviews® [Internet]. 2023;
20. US Preventive Services Task Force. Screening for Peripheral Artery Disease and Cardiovascular Disease Risk Assessment with the Ankle-Brachial Index: US Preventive Services Task Force Recommendation Statement. JAMA. 2018; 320: 177 - 183. 10.1001/jama.2018.8357.
21. Golledge J, Moxon J, Rowbotham S, Pinchbeck J, Quigley F. High ankle brachial index predicts high risk of cardiovascular events amongst people with peripheral artery disease. PLOS ONE. 2020; 15: true.

EVOLENT CLINICAL GUIDELINE 057-4 FOR LOWER EXTREMITY MRI

Guideline or Policy Number: Evolent_CG_057-4	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
MRI	3
SPECIAL NOTE	3
INDICATIONS FOR LOWER EXTREMITY MRI (FOOT, ANKLE, KNEE, LEG, OR HIP)	3
<i>Pre-condition</i>	3
JOINT OR MUSCLE PAIN	4
JOINT SPECIFIC PROVOCATIVE EXAM TESTS AND SUSPECTED INJURIES	4
<i>Ankle</i>	4
<i>Knee</i>	5
<i>Hip</i>	6
TENDON RUPTURE	6
TRAUMA	6
<i>Bone Fracture</i>	6
OSTEOCHONDRAL LESIONS	7
JOINT PROSTHESIS/REPLACEMENT	7
EXTREMITY MASS	7
KNOWN PRIMARY CANCER OF THE EXTREMITY	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
OSTEONECROSIS	8
LOOSE BODIES OR SYNOVIAL CHONDROMATOSIS	8
INFECTION OF BONE, JOINT, OR SOFT TISSUE ABSCESS	9
PRE-OPERATIVE/PROCEDURAL EVALUATION	9
EVALUATION OF TUMOR	9
POST-OPERATIVE/PROCEDURAL EVALUATION	9
EVALUATION OF KNOWN OR SUSPECTED AUTOIMMUNE DISEASE	10
KNOWN OR SUSPECTED INFLAMMATORY MYOPATHIES	10
PERIPHERAL NERVE ENTRAPMENT	10
FOREIGN BODY	10
PAINFUL ACQUIRED OR CONGENITAL FLATFOOT DEFORMITY	11
<i>Adult</i>	11

PEDIATRICS (UP TO AGE 18)	11
CODING AND STANDARDS	12
CODING	12
<i>CPT Codes</i>	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
*CONSERVATIVE THERAPY	12
**HOME EXERCISE PROGRAM (HEP).....	12
CONTRAINDICATION AND PREFERRED STUDIES.....	13
POLICY HISTORY	13
<i>Summary</i>	13
LEGAL AND COMPLIANCE	13
GUIDELINE APPROVAL.....	13
<i>Committee</i>	13
DISCLAIMER.....	13
REFERENCES	15

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRI

Magnetic resonance imaging shows the soft tissues and bones. With its multiplanar capabilities, high contrast, and high spatial resolution, it is an accurate diagnostic tool for conditions affecting the joint and adjacent structures.

MRI can positively influence clinicians' diagnoses and management plans for patients with conditions such as primary bone cancer, fractures, abnormalities in ligaments/tendons/cartilage, septic arthritis, and infection/inflammation.

Special Note

- Plain radiographs must precede MRI evaluation unless otherwise indicated
- Some indications are for MRI, CT, or MR or CT Arthrogram (more than one should not be approved at the same time)
- If an MR Arthrogram fits approvable criteria below, approve as MRI

INDICATIONS FOR LOWER EXTREMITY MRI (FOOT, ANKLE, KNEE, LEG, OR HIP)

Pre-condition

Plain radiographs must precede MRI evaluation unless otherwise indicated.

Joint or Muscle Pain (1,2,3)

Negative Findings on Orthopedic Exam and after X-Ray Completed

NOTE: Does not apply to young children (up to age 12)

- Persistent joint or musculotendinous pain unresponsive to **conservative treatment***, within the last 6 months which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician supervised **exercise****) of at least four (4) weeks
- With progression or worsening of symptoms during the course of conservative treatment

Joint Specific Provocative Exam Tests and Suspected Injuries (4)

Approvable Orthopedic Test

With a positive orthopedic sign, an initial x-ray is always preferred; however, it is not required to approve advanced imaging **UNLESS** otherwise specified in **bold** below. Any test that suggests joint instability requires further imaging (the below list is not all inclusive)

Ankle (5,6)

- Syndesmotic injury (high ankle injury) with tenderness to palpation over the syndesmosis (AITFL – anterior inferior tibiofibular ligament) and any of the following:^(7,8)
 - Positive stress X-rays
 - Squeeze test
 - Cotton test
 - Dorsiflexion external rotation test
- Unstable lateral injury to ATFL (anterior talofibular ligament) with suspicion of a possible associated fracture around the ankle or a possible osteochondral injury of the talus and any **ONE** of the following:⁽⁹⁾
 - Positive stress x-rays
 - Positive anterior drawer test with non-diagnostic or inconclusive X-rays
 - Positive posterior drawer test with non-diagnostic or inconclusive X-rays
- Achilles tendon tear⁽¹⁰⁾
 - Thompson test or palpable partial or complete Achilles defect on physical examination

Knee (11,12)

- Anterior cruciate ligament (ACL) Injury⁽¹³⁾
 - Positive testing:
 - Anterior drawer
 - Lachman's
 - Pivot shift test
- Suspected ACL Rupture - acute knee injury with physical exam limited by pain and swelling **AFTER** initial x-ray completed with any of the following ⁽¹⁴⁾
 - Based on mechanism of injury, i.e., twisting, blunt force
 - Normal x-ray:

OR

- Anyone of the following:
 - Extreme pain
 - Instability to stand
 - Audible pop at time of injury
 - Very swollen joint with inability to perform the physical exam

OR

- Abnormal x-ray:
 - Large knee effusion on x-ray
- Acute mechanical locking of the knee not due to guarding⁽¹⁵⁾
- Meniscal injury/tear (A positive test is denoted by pain or audible/palpable clunk)⁽¹⁶⁾
 - McMurray's Compression
 - Apley's
 - Thessaly test
- Patellar dislocation (acute or recurrent)⁽¹⁷⁾
 - Positive patellofemoral apprehension test
 - Radiographic findings compatible with a history of patellar dislocation (i.e., lipohearthrosis or osteochondral fracture)
- Posterior cruciate ligament (PCL) injury
 - Posterior drawer
 - Posterior tibial sag (Godfrey or step-off test)
- Medial collateral ligament tear
 - Positive valgus stress testing/laxity

- Lateral Collateral ligament tear
 - Positive Varus stress testing/laxity

Hip

- Femoroacetabular impingement (FAI) / Labral tear^(18,19,20)
 - Anterior Impingement sign (aka FADIR test) (Hip or groin pain with flexion, adduction, and internal rotation)
 - Posterior Impingement sign (Pain with hip extension and external rotation on exam)
 - Persistent hip mechanical symptoms (after initial radiographs completed) including clicking, locking, catching, giving way or hip instability with a clinical suspicion of labral tear and/or radiographic findings suggestive of FAI (i.e., cross over sign, pistol grip deformity, alpha angle over 50 degrees) and suspected labral tear
 - Determine candidacy for hip preservation surgery for known FAI

NOTE: For evaluation of both hips when the patient meets hip MRI guidelines (x-ray + persistent pain unresponsive to conservative treatment) for both the right and left hip, Evolent Clinical Guideline 037 for Pelvis MRI is the preferred study.

- Labral tear is suspected and fulfills above criteria, then bilateral hip MRIs are the preferred studies (not Pelvis MRI)
- Bilateral hip arthrograms are requested and otherwise meet guidelines, bilateral hip MRIs are the preferred studies (not Pelvis MRI)

Tendon Rupture^(21,22)

After X-Ray and not Listed Above

High clinical suspicion of specific tendon rupture based on mechanism of injury and physical findings (i.e., palpable defect in quadriceps or patellar tendon rupture)

Trauma

Bone Fracture

- Hip and Femur⁽²³⁾
 - Suspected occult, stress or insufficiency fracture with a negative or non-diagnostic initial x-ray
 - Approve an immediate MRI (no follow up radiographs required)- MRI preferred test

- Suspicion of a hip fracture in a pregnant patient does not require an initial x-ray
- Non-hip extremities: Suspected occult, stress, or insufficiency fracture⁽²⁴⁾
 - If x-rays, taken 10-14 days after the injury or clinical assessment, are negative or non-diagnostic
 - If at high risk for a complete fracture with conservative therapy (e.g., navicular bone), then immediate MRI is warranted
- Pathologic or concern for impending fracture on x-ray or CT⁽²⁴⁾ – approve immediate MRI
- Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery
- Nonunion or delayed union as demonstrated by no healing between two sets of x-rays. If a fracture has not healed by 4-6 months, there is delayed union. Incomplete healing by 6-8 months is nonunion, CT is the preferred study⁽²⁵⁾

Osteochondral Lesions ^(12,26,27)

Defects, Fractures, Osteochondritis Dissecans

Clinical suspicion based on mechanism of injury and physical findings

NOTE: X-ray completed

Joint Prosthesis/Replacement ⁽²⁸⁾

Suspected joint prosthesis loosening, or dysfunction, (i.e., pseudotumor formation) after initial x-rays

- Suspected Metallosis with painful metal on metal hip replacement⁽²⁹⁾ after initial x-rays

Extremity Mass ⁽³⁰⁾

- Mass or lesion after non-diagnostic x-ray or ultrasound. CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI
 - Baker's cyst should be initially evaluated with ultrasound
 - Superficial mass, then ultrasound is the initial study
 - Deep mass, then x-ray is the initial study
- Vascular malformations⁽³¹⁾
 - After initial evaluation with ultrasound and results will change management

- Inconclusive ultrasound
- Preoperative planning
 - MRA is also approvable
- Follow up after treatment/embolization

Known Primary Cancer of the Extremity (32,33,34,35)

- Initial staging primary extremity tumor
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Osteonecrosis (36,37)

- To further characterize a prior abnormal x-ray or CT suggesting osteonecrosis
- Normal or indeterminate X-rays, but symptomatic and high risk (such as glucocorticosteroid use, renal transplant, glycogen storage disease, alcohol abuse, sickle cell anemia)
- Known osteonecrosis to evaluate a contralateral joint after initial x-rays

e.g., Avascular Necrosis (AVN), Legg-Calve-Perthes Disease

Loose Bodies or Synovial Chondromatosis (38)

(After X-Ray or Ultrasound Completed)

In the setting of joint pain or mechanical symptoms

Infection of Bone, Joint, or Soft Tissue Abscess ⁽³⁹⁾

- Abnormal x-ray or ultrasound
- Negative x-ray or ultrasound but with a clinical suspicion of infection based on either of the following:
 - Signs and symptoms of joint or bone infection such as:
 - Pain and swelling
 - Decreased range of motion
 - Fevers
 - Laboratory findings of infection include any of the following:
 - Elevated ESR or CRP
 - Elevated white blood cell count
 - Positive joint aspiration
- Ulcer (diabetic, pressure, ischemic, traumatic) with signs of infection (redness, warmth, swelling, pain, discharge which may range from white to serosanguineous) that is not improving despite treatment and bone, or deep infection is suspected⁽⁴⁰⁾
 - Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell
- Neuropathic foot with friable or discolored granulation tissue, foul odor, non-purulent discharge, and delayed wound healing⁽⁴⁰⁾

Pre-Operative/Procedural Evaluation

Pre-operative evaluation for a planned surgery or procedure

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging.

Post-Operative/Procedural Evaluation

- When imaging, physical examination, or laboratory findings indicate joint infection, delayed or non-healing or other surgical/procedural complications.
- Trendelenburg sign⁽⁴¹⁾ or other indication of muscle or nerve damage after recent hip surgery

Evaluation of Known or Suspected Autoimmune Disease (42,43)

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging
- Initial imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR)
- To determine change in treatment or when diagnosis is uncertain prior to start of treatment
- Follow-up to determine treatment efficacy of the following:
 - Early rheumatoid arthritis
 - Advanced rheumatoid arthritis if x-ray and ultrasound are equivocal or noncontributory

e.g., Rheumatoid Arthritis

Known or Suspected Inflammatory Myopathies (44)

- For diagnosis
- For biopsy planning

NOTE: Includes polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis

Peripheral Nerve Entrapment (45,46)

- Abnormal electromyogram or nerve conduction study
- Abnormal x-ray or ultrasound
- Clinical suspicion and failed 4 weeks conservative treatment including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat
 - Splinting or orthotics
 - Medication

e.g., Tarsal tunnel, Morton's neuroma

Foreign Body (47)

Indeterminate x-ray and ultrasound

Painful Acquired or Congenital Flatfoot Deformity ^(48,49)

Adult

- After X-ray completed
- After failure of active conservative therapy
 - Including at least two of the following (active treatment with physical therapy is not required):
 - Activity modification
 - Rest, ice, or heat
 - Splinting or orthotics
 - Medication

Pediatrics (Up to Age 18)

- Painful flatfoot (pes planus) deformity with suspected tarsal coalition, not responsive to non-active conservative care (such as orthotics, rest etc.) ⁽⁵⁰⁾
- Slipped Capital Femoral Epiphysis with negative frog leg and AP x-rays of the hips but clinically suspected ^(51,52)
 - Drehmann sign
 - Limited internal rotation of the hip
 - Consider imaging the asymptomatic contralateral hip with a normal x-ray to detect early SCFE if prophylactic surgery is planned
- Chronic Recurrent Multifocal Osteomyelitis after initial work-up (labs (i.e. CRP/ESR and x-ray) ^(53,54)
 - Whole body bone marrow MRI is more appropriate when multiple joints requested see **Evolent_CG_059 for Bone Marrow MRI**)
- Acute limp in a child 5 or less years old ⁽⁵⁵⁾
 - Concern for infection not localized to the hip (initial imaging not required)
 - Concern for infection localized to the hip after initial evaluation with ultrasound
- Osteoid Osteoma – MRI not usually done because x-ray and CT more accurate for diagnosis ⁽⁵⁶⁾

CODING AND STANDARDS

Coding

CPT Codes

73718, 73719, 73720, 73721, 73722, 73723, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

*Conservative Therapy

Musculoskeletal should include a multimodality approach consisting of a combination of active and inactive components.

Inactive components such as rest, ice, heat, modified activities, medical devices, (including crutches, immobilizer, metal braces, orthotics, rigid stabilizer, or splints, etc. and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized.

Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or chiropractic care.

**Home Exercise Program (HEP)

The following two elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan **AND**
- Follow-up with member with information provided regarding completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises.

NOTE: Patient inconvenience or noncompliance without explanation does not constitute "inability to complete" HEP

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Contraindications and preferred studies section added to the background • Updated background and references
April 2023	<ul style="list-style-type: none"> • Updated orthopedic signs • Clarified hip versus pelvis imaging • Added: <ul style="list-style-type: none"> ○ Evaluation of indeterminate findings on imaging reports ○ Metallosis ○ Statement regarding clinical indications not addressed in the guideline • Modified: <ul style="list-style-type: none"> ○ References ○ Background section ○ CRMO • Removed Additional Resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent



uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Katz J, Brophy R, Chaisson C, de Chaves L, Cole B et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *N Engl J Med*. May 2, 2013; 368: 1675-84. 10.1056/NEJMoa1301408.
2. Mordecai S, Al-Hadithy N, Ware H, Gupte C. Treatment of meniscal tears: An evidence based approach. *World J Orthop*. Jul 18, 2014; 5: 233-41. 10.5312/wjo.v5.i3.233.
3. Tafur M, Bencardino J T, Roberts C, Appel M, Bell A M et al. ACR Appropriateness Criteria® Chronic Foot Pain. *Journal of the American College of Radiology*. 2020; 17: S391 - S402. 10.1016/j.jacr.2020.09.015.
4. Fox M G, Chang E Y, Amini B, Bernard S A, Gorbachova T et al. ACR Appropriateness Criteria® Chronic Knee Pain. *Journal of the American College of Radiology*. 2018; 15: S302 - S312. 10.1016/j.jacr.2018.09.016.
5. Chen E, Borg-Stein J, McInnis K. Ankle Sprains: Evaluation, Rehabilitation, and Prevention. *Curr Sports Med Rep*. Jun 2019; 18: 217-223. 10.1249/jsr.0000000000000603.
6. Jungmann P, Lange T, Wenning M, Baumann F, Bamberg F. Ankle Sprains in Athletes: Current Epidemiological, Clinical and Imaging Trends. *Open access journal of sports medicine*. 2023; 14: 29-46. 10.2147/OAJSM.S397634.
7. Netterström-Wedin F, Matthews M, Bleakley C. Diagnostic Accuracy of Clinical Tests Assessing Ligamentous Injury of the Talocrural and Subtalar Joints: A Systematic Review with Meta-Analysis. *Sports health*. 2022; 14: 336-347.
8. de-Las-Heras Romero J, Alvarez A, Sanchez J, Garcia A, Porcel P et al. Management of syndesmotic injuries of the ankle. *EFORT open reviews*. 2017; 2: 403-409. 10.1302/2058-5241.2.160084.
9. Chen R, Wang Q, Li M, Su X, Wang D et al. Progress in diagnosis and treatment of acute injury to the anterior talofibular. *World journal of clinical cases*. 2023; 11: 3395-3407. 10.12998/wjcc.v11.i15.3395.
10. Periasamy M, Venkatramani H, Shanmuganathan R. Management of Chronic Achilles Tendon Injuries-Review of Current Protocols and. *Indian journal of plastic surgery : official publication of the Association of*. 2019; 52: 109-116. 0.1055/s-0039-1687923.
11. Chien A, Weaver J, Kinne E, Omar I. Magnetic resonance imaging of the knee. *Polish journal of radiology*. 2020; 85: e509-e531. 10.5114/pjr.2020.99415.
12. Taljanovic M S, Chang E Y, Ha A S, Bartolotta R J, Bucknor M et al. ACR Appropriateness Criteria® Acute Trauma to the Knee. *Journal of the American College of Radiology*. 2020; 17: S12 - S25. 10.1016/j.jacr.2020.01.041.
13. Kulwin R L, Schmidt G J, Snyder D A, Klitzman R G. Clinical Examination in the Diagnosis of Anterior Cruciate Ligament Injury: A Blinded, Cross-sectional Evaluation. *Journal of the American Academy of Orthopaedic Surgeons*. 2023; 7: 10.5435/JAAOSGlobal-D-22-00123.
14. Li X, Hou Q, Zhan X, Chang L, Ma X. The accuracy of MRI in diagnosing and classifying acute traumatic multiple ligament knee injuries. *BMC Musculoskeletal Disorders*. 2022; 23: 10.1186/s12891-021-04976-1.
15. Hussin P, Mawardi M, Nizlan N. The Chalky Culprit of acute locked knee. *G Chir. Sep-Oct 2014*; 35: 239-40.

16. Smoak J B, Matthews J R, Vinod A V, Kluczynski M A, Bisson L J. An Up-to-Date Review of the Meniscus Literature: A Systematic Summary of Systematic Reviews and Meta-analyses. *Orthop J Sports Med.* 2020; 8: 10.1177/2325967120950306.
17. Hayat Z, El Bitar Y, Case J. Patella Dislocation. [Updated 2023 Jul 4]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK538288/>.
18. Groh M, Herrera J. A comprehensive review of hip labral tears. *Curr Rev Musculoskelet Med.* Jun 2009; 2: 105-17. 10.1007/s12178-009-9052-9.
19. Hananouchi T, Yasui Y, Yamamoto K, Toritsuka Y, Ohzono K. Anterior impingement test for labral lesions has high positive predictive value. *Clin Orthop Relat Res.* Dec 2012; 470: 3524-9. 10.1007/s11999-012-2450-0.
20. O'Rourke R, El Bitar Y. Femoroacetabular Impingement. [Updated 2023 Jun 26]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK547699/>.
21. Hsu H, Siwiec R. Patellar Tendon Rupture. [Updated 2023 Feb 13]. StatPearls Publishing. 2023; Accessed February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK513275/>.
22. Shamrock A, Dreyer M, Varacallo M. Achilles Tendon Rupture. [Updated 2023 Aug 17]. StatPearls Publishing. 2023; Accessed on February 15, 2024: <https://www.ncbi.nlm.nih.gov/books/NBK430844/>.
23. Ross A B, Lee K S, Chang E Y, Amini B, Bussell J K et al. ACR Appropriateness Criteria® Acute Hip Pain-Suspected Fracture. *Journal of the American College of Radiology.* 2019; 16: S18 - S25. 10.1016/j.jacr.2019.02.028.
24. Bencardino J, Stone T, Roberts C, Appel M, Baccei S et al. ACR Appropriateness Criteria(®) Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. *J Am Coll Radiol.* May 2017; 14: S293-s306. 10.1016/j.jacr.2017.02.035.
25. Thomas J, Kehoe J. Bone Nonunion. [Updated 2023 Mar 6]. StatPearls Publishing. 2024; <https://www.ncbi.nlm.nih.gov/books/NBK554385/>.
26. Mintz D, Roberts C, Bencardino J, Baccei S, Caird M et al. ACR Appropriateness Criteria(®) Chronic Hip Pain. *J Am Coll Radiol.* May 2017; 14: S90-s102. 10.1016/j.jacr.2017.01.035.
27. Pedersen M, DaCambra M, Jibri Z, Dhillon S, Jen H. Acute Osteochondral Fractures in the Lower Extremities - Approach to. *The open orthopaedics journal.* 2015; 9: 463-74. 10.2174/1874325001509010463.
28. Ong N, Zailan I, Tandon A. Imaging update in arthroplasty. *Journal of clinical orthopaedics and trauma.* 2021; 23: 101649. 10.1016/j.jcot.2021.101649.
29. Lee A, Paiement G D, Penenberg B L, Rajaei S. Metallosis in Total Hip Arthroplasty. *JBJS reviews.* 2023; 11: 10.2106/JBJS.RVW.23.00105.
30. Kransdorf M, Murphey M, Wessell D, Cassidy R, Czuczman G et al. ACR Appropriateness Criteria(®) Soft-Tissue Masses. *J Am Coll Radiol.* May 2018; 15: S189-s197. 10.1016/j.jacr.2018.03.012.
31. Obara P, McCool J, Kalva S P, Majdalany B S, Collins J D et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *Journal of the American College of Radiology.* 2019; 16: S340 - S347. 10.1016/j.jacr.2019.05.013.
32. Bestic J M, Wessell D E, Beaman F D, Cassidy R C, Czuczman G J et al. ACR Appropriateness Criteria® Primary Bone Tumors. *Journal of the American College of Radiology.* 2020; 17: S226 - S238. 10.1016/j.jacr.2020.01.038.

33. Murphey M D, Kransdorf M J. Staging and Classification of Primary Musculoskeletal Bone and Soft-Tissue Tumors According to the 2020 WHO Update, From the AJR Special Series on Cancer Staging. *American Journal of Roentgenology*. 2021; 217: 1038 - 1052. 10.2214/AJR.21.25658.
34. National Comprehensive Cancer Network. Bone Cancer (Version 1.2024). Accessed February 22, 2024. 2023; https://www.nccn.org/professionals/physician_gls/pdf/bone.pdf.
35. Stanborough R, Demertzis J L, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Malignant or Aggressive Primary Musculoskeletal Tumor-Staging and Surveillance: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S374 - S389. 10.1016/j.jacr.2022.09.015.
36. Ha A S, Chang E Y, Bartolotta R J, Bucknor M D, Chen K C et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
37. Balch Samora J, Adler B, Druhan S, Brown S, Erickson J et al. MRI in idiopathic, stable, slipped capital femoral epiphysis: evaluation of contralateral pre-slip. *J Child Orthop*. Oct 1, 2018; 12: 454-460. 10.1302/1863-2548.12.170204.
38. Habusta S, Mabrouk A, Tuck J. Synovial Chondromatosis. [Updated 2023 Apr 22]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470463/>.
39. Pierce J L, Perry M T, Wessell D E, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot): 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S473 - S487. 10.1016/j.jacr.2022.09.013.
40. Wu Y, Wang C, Cheng N, Lin H, Huang H et al. 2024 TSOC/TSPS Joint Consensus: Strategies for Advanced Vascular Wound Management. *Acta Cardiologica Sinica*. 2024; 40: 1-44. 10.6515/ACS.202401_40(1).20231220A.
41. Gogu S, Gandbhir V N. Trendelenburg Sign. StatPearls. 2022; <https://www.ncbi.nlm.nih.gov/books/NBK555987/>.
42. Colebatch A, Edwards C, Østergaard M, van der Heijde D, Balint P et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis*. Jun 2013; 72: 804-14. 10.1136/annrheumdis-2012-203158.
43. Radu A, Bungau S. Management of Rheumatoid Arthritis: An Overview. *Cells*. 2021; 10: 10.3390/cells10112857.
44. Nagy H, Veerapaneni K. Myopathy. [Updated 2023 Aug 14]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK562290/>.
45. Fortier L, Markel M, Thomas B, Sherman W, Thomas B. An Update on Peroneal Nerve Entrapment and Neuropathy. *Orthopedic reviews*. 2021; 13: 24937. 0.52965/001c.24937.
46. Griffith J, Guggenberger R. Peripheral Nerve Imaging. In: Hodler J, Kubik-Huch RA, von Schulthess GK, editors. *Musculoskeletal Diseases 2021-2024: Diagnostic Imaging [Internet]*. Cham (CH): Springer; 2021. Chapter 18. 2021; doi: 10.1007/978-3-030-71281-5_18.
47. Campbell E, Wilbert C. Foreign Body Imaging. [Updated 2023 Jul 30]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK470294/>.
48. Abousayed M, Alley M, Shakked R, Rosenbaum A. Adult-Acquired Flatfoot Deformity: Etiology, Diagnosis, and Management. *JBJS Rev*. Aug 2017; 5: e7. 10.2106/jbjs.Rvw.16.00116.
49. Arain A, Harrington M, Rosenbaum A. Adult-Acquired Flatfoot. [Updated 2023 Aug 8]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK542178/>.

50. Raj M, Tafti D, Kiel J. Pes Planus. [Updated 2023 May 23]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK430802/>.
51. Aprato A, Conti A, Bertolo F, Massè A. Slipped capital femoral epiphysis: current management strategies. Orthopedic research and reviews. 2019; 11: 47-54. 10.2147/ORR.S166735. eCollection 2019.
52. Johns K, Mabrouk A, Tavarez M. Slipped Capital Femoral Epiphysis. [Updated 2023 Jul 25]. StatPearls Publishing. 2023; <https://www.ncbi.nlm.nih.gov/books/NBK538302/>.
53. Roderick M, Shah R, Rogers V, Finn A, Ramanan A. Chronic recurrent multifocal osteomyelitis (CRMO) - advancing the diagnosis. Pediatr Rheumatol Online J. Aug 30, 2016; 14: 47. 10.1186/s12969-016-0109-1.
54. Zhao D, McCann L, Hahn G, Hedrich C. Chronic nonbacterial osteomyelitis (CNO) and chronic recurrent multifocal osteomyelitis (CRMO). J Transl Autoimmun. 2021; 4: 100095. 10.1016/j.jtauto.2021.100095.
55. Safdar N M, Rigsby C K, Iyer R S, Alazraki A L, Anupindi S A et al. ACR Appropriateness Criteria(®) Acutely Limping Child Up to Age 5. J Am Coll Radiol. 2018; 15: S252-s262. 10.1016/j.jacr.2018.09.030.
56. Iyer R, Chapman T, Chew F. Pediatric bone imaging: diagnostic imaging of osteoid osteoma. AJR Am J Roentgenol. May 2012; 198: 1039-52. 10.2214/ajr.10.7313.

EVOLENT CLINICAL GUIDELINE 058-1 FOR LOWER EXTREMITY MRA/MRV

Guideline or Policy Number: Evolent_CG_058-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
MRA/MRV	3
SPECIAL NOTE	3
Imaging Request	3
INDICATIONS	3
POPLITEAL ARTERY ENTRAPMENT SYNDROME	3
DEEP VENOUS THROMBOSIS	3
CLINICAL SUSPICION OF VASCULAR DISEASE	4
HEMODIALYSIS GRAFT DYSFUNCTION	4
VASCULAR MALFORMATION	4
TRAUMATIC INJURIES	4
PERIPHERAL VASCULAR DISEASE	4
EVALUATION OF TUMOR	5
PRE-OPERATIVE/PROCEDURE EVALUATION	5
POST-OPERATIVE/PROCEDURE EVALUATION	5
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	5
GENETICS AND RARE DISEASES	6
COMBINATION STUDIES	6
Abdomen MRA/Chest MRA/ and/or Lower Extremity MRA	6
CODING AND STANDARDS	6
CODING	6
CPT Codes	6
APPLICABLE LINES OF BUSINESS	6
BACKGROUND	7
TESTING	7
Noninvasive Testing	7
Noninvasive Hemodynamic Testing	7
CONTRAINDICATIONS AND PREFERRED STUDIES	7

POLICY HISTORY	8
<i>Summary</i>	8
LEGAL AND COMPLIANCE	8
GUIDELINE APPROVAL.....	8
<i>Committee</i>	8
DISCLAIMER.....	8
REFERENCES.....	9

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRA/MRV

Magnetic resonance angiography (MRA) and (MRV) generates images of the blood vessels that can be evaluated for evidence of stenosis, occlusion, or aneurysms without use of ionizing radiation. It is used to evaluate the blood vessels of the lower extremities.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

Special Note

Imaging Request

When a separate MRA and MRI exam is requested, documentation requires a medical reason that clearly indicates why additional MRI imaging of the lower extremity is needed.

INDICATIONS

Popliteal Artery Entrapment Syndrome

After abnormal arterial ultrasound and when imaging will change management⁽¹⁾

Deep Venous Thrombosis

Clinical suspicion of lower extremity DVT (when ultrasound is abnormal or inconclusive and a positive study would change management)^(2,3,4)

Clinical Suspicion of Vascular Disease

Abnormal or indeterminate ultrasound or other imaging:

- Tumor invasion^(5,6)
- Trauma⁽⁷⁾
- Vasculitis⁽⁸⁾
- Aneurysm⁽⁸⁾
- Stenosis/occlusions⁽⁹⁾

Hemodialysis Graft Dysfunction

After Doppler ultrasound, if findings were not adequate⁽¹⁰⁾ for treatment decisions⁽¹¹⁾

Vascular Malformation ^(11,12)

- After initial evaluation with ultrasound if:
 - Results will change management
 - Results are inconclusive ultrasound
 - If a known or suspected high flow lesion
- For preoperative planning
 - MRI is also approvable for initial evaluation

Traumatic Injuries

Clinical findings suggestive of arterial injury (CTA preferred if emergent)

Peripheral Vascular Disease ^(9,13,14,15)

For evaluation of known or suspected lower extremity arterial disease when **CTA is contraindicated** or cannot be performed:

- For known or suspected peripheral arterial disease (such as claudication, or clinical concern for vascular causes of ulcers) when non-invasive studies (pulse volume recording, ankle-brachial index, toe brachial index, segmental pressures, or doppler ultrasound) are abnormal or indeterminate **OR**
- For critical limb ischemia with **ANY** of the below clinical signs of peripheral artery disease (prior ultrasound is not needed; if done and negative, MRA should still be approved)^(16,17)

- Ischemic rest pain
- Tissue Loss
- Gangrene
- After stenting or surgery with signs of recurrent symptoms, abnormal ankle/brachial index, abnormal or indeterminate arterial Doppler, or abnormal or indeterminate pulse volume recording

NOTE: As there is no CPT for MRA Aortogram with runoff, when the criteria above are met, two separate authorizations are required: Abdomen MRA (CPT 74185) and one Lower Extremity MRA (CPT 73725). This will provide imaging of the abdomen, pelvis and both legs. A separate Pelvis MRA authorization is **NOT** required. Only one Lower Extremity MRA is required (not two).

Evaluation of Tumor

When needed for clarification of vascular invasion from tumor after prior imaging (may be approved in combination with CT or MRI of tumor)

Pre-operative/Procedure Evaluation

Pre-operative evaluation for a planned surgery or procedure⁽¹³⁾

Post-operative/Procedure Evaluation

Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.^(18,19)

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

Genetics and Rare Diseases

- Known vascular EDS (vEDS) with acute extremity pain and concern for dissection/rupture^(20,21)
- Vascular EDS (vEDS) surveillance imaging: with inconclusive ultrasound or ultrasound suggestive of vascular pathology^(20,21)
- Known Williams Syndrome: when there is concern for vascular disease based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)⁽²²⁾
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Abdomen MRA/Chest MRA/ and/or Lower Extremity MRA

- To evaluate for an embolic source of lower extremity vascular disease. Echocardiography is also often needed, since the heart is the most commonly reported source of lower extremity emboli, accounting for 55 to 87 percent of events

CODING AND STANDARDS

Coding

CPT Codes

73725

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Testing

Noninvasive Testing

“Noninvasive testing (NIVT), both before and after intervention, has been used as a first-line investigatory tool in the diagnosis and categorization of PAD. It is widely available, provides a large amount of information, and is a low cost without the use of ionizing radiation.”⁽¹⁹⁾ NIVT can consist of one or more of the following components:⁽¹⁹⁾

- ABI
- Segmental pressure measurements (SPMs)
- Pulse-volume recordings (PVRs)
- Photoplethysmography (PPG)
- Transcutaneous oxygen pressure measurement (TcPO₂)

Noninvasive Hemodynamic Testing

The ankle- brachial index (ABI) is the ratio of systolic blood pressure at the ankle divided by the systolic pressure of the upper arm. The normal range lies between 0.9-1.4. An ABI of <0.9 is a reliable indicator of the presence of lower extremity PAD, indicating athero-occlusive arterial disease. The upper limit of normal ABI should not exceed 1.40. An ABI >1.40 is suggestive of arterial stiffening (i.e., medial arterial calcification) and is also associated with a higher risk of cardiovascular events and is seen in elderly patients, typically in those with diabetes or chronic kidney disease (CKD).

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Content clarified without change to clinical indications • Added Genetics Syndrome and Rare Diseases section • Added Contraindications and Preferred Studies section in background • Combination Studies updated • Updated References
April 2023	<ul style="list-style-type: none"> • Updated references • Modified background section • Added vascular malformations • Added graft evaluation • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added indeterminate prior imaging findings

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bradshaw S, Habibollahi P, Soni J, Kolber M, Pillai A. Popliteal artery entrapment syndrome. Cardiovascular diagnosis and therapy. 2021; 11: 1159-1167. 10.21037/cdt-20-186.
2. Hanley M, Steigner M, Ahmed O, Azene E, Bennett S et al. ACR Appropriateness Criteria® Suspected Lower Extremity Deep Vein Thrombosis. Journal of the American College of Radiology. 2018; 15: S413 - S417. 10.1016/j.jacr.2018.09.028.
3. Karande G Y, Hedgire S, Sanchez Y, Baliyan V, Mishra V et al. Advanced imaging in acute and chronic deep vein thrombosis. Cardiovasc Diagn Ther. 2016; 6: 493-507. 10.21037/cdt.2016.12.06.
4. Katz D, Fruauff K, Kranz A, Hon M. Imaging of deep venous thrombosis: A multimodality overview. Applied Radiology. 2014; 6-16.
5. Garner H, Wessell D, Lenchik L, Ahlawat S, Baker J et al. ACR Appropriateness Criteria® Soft Tissue Masses: 2022 Update. Journal of the American College of Radiology : JACR. 2023; 20: S234-S245. 10.1016/j.jacr.2023.02.009.
6. Jin T, Wu G, Li X, Feng X. Evaluation of vascular invasion in patients with musculoskeletal tumors of lower extremities: use of time-resolved 3D MR angiography at 3-T. Acta Radiol. 2018; 59: 586-592. 10.1177/0284185117729185.
7. Wani M L, Ahangar A G, Ganie F A, Wani S N, Wani N U. Vascular injuries: trends in management. Trauma Mon. 2012; 17: 266-9. 10.5812/traumamon.6238.
8. Seitz L, Seitz P, Pop R, Lötscher F. Spectrum of Large and Medium Vessel Vasculitis in Adults: Primary Vasculitides, Arthritides, Connective Tissue, and Fibroinflammatory Diseases. Current rheumatology reports. 2022; 24: 352-370. 10.1007/s11926-022-01086-2.
9. Conte M, Pomposelli F, Clair D, Geraghty P, McKinsey J et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: management of asymptomatic disease and claudication. Journal of vascular surgery. 2015; 61: 2S-41S. 10.1016/j.jvs.2014.12.009.
10. Richarz S, Isaak A, Aschwanden M, Partovi S, Staub D. Pre-procedure imaging planning for dialysis access in patients with end-stage renal disease using ultrasound and upper extremity computed tomography angiography: a narrative review. Cardiovascular Diagnosis and Therapy. 2023; 13: 122-132. 10.21037/cdt-21-797.
11. Madani H, Farrant J, Chhaya N, Anwar I, Marmery H et al. Peripheral limb vascular malformations: an update of appropriate imaging and treatment options of a challenging condition. Br J Radiol. 2015; 88: 20140406. 10.1259/bjr.20140406.
12. Obara P, McCool J, Kalva S, Majdalany B, Collins J et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. J Am Coll Radiol. 2019; 16: S340-s347. 10.1016/j.jacr.2019.05.013.
13. Azene E, Steigner M, Aghayev A, Ahmad S, Clough R et al. ACR Appropriateness Criteria® Lower Extremity Arterial Claudication-Imaging Assessment for Revascularization: 2022 Update. Journal of the American College of Radiology. 2022; 19: S364 - S373. 10.1016/j.jacr.2022.09.002.
14. Singh-Bhinder N, Kim D H, Holly B P, Johnson P T, Hanley M et al. ACR Appropriateness Criteria® Nonvariceal Upper Gastrointestinal Bleeding. Journal of the American College of Radiology. 2017; 14: S177 - S188. 10.1016/j.jacr.2017.02.038.
15. Werncke T, Ringe K, von Falck C, Kruschewski M, Wacker F. Diagnostic Confidence of Run-Off CT-Angiography as the Primary Diagnostic Imaging Modality in Patients Presenting with Acute or Chronic Peripheral Arterial Disease. PLOS ONE. 2015; 10: true. <https://doi.org/10.1371/journal.pone.0119900>.

16. Browne W, Sung J, Majdalany B, Khaja M, Calligaro K et al. ACR Appropriateness Criteria® Sudden Onset of Cold, Painful Leg: 2023 Update. Journal of the American College of Radiology : JACR. 2023; 20: S565-S573.
17. Shishehbor M, White C, Gray B, Menard M, Lookstein R et al. Critical Limb Ischemia: An Expert Statement. Journal of the American College of Cardiology. 2016; 68: 2002 - 2015. <https://doi.org/10.1016/j.jacc.2016.04.071>.
18. Conte M S, Bradbury A W, Kolh P, White J V, Dick F et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. J Vasc Surg. 2019; 69: 3S-125S.e40. 10.1016/j.jvs.2019.02.016.
19. Cooper K, Majdalany B, Kalva S, Chandra A, Collins J et al. ACR Appropriateness Criteria(®) Lower Extremity Arterial Revascularization-Post-Therapy Imaging. J Am Coll Radiol. 2018; 15: S104-S115. 10.1016/j.jacr.2018.03.011.
20. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. GeneReviews® [Internet]. 2019;
21. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. European journal of human genetics : EJHG. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
22. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. GeneReviews® [Internet]. 2023;



EVOLENT CLINICAL GUIDELINE 030 FOR ABDOMEN CT

Guideline or Policy Number: Evolent_CG_030	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR ABDOMEN CT	3
ORGAN SPECIFIC IMAGING.....	3
Adrenal	3
Liver.....	4
Pancreas.....	5
Renal	5
Spleen	6
EVALUATION OF IRON OVERLOAD	6
EVALUATION OF SUSPECTED INFECTION OR INFLAMMATORY DISEASE	7
Pancreatitis: Suspected and Known	7
Infection.....	7
and Inflammation Limited to the Abdomen.....	7
EVALUATION OF SUSPECTED/KNOWN HERNIA.....	7
OTHER INDICATIONS	8
FOLLOW-UP OF KNOWN CANCER	8
Initial Staging	8
Restaging.....	8
Surveillance	8
PRE-OPERATIVE PLANNING	9
POST-OPERATIVE/PROCEDURAL EVALUATION	9
GENETIC SYNDROMES AND RARE DISEASES.....	9
Surveillance Screening Abdomen CT for the Following KNOWN Genetic Syndromes	9
Surveillance Screening Based on Family History	10
Special Note.....	11
COMBINATION STUDIES	11
Abdomen CT and Abdomen CTA	11
Abdomen CT (or MRI) and Abdomen CTA (or MRA) and PET	11



<i>Abdomen MRA and Abdomen MRI or CT</i>	11
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	11
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	11
CODING AND STANDARDS	12
CODING	12
<i>CPT Codes</i>	12
APPLICABLE LINES OF BUSINESS	12
BACKGROUND	12
ADRENAL AND NEUROENDOCRINE TUMORS	12
<i>Biochemical Evaluation</i>	12
LIVER	13
<i>Screening for Hepatocellular Carcinoma (HCC)</i>	13
KIDNEY	13
<i>PRO-PKD Score</i>	13
CONTRAINDICATIONS AND PREFERRED STUDIES	14
POLICY HISTORY	14
<i>Summary</i>	14
LEGAL AND COMPLIANCE	15
GUIDELINE APPROVAL	15
<i>Committee</i>	15
DISCLAIMER	15
REFERENCES	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Abdomen Computed Tomography (CT) uses radiation to generate images of the organs and structures in the upper abdomen. Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crests.

Special Note

- Abdomen CT alone should **ONLY** be approved when disease process is suspected to be limited to the abdomen. Abdomen/Pelvis CT (CPT Codes: 74176, 74177, 74178) is the correct study when the indication(s) include both the abdomen **AND** pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease, or neoplasm.
- When separate requests for CT abdomen and CT Pelvis are encountered for processes involving both the abdomen and pelvis, they need to be resubmitted as a single Abdomen/Pelvis CT (to avoid unbundling; CPT codes 74176, 74177, 74178). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen **OR** Pelvis) which includes the specific organ, area of known disease/abnormality, or the area of concern.

INDICATIONS FOR ABDOMEN CT

Organ Specific Imaging

Adrenal ⁽¹⁾

- Indeterminate adrenal lesion seen on prior imaging
- For further evaluation of suspected adrenal tumors and/or endocrine disorders when there is clinical and laboratory evidence to suggest an adrenal source; see

Background for specific laboratory testing that is needed based on suspected diagnosis⁽²⁾

- Adrenal mass < 4 cm incidentally discovered with benign characteristics (homogenous, regular borders, HU < 10), one follow-up at 6 months then annually x 2 years (no further imaging if stable)
- If adrenal mass ≥ 4 cm and no diagnosis of cancer, can approve for either pre-operative planning **OR** if surgery is not done, can repeat imaging in 6-12 months then as clinically indicated (if there is known malignancy, biopsy is typically the next step rather than surveillance imaging)
- For follow up of known adrenal mass when a change in tumor is suspected by either imaging, laboratory evaluation and/or symptoms
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Liver

- Indeterminate liver lesion seen on prior imaging⁽³⁾
- For evaluation of rising AFP (requires a ≥7 ng/mL increased in AFP per month) in patients at high risk for HCC (known cirrhosis and/or chronic hepatitis B, see **Background** for additional risk categories)⁽⁴⁾
- For screening in patients at high risk for HCC (see above) every 6 months when prior ultrasound is insufficient to evaluate the liver due to steatosis/fatty liver or nodular liver
 - The finding of steatosis/fatty liver and/or nodular liver alone on an ultrasound report is insufficient for approval; the report must specify that those findings prevent adequate visualization of the liver by ultrasound
- For jaundice or abnormal liver function tests after equivocal or abnormal ultrasound^(5,6)
- For follow-up of suspected hepatocellular adenomas every 6-12 months for two years, then annually (sooner if change was noted on last imaging study) ^(7,8)
- For surveillance of patients with primary sclerosing cholangitis every 6-12 months after the age of 20 when MRI is contraindicated or cannot be performed⁽⁹⁾
- For follow-up of focal nodular hyperplasia (FNH), repeat imaging in 6-12 months to ensure stability. Additional imaging beyond that is needed only if atypical features or diagnosis is still in question⁽⁷⁾
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Pancreas

- Pancreatic cystic lesion found on initial imaging, approve for initial characterization of lesion⁽¹⁰⁾
- Follow-up for pancreatic cyst as below **AND** MRI is contraindicated:^(10,11)
 - Incidental and asymptomatic cysts <1.5 cm, **AND**:
 - Age < 65, image annually x 5 years, then every 2 years if stable
 - Age 65-79, imaging every 2 years x 5, then stop if stable
 - Cysts 1.5-1.9 cm with main pancreatic duct communication (MPD), image annually x 5 years, then every 2 years x 2, stop if stable at year 9.
 - Cysts 2.0-2.5 cm with MPD communication, image every 6 months x 4, then annually x 2, then every 2 years x 3, stop if stable at year 10.
 - Cysts 1.5-2.5 cm with **NO** MPD communication (or cannot be determined), image every 6 mos. x 4, then annually x 2 then every 2 years x 3, stop if stable at year 10.
 - Cyst > 2.5 cm on surveillance (i.e., intervention has not been chosen), image every 6 mos. x 4, then annually x 2 years, then every 2 years x 3. Stop if stable at year 10.
 - Patients > 80 years of age at presentation are imaged less frequently: image every 2 years x 2, stop if stable at year 4 (intervals are the same regardless of size if surveillance chosen)
 - Growth or suspicious change on a surveillance imaging scan may warrant more frequent surveillance
- Localization of a functional pancreatic tumor, see **Background** (endocrine) once diagnosis is confirmed (or highly suspected)⁽¹⁰⁾
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Renal

- Indeterminate renal mass on other imaging⁽¹²⁾
- Follow-up for solid renal masses under 3 cm at 6 and 12 months, then annually⁽¹³⁾
- Active surveillance for follow-up of a Bosniak IIF, III and IV complex cystic renal lesions:
 - Every 6 months for the first year then
 - Annually for 5 years if no progression
 - If progression or change is seen, then follow-up imaging may be indicated prior to the above intervals.

- **NOTE:** Bosniak I and II cysts need no further follow-up. (Bosniak I cysts are simple non-enhancing cysts with thin walls, no septa, calcifications or solid components, Bosniak II cysts may contain thin septa, small or fine calcification, minimal enhancement and/or hyperdense and < 3 cm.)⁽¹⁴⁾
- Surveillance of known angiomyolipoma (AML):
 - Size > 4 cm: Annually
 - Size 3-4 cm: Every 2 years
 - **NOTE:** if < 3 cm monitoring with advanced imaging (CT/MRI) is not needed unless the pt has known Tuberous Sclerosis ^(15,16,17)
 - AML (any size) in an individual **with** known tuberous sclerosis (TSC)⁽¹⁸⁾: Annually
 - Post-embolization imaging for AML:
 - One study within the first 6 months, then
 - At one-year post-embolization,
 - Further imaging beyond one year if stable reverts to the above imaging frequency for monitoring (based on size and/or presence of known TSC)^(19,20)
- Polycystic Kidney Disease⁽²¹⁾
 - To assess total kidney volume (TKV) prior to treatment when MR is contraindicated or cannot be performed
 - To monitor total kidney volume annually if PRO-PKD score is ≥ 4 when MR is contraindicated or cannot be performed
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Spleen

- Incidental findings of the spleen that are indeterminate on other imaging
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Evaluation of Iron Overload ^(22,23)

- Initial evaluation of liver iron in Hemochromatosis diagnosed in lieu of liver biopsy when MRI is contraindicated or cannot be performed
- Annual evaluation for high-risk patients: transfusion-dependent thalassemia major, sickle cell disease, and other congenital anemias when ultrasound is insufficient and when MRI is contraindicated or cannot be performed

Evaluation of Suspected Infection or Inflammatory Disease (24,25)

Pancreatitis: Suspected and Known

- Initial imaging for suspected acute pancreatitis due to epigastric pain with elevated amylase and/or lipase:
 - For mild presentation when symptom improvement is not seen after 72 hours of treatment and either:
 - Ultrasound has been performed and did not show an abnormality such as gallstones, dilated bile duct
 - Ultrasound suggests complications (such as fluid collection)
 - For severe presentation (such as fever, elevated WBC)
 - For a decline in clinical status and/or suspected complication
- History of pancreatitis, including pancreatic pseudocyst, with abdominal pain suspicious for worsening or re-exacerbation
- Known necrotizing pancreatitis requiring follow-up
- In patients > 40 years of age who have pancreatitis with no identifiable cause, CT is indicated to exclude neoplasm

Infection and Inflammation Limited to the Abdomen

- Any known infection that is clinically suspected to have created an abscess limited to the abdomen (If location unclear or unknown, CT Abdomen/Pelvis)
- Any history of fistula limited to the abdomen that requires re-evaluation or is suspected to have recurred
- Abnormal fluid collection limited to the abdomen seen on prior imaging that needs follow-up evaluation

Evaluation of Suspected/Known Hernia ⁽²⁶⁾

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, or incisional hernia (including recurrent hernias) when physical exam and prior imaging (such as ultrasound) is non-diagnostic or equivocal or if requested as a preoperative study and limited to the abdomen
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain, or guarding), physical exam (guarding, rebound) or prior imaging

- Lower esophageal hernias (such as hiatal, paraesophageal) for pre-operative planning (Chest CT can be approved instead of abdomen if specific reason given but **NOT** both Chest and Abdomen); CT is not a part of the typical workup for diagnosis⁽²⁷⁾
- Deep intraabdominal hernia is suspected (post-Roux-en-Y, does not require US first; hernia type needs to be specified)

Other Indications

- Right upper quadrant pain for suspected biliary disease with negative or equivocal ultrasound⁽²⁸⁾
- Evaluation of known or suspected non-aortic vascular disease (such as aneurysm, hematomas) after inconclusive ultrasound **AND** CTA/MRA is contraindicated or cannot be performed
- Prior to solid organ transplantation
- For abnormal incidental abdominal lymph nodes when follow-up is recommended based on prior imaging and pelvic imaging is not needed (initial 3-month follow-up)⁽²⁹⁾

Follow-Up of Known Cancer^(30,31)

Initial Staging

- For initial staging of the majority of cancers, CT Abdomen and Pelvis is the more appropriate study (see CG_068). For Hepatocellular Carcinoma, Esophageal Carcinoma and Malignancies where liver metastases are suspected and pelvis imaging is not needed, CT Abdomen can be considered.

Restaging

- Abdomen CT is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the following malignancies:
 - Esophageal and Esophagogastric Junction Cancers
 - Primary Liver Cancers

Surveillance

- Abdomen CT is indicated during surveillance for the following malignancies at the intervals defined below:

- Esophageal and Esophagogastric Junction Cancers every 3 months for 2 years, then annually for 5 years
- Hepatocellular Carcinoma every 3 months for 2 years, then every 6 months indefinitely⁽⁴⁾
- Renal Cell Carcinoma baseline within 3-6 months, then every 3-6 months for 3 years, then annually for 2 years then as clinically indicated
- When a cancer is not listed above, Abdomen CT is not routinely a part of surveillance for that cancer in an asymptomatic patient. Please see CG_068 Abdomen and Pelvis CT for additional indications. For Abdomen CT **NOT** including the pelvis, there would need to be concern for recurrence in the liver (i.e. liver metastases) to consider Abdomen CT.

Pre-Operative Planning

- For abdominal surgery or procedure
- Pre-procedure for transjugular intrahepatic portosystemic shunt (TIPS)⁽³²⁾

Post-Operative/Procedural Evaluation

- Follow-up of known or suspected post-operative complication involving only the abdomen
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Genetic Syndromes and Rare Diseases

Surveillance Screening Abdomen CT for the Following KNOWN Genetic Syndromes

- BAP1-TPDS (BAP-1 tumor predisposition syndrome) every 2 years starting at age 30⁽³³⁾
- Beckwith-Wiedemann syndrome: when ultrasound is abnormal or AFP is rising⁽³⁴⁾
- BHDS (Birt-Hogg-Dube) every 3 years starting at age 20⁽³³⁾
- CDKN2A variant: Annually starting at age 40 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) when MRI is **contraindicated** or cannot be performed⁽³⁵⁾
- Gaucher Disease: At initial diagnosis and then annually when MRI and ultrasound are contraindicated or cannot be performed⁽³⁶⁾

- HLRCC (hereditary leiomyomatosis and renal cell cancer) annually starting at age 8⁽³³⁾
- HPRCC (hereditary papillary renal carcinoma) annually starting at age 30⁽³³⁾
- Multiple Endocrine Neoplasia type 1 (MEN1): annually^(37, 38)
- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) not available⁽³⁹⁾ (see Unlisted Studies Evolent_CG_063)⁽³³⁾
- PRSS1 (Hereditary Pancreatitis; including PRSS1, SPINK1 and other hereditary pancreatitis genes): Annually starting 20 years after onset of pancreatitis, or at age 40 years, whichever is earlier when MRI is contraindicated or cannot be performed⁽³⁵⁾
- SKT11 variant (including Peutz-Jeghers): Annually starting at age 30 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) when MRI is contraindicated or cannot be performed⁽³⁵⁾
- TSC (tuberous sclerosis complex)⁽³³⁾
 - TSC **without** known AML: every 3 years starting at age 12
 - TSC **with** known AML: annually
- Von Hippel Lindau (VHL) every 2 years starting at age 15^(33,37)
- Other variants **AND** family history of pancreatic cancer as detailed below: Starting at age 50 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) when MRI is contraindicated or cannot be performed for the following:
 - ≥ 1 first- or second-degree relative with history of pancreatic cancer from the same side of the family as the identified variant **AND** known mutation in other pancreatic susceptibility genes (ATM, BRCA1, BRCA2, MLH1 (Lynch), MSH2, MSH6, EPCAM, PALB2, TP53): Annually when MRI is contraindicated or cannot be performed
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Surveillance Screening Based on Family History

- To Screen for Pancreatic Cancer in patients with no identified mutation listed above **AND** the following family history when MRI is contraindicated or cannot be performed:
 - ≥ 2 first-degree relatives with a history of pancreatic cancer from the same side of the family: Annually
 - ≥ 3 first- and/or second-degree relatives with a history of pancreatic cancer from the same side of the family: Annually

Special Note

- For syndromes for which imaging starts in the pediatric age group, MRI is preferred to limit lifetime radiation exposure. When CT is requested instead of MRI, a contraindication or relative contraindication to MRI should be provided such as contraindication to sedation if sedation is required for MRI.

Combination Studies

Abdomen CT and Abdomen CTA

- When needed for clarification of vascular invasion from tumor (including renal vein thrombosis)

Abdomen CT (or MRI) and Abdomen CTA (or MRA) and PET

- Prior to Y90 treatment

Abdomen MRA and Abdomen MRI or CT

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline;

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification **AND** finding is expected to be limited to the abdomen
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

74150, 74160, 74170, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Adrenal and Neuroendocrine Tumors

Biochemical Evaluation

Laboratory evaluation prior to imaging when neuroendocrine and hormonally active tumors are suspected, the required laboratory evaluation prior to advanced imaging is dependent on the tumor type that is suspected. The following list describes suspected syndrome/tumor and typical laboratory evaluation in parenthesis:

GI Carcinoid (24-hour urine or plasma 5-HIAA), Lung/Thymus Carcinoid (24-hour urine or plasma 5-HIAA **AND** one of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), PPoma (serum pancreatic polypeptide), Insulinoma (serum insulin, pro-insulin and C-peptide all drawn during a period of hypoglycemia (i.e. 72 hour fast)), VIPoma (serum VIP), glucagonoma (serum glucagon), gastrinoma (serum gastrin), somatostatinoma (serum somatostatin), pheochromocytoma/paraganglioma (plasma free or 24-hour urine fractionated metanephrines and normetanephrines +/- serum or urine catecholamines), pituitary tumor (serum IGF-1, prolactin, LH/FSH, alpha subunits, TSH and ONE of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), primary hyperaldosteronism (suppressed renin/renin activity in association with elevated plasma aldosterone (>10 ng/dL) and confirmatory testing if positive), adrenocortical carcinoma (testosterone, DHEA-S **AND** complete evaluation for hypercortisolemia or primary aldosteronism).⁽³⁷⁾

If Cushing's (hypercortisolemia) is suspected, typical labs include a plasma ACTH **AND** one or more of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, **OR** 24-hour urinary free cortisol. The results of the suppression test then indicate whether brain imaging is needed (pituitary source) **OR** chest and abdominal imaging is

needed (CXR + Adrenal CT/MRI). ACTH > 20 after suppression > 20 is suggestive of Cushing's Disease and Pituitary MRI is indicated. ACTH after suppression < 5 is suggestive of Cushing's Syndrome and CXR + Adrenal CT/MRI is indicated.⁽⁴⁰⁾ If indeterminate, a CRH or desmopressin test is then done. If there is no ACTH suppression with CRH/desmopressin, then adrenal imaging is indicated.

Liver

Screening for Hepatocellular Carcinoma (HCC)

AASLD (American Association for the Study of Liver Diseases) recommends screening for HCC with ultrasound every 6 months for patients with hepatitis C and B.⁽⁴¹⁾ Advanced imaging is recommended when the AFP is rising, regardless of ultrasound results. The main risk factors for HCC are cirrhosis and Hepatitis B. Additional populations for which there is a benefit to surveillance for HCC include: Asian males Hepatitis B carriers ≥ 40 y, Asian female Hepatitis B carriers ≥ 50 y, Hepatitis B carriers with + family history of HCC and African and/or North American blacks with hepatitis B.^(4,42)

Kidney

PRO-PKD Score^(43,44)

The PRO-PDK score is to assess prognosis in ADPKD, risk scoring system is on the basis of PKD mutation and clinical parameters.

Risk Category	Points
Being Male	1
Hypertension before 35 years of age	2
First Urological event (macroscopic hematuria, flank pain or cyst infection) before 35 years of age	2
PKD2 mutation	0
Non-truncating PKD1 mutation	2
Truncating PKD1 mutation	4
A score of > 6 predicts rapid disease progression with ESRD onset before the age of 60 years with a positive predictive value of 90.0%	
For those with an intermediate score (4-6 points), the prognosis is unclear	

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine
- Abdominal ultrasound may be limited by the body habitus and BMI (Body Mass Index) and when the abdominal wall thickness impairs visualization of the intra-abdominal contents by ultrasound, CT can be considered without prior ultrasound provided the other guideline criteria for that indication are met

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Revised the purpose • Genetics section and Malignancy was reorganized • Organ section was reorganized • Fixed typo in pancreas section for mm to be cm • Renal Bosniak section was adjusted to incorporate background into this section for further clarification • Polycystic Kidney Disease was updated • Known Malignancy section was adjusted to indicate initial staging, restaging, and surveillance to be consistent with new cancer bundles coming out • Background cut • Added in post-embolization imaging • Added in CPT code +0722T • Added in Contraindications and Preferred Studies Statement in Background • Adjusted Combination section
May 2023	<ul style="list-style-type: none"> • IBD: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication • Adrenal: additional guidance provided for imaging intervals and background given for functional tumors • Liver: clarified guidance for HCC surveillance imaging, follow up of specific conditions such as hepatic steatosis and focal nodular hyperplasia

	<ul style="list-style-type: none"> ● Pancreas: updated pancreatic cystic lesion guidance, specified guidance for increased lifetime risk for pancreatic cancer and pancreatitis ● Renal: specified guidance for increased lifetime risk of renal cancer ● Hernia: Added indications for lower esophageal and deep intraabdominal hernias ● Aneurysm: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication ● Transplant: added section ● Background: deleted some sections, added information to assist with adjudication/application of guideline statement ● Aligned sections across body imaging guidelines ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ● Added statement regarding further evaluation of indeterminate findings on prior imaging
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Francis I, Mayo-Smith W. Adrenal Imaging: In: Hodler J, Kubik-Huch RA, von Schulthess GK, editors. Diseases of the Abdomen and Pelvis 2018-2021: Diagnostic Imaging. IDKD Book [Internet]. Cham (CH): Springer. 2018; Chapter 9: 10.1007/978-3-319-75019-4_9.
2. Zeiger M, Thompson G, Duh Q, Hamrahian A, Angelos P et al. American Association of Clinical Endocrinologists And American Association Of Endocrine Surgeons Medical Guidelines For The Management Of Adrenal Incidentalomas. Endocrine Practice. 2009; 15: 1-20. 10.4158/EP.15.S1.1.
3. Chernyak V, Horowitz J M, Kamel I R, Arif-Tiwari H, Bashir M R et al. ACR Appropriateness Criteria® Liver Lesion-Initial Characterization. Journal of the American College of Radiology. 2020; 17: S429 - S446. 10.1016/j.jacr.2020.09.005.
4. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Hepatocellular Carcinoma. National Comprehensive Cancer Network®. 2024; Version 1.2024:
5. Vagvala S H, O'Connor S D. Imaging of abnormal liver function tests. Clinical liver disease. 2018; 11: 128-134. 10.1002/cld.704.
6. Arif-Tiwari H, Porter K K, Kamel I R, Bashir M R, Fung A et al. ACR Appropriateness Criteria® Abnormal Liver Function Tests. Journal of the American College of Radiology. 2023; 20: S302 - S314. 10.1016/j.jacr.2023.08.023.
7. Mounajjed T. Hepatocellular Adenoma and Focal Nodular Hyperplasia. Clinical liver disease. 2021; 17: 244-248. 10.1002/cld.1069.
8. Marrero J, Kulik L, Sirlin C, Zhu A, Finn R et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. Hepatology. Aug 2018; 68: 723-750. 10.1002/hep.29913.
9. Catanzaro E, Gringeri E, Burra P, Gambato M. Primary Sclerosing Cholangitis-Associated Cholangiocarcinoma: From Pathogenesis to Diagnostic and Surveillance Strategies. Cancers. 2023; 15: 10.3390/cancers15204947.
10. Fábrega-Foster K, Kamel I R, Horowitz J M, Arif-Tiwari H, Bashir M R et al. ACR Appropriateness Criteria® Pancreatic Cyst. Journal of the American College of Radiology. 2020; 17: S198 - S206. 10.1016/j.jacr.2020.01.021.
11. Megibow A J, Baker M E, Morgan D E, Kamel I R, Sahani D V et al. Management of Incidental Pancreatic Cysts: A White Paper of the ACR Incidental Findings Committee. Journal of the American College of Radiology. 2017; 14: 911 - 923. 10.1016/j.jacr.2017.03.010.
12. Wang Z J, Nikolaidis P, Khatri G, Dogra V S, Ganeshan D et al. ACR Appropriateness Criteria® Indeterminate Renal Mass. Journal of the American College of Radiology. 2020; 17: S415 - S428. 10.1016/j.jacr.2020.09.010.
13. Herts B R, Silverman S G, Hindman N M, Uzzo R G, Hartman R P et al. Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee. Journal of the American College of Radiology. 2018; 15: 264 - 273. 10.1016/j.jacr.2017.04.028.
14. Richard P, Violette P, Bhindi B, Breau R, Gratton M et al. 2023 UPDATE - Canadian Urological Association guideline: Management of cystic. 2023 UPDATE - Canadian Urological Association guideline: Management of cystic renal lesions Prior to original publication (March 2017). 2023; 17: 162-174. 10.5489/cuaj.8389.
15. Pandey P, Pandey A, Luo Y, Aliyari Ghasabeh M, Khoshpouri P et al. Follow-up of Incidentally Detected Pancreatic Cystic Neoplasms: Do Baseline MRI and CT Features Predict Cyst Growth? Radiology. Sep 2019; 292: 647-654. 10.1148/radiol.2019181686.

16. Ryan J, Farrelly C, Geoghegan T. What Are the Indications for Prophylactic Embolization of Renal Angiomyolipomas? A Review of the Current Evidence in the Literature. *Canadian Association of Radiologists Journal*. 2018/08/01/; 69: 236-239. <https://doi.org/10.1016/j.carj.2018.01.002>.
17. Chan K, Chedgy E, Bent C, Turner K. Surveillance imaging for sporadic renal angiomyolipoma less than 40 mm: lessons learnt and recommendations from the experience of a large district general hospital. *Ann R Coll Surg Engl*. Jul 2018; 100: 480-484. 10.1308/rcsann.2018.0040.
18. Northrup H, Koenig M K, Pearson D A, Au K S. Tuberous Sclerosis Complex. 1999 July 13 [Updated 2021 Dec9]. *GeneReviews®* [Internet]. 2021.
19. Bardin F, Chevallier O, Bertaut A, Delorme E, Moulin M et al. Selective arterial embolization of symptomatic and asymptomatic renal angiomyolipomas: a retrospective study of safety, outcomes and tumor size reduction. *Quantitative imaging in medicine and surgery*. 2017; 7: 8-23. 10.21037/qims.2017.01.02.
20. Zeid M, Sayedin H, Nabi N, Abdelrahman M, Jacob P et al. Active Surveillance for Renal Angiomyolipoma Less Than 4 Centimeters: A Systematic Review of Cohort Studies. *Cureus*. 2022; 14: e22678. 10.7759/cureus.22678.
21. Harris P, Torres V. Polycystic Kidney Disease, Autosomal Dominant. 2002 Jan 10 [Updated 2022 Sep 29]. *GeneReviews®* [Internet]. 2022; Accessed May 2024.
22. McDowell L, Kudaravalli P, Chen R, Sticco K. Iron Overload. [Updated 2024 Jan 11]. *StatPearls Publishing* [Internet]. 2024; Accessed May 2024.
23. Wood J. Use of magnetic resonance imaging to monitor iron overload. *Hematology/oncology clinics of North America*. 2014; 28: 747-64. 10.1016/j.hoc.2014.04.002.
24. Cartwright S, Knudson M. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician*. 2015; 91: 452-9.
25. Frickenstein A, Jones M, Behkam B, McNally L. Imaging Inflammation and Infection in the Gastrointestinal Tract. *International journal of molecular sciences*. 2019; 21: 10.3390/ijms21010243.
26. Garcia E M, Pietryga J A, Kim D H, Fowler K J, Chang K J et al. ACR Appropriateness Criteria® Hernia. *Journal of the American College of Radiology*. 2022; 19: S329 - S340. 10.1016/j.jacr.2022.09.016.
27. Laracca G, Spota A, Perretta S. Optimal workup for a hiatal hernia. *Annals of Laparoscopic and Endoscopic Surgery*. 2020; 6:
28. Russo G K, Zaheer A, Kamel I R, Porter K K, Archer-Arroyo K et al. ACR Appropriateness Criteria® Right Upper Quadrant Pain: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S211 - S223. 10.1016/j.jacr.2023.02.011.
29. Smereka P, Doshi A, Ream J, Rosenkrantz A. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol*. May 2017; 24: 603-608. 10.1016/j.acra.2016.12.009.
30. ACR-SABI-SAR-SPR. ACR–SABI–SAR–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF COMPUTED TOMOGRAPHY (CT) OF THE ABDOMEN AND COMPUTED TOMOGRAPHY (CT) OF THE PELVIS. *American College of Radiology*. 2021.
31. Bourgioti C, Chatoupis K, Mouloupoulos L. Current imaging strategies for the evaluation of uterine cervical cancer. *World J Radiol*. Apr 28, 2016; 8: 342-54. 10.4329/wjr.v8.i4.342.
32. Farsad K, Kolbeck K. Clinical and radiologic evaluation of patients before TIPS creation. *AJR Am J Roentgenol*. Oct 2014; 203: 739-45. 10.2214/ajr.14.12999.

33. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer V3.2024. National Comprehensive Cancer Network®. 2024; 1,23.
34. Shuman C, Kalish J, Weksberg R. Beckwith-Wiedemann Syndrome. 2000 Mar 3 [Updated 2023 Sep 21]. GeneReviews® [Internet]. 2023.
35. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic V3.2024. National Comprehensive Cancer Network®. 2024; v3.2024.
36. Hughes D, Pastores G. Gaucher Disease. 2000 Jul 27 [Updated 2023 Dec 7]. GeneReviews® [Internet]. 2023.
37. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors. February 8, 2023; Version 2.2022: 70-71.
38. Kamilaris C D C, Stratakis C A. Multiple Endocrine Neoplasia Type 1 (MEN1): An Update and the Significance of Early Genetic and Clinical Diagnosis. *Frontiers in endocrinology*. 2019; 10: 339. 10.3389/fendo.2019.00339.
39. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. 2008 May 21 [Updated 2023 Sep 21]. GeneReviews® [Internet]. 2023.
40. Consult A. Adrenal Hyperfunction (Cushing Syndrome) Testing Algorithm. 2021; 2023:
41. Lichtenstein G, Loftus E, Isaacs K, Regueiro M, Gerson L. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Am J Gastroenterol*. Apr 2018; 113: 481-517. 10.1038/ajg.2018.27.
42. Marrero J A, Ahn J, Reddy R K. ACG Clinical Guideline: The Diagnosis and Management of Focal Liver Lesions. *Official journal of the American College of Gastroenterology | ACG*. 2014; 109: 1328-1347. 10.1038/ajg.2014.213.
43. Cornec-Le Gall E, Audrézet M, Rousseau A, Hourmant M, Renaudineau E et al. The PROPKD Score: A New Algorithm to Predict Renal Survival in Autosomal Dominant Polycystic Kidney Disease. *Journal of the American Society of Nephrology*. 2016; 27: 942-51. 10.1681/ASN.2015010016.
44. Gansevoort R T, Arici M, Benzing T, Birn H, Capasso G et al. Recommendations for the use of tolvaptan in autosomal dominant polycystic kidney disease: a position statement on behalf of the ERA-EDTA Working Groups on Inherited Kidney Disorders and European Renal Best Practice. *Nephrology, dialysis, transplantation*. 2016; 31: 337-48. 10.1093/ndt/gfv456.

*Evolent	
Clinical guidelines ABDOMEN CT	Original Date: September 1997
CPT Codes: 74150, 74160, 74170	Last Revised Date: May 2023
Guideline Number: Evolent_CG_030	Implementation Date: January 2024

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

Note: For syndromes for which imaging starts in the pediatric age group, MRI preferred

NOTE: ABDOMEN CT **ALONE** SHOULD ONLY BE APPROVED WHEN DISEASE PROCESS IS SUSPECTED TO BE LIMITED TO THE ABDOMEN. Abdomen/Pelvis CT (CPT Codes: 74176, 74177, 74178) is the correct study when the indication(s) include both the abdomen AND pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease, or neoplasm.

When separate requests for CT abdomen and CT Pelvis are encountered for processes involving both the abdomen and pelvis, they need to be resubmitted as a single Abdomen/Pelvis CT (to avoid unbundling; CPT codes 74176, 74177, 74178). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen **OR** Pelvis) which includes the specific organ, area of known disease/abnormality, or the area of concern.

INDICATIONS FOR ABDOMEN CT

Abdominal Pain for Unknown Etiology

- CT allowed after initial workup is inconclusive and must include results of the following:
 - Appropriate laboratory testing (chemistry profile, complete blood count, and/or urinalysis) for the patient's presentation (e.g., suspected pancreatitis – amylase/lipase etc.) **AND**

- Initial imaging (such as ultrasound, barium study, nuclear medicine, or scope study) appropriate to the symptoms
- Not all of the above tests need to be performed, but both labs and initial imaging need to be performed
 - E.g., for GI bleeding, CBC and a scope study would be appropriate initial testing (however, a UA and ultrasound would not be)
- For acute abdominal pain in a patient over the age of 65^{1, 2}
- Initial evaluation of abnormal findings seen on other imaging, such as ultrasound (US) or x-ray and limited to the abdomen, and CT is the most reasonable next step for that diagnosis

Evaluation of suspicious known mass/tumors (unconfirmed diagnosis of cancer) for further evaluation of indeterminate or questionable findings

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study, such as ultrasound (US), and only the abdomen is affected^{3, 4}
- One follow-up exam to ensure no suspicious change has occurred in a tumor. No further surveillance imaging unless tumor(s) is/are specified as highly suspicious, or change was found on exam or last follow-up imaging.
- For abnormal incidental abdominal lymph nodes when follow-up is recommended based on prior imaging (initial 3-month follow-up)⁵

Follow-up of known cancer^{6, 7}

- In a patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- Known cancer with suspected abdominal metastasis based on a sign, symptom (e.g., anorexia, early satiety, intestinal obstruction, night sweats, pelvic pain, weight loss, vaginal bleeding) or an abnormal lab value (alpha-fetoprotein, CEA, CA 19-9, p53 mutation)

For evaluation of suspected infection or inflammatory disease based on exam or discovered on previous imaging⁸⁻¹⁰

- Right upper quadrant pain for suspected biliary disease with negative or equivocal ultrasound
- For epigastric or left upper quadrant pain if labs or other imaging are inconclusive¹¹

For evaluation of suspected infection or for follow-up known infection limited to the abdomen

- Any known infection that is clinically suspected to have created an abscess limited to the abdomen. (If location unclear or unknown, CT Abdomen/Pelvis)
- Any history of fistula limited to the abdomen that requires re-evaluation or is suspected to have recurred
- Abnormal fluid collection limited to the abdomen seen on prior imaging that needs follow-up evaluation

For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis (MRE should be considered for age < 35 to reduce radiation exposure). If only Abdomen CT is requested for IBD, the request should be resubmitted as CT Abdomen and Pelvis (see Guideline for criteria) unless it is known that the disease is limited to the abdomen.

For evaluation of an organ or abnormality seen on previous imaging

ADRENAL

- Indeterminate adrenal lesion seen on prior imaging
- For further evaluation of suspected adrenal tumors and/or endocrine disorders when there is clinical and laboratory evidence to suggest an adrenal source; see [Background](#) for specific laboratory testing that is needed based on suspected diagnosis¹²
- Adrenal mass < 4 cm incidentally discovered with benign characteristics, one follow-up at 6 months then annually x 2 years (no further imaging if stable, see Background for details)
- If adrenal mass ≥ 4 cm and no diagnosis of cancer, can approve for either pre-operative planning **OR** if surgery is not done, can repeat imaging in 6-12 months

LIVER

- Indeterminate liver lesion seen on prior imaging ¹¹
- For evaluation of rising AFP (requires a ≥7 ng/mL increased in AFP per month) in patients at high risk for HCC (known cirrhosis and/or chronic hepatitis B, see [Background](#) for additional risk categories)¹³
- For screening in patients at high risk for HCC (see above) every 6 months when prior ultrasound is insufficient to evaluate the liver due to steatosis/fatty liver or nodular liver
 - The finding of steatosis/fatty liver and/or nodular liver alone on an ultrasound report is insufficient for approval; the report must specify that those findings prevent adequate visualization of the liver by ultrasound
- For jaundice or abnormal liver function tests after equivocal or abnormal ultrasound¹⁴
- For surveillance of HCC (MRI or CT) in patients who have received liver-directed therapy, surgical resection, medical treatment, or transplant at one-month post treatment and then every 3 months for up to two years, then every 6 months^{14, 15}
- For follow-up of suspected adenoma every 6-12 months
- For surveillance of patients with primary sclerosing cholangitis (also CA 19-9), every 6-12 months after the age of 20 (MRI and MRCP preferred over CT) ¹⁶
- For follow-up of focal nodular hyperplasia (FNH), repeat imaging in 6-12 months to ensure stability. Additional imaging beyond that is needed only if atypical features or diagnosis is still in question. ¹⁷
- For annual elastography¹⁸ in chronic liver disease to stage hepatic fibrosis when MRI is contraindicated and transient elastography with ultrasound is insufficient

- In patients with Beckwith-Wiedemann syndrome and abnormal ultrasound or rising AFP and MRI is contraindicated ¹⁹
- Pre-procedure for transjugular intrahepatic portosystemic shunt (TIPS)^{20, 21}
- For evaluation and monitoring of Gaucher Disease at initial diagnosis and every 12 to 24 months when MRI is contraindicated ²²

Evaluation of iron overload in the following settings when MRI is contraindicated

- Initial evaluation of liver iron in Hemochromatosis diagnosed in lieu of liver biopsy ²³
- Annual evaluation for high-risk patients: transfusion-dependent thalassemia major, sickle cell disease, and other congenital anemias ²⁴when ultrasound is insufficient

PANCREAS

- Pancreatic cystic lesion found on initial imaging, approve for initial characterization of lesion
- For follow-up for pancreatic cyst as below AND MRI is contraindicated ²⁵:
 - For incidental and asymptomatic cysts <1.5 mm, **AND**:
 - Age < 65, image annually x 5 years, then every 2 years if stable
 - Age 65-79, imaging every 2 years x 5, then stop if stable
 - For cysts 1.5-1.9 cm with main pancreatic duct communication (MPD), image annually x 5 years, then every 2 years x 2, stop if stable at year 9.
 - For cysts 2.0-2.5 cm with MPD communication, image every 6 months x 4, then annually x 2, then every 2 years x 3, stop if stable at year 10.
 - For cysts 1.5-2.5 cm with NO MPD communication (or cannot be determined), image every 6 mos. x 4, then annually x 2 then every 2 years x 3, stop if stable at year 10.
 - For cyst > 2.5 cm on surveillance (i.e., intervention has not been chosen), image every 6 mos. x 4, then annually x 2 years, then every 2 years x 3. Stop if stable at year 10.
 - Patients > 80 years of age at presentation are imaged less frequently: image every 2 years x 2, stop if stable at year 4 (intervals are the same regardless of size if surveillance chosen)
 - GROWTH or suspicious change on a surveillance imaging scan may warrant more frequent surveillance
- For localization of a functional pancreatic tumor, see [Background](#) (endocrine) once diagnosis is confirmed (or highly suspected)
- Annual surveillance for individuals determined to have an increased lifetime risk of developing pancreatic cancer (if MRI/MRCP and EUS contraindicated), based on genetic predisposition or family history as below:
 - SKT11 variant (including Peutz-Jeghers): starting at age 30 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier)
 - CDKN2A variant: starting at age 40 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier)

- Other variants and based on family history as detailed below: Starting at age 50 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) for the following:
 - ≥ 1 first- or second-degree relative with history of pancreatic cancer from the same side of the family as the identified variant AND known mutation in other pancreatic susceptibility genes (ATM, BRCA1, BRCA2, MLH1 (Lynch), MSH2, MSH6, EPCAM, PALB2, TP53)
 - ≥ 2 first-degree relatives with a history of pancreatic cancer from the same side of the family
 - ≥ 3 first- and/or second-degree relatives with a history of pancreatic cancer from the same side of the family
- Hereditary Pancreatitis (such as PRSS1 variant) starting 20 years after onset of pancreatitis, or at age 40 years, whichever is earlier^{1, 26-28}
- Multiple Endocrine Neoplasia type 1 (MEN1) (to screen for PanNET (neuroendocrine tumor) every 1-3 years (chest CT or MRI also approvable for this syndrome at same interval))
- Initial imaging for suspected acute pancreatitis due to epigastric pain with elevated amylase and/or lipase:
 - For mild presentation when symptom improvement is not seen after 72 hours of treatment and either:
 - ultrasound has been performed and did not show an abnormality such as gallstones, dilated bile duct
 - ultrasound suggests complications (such as fluid collection)
 - For severe presentation (such as fever, elevated WBC)
 - For a decline in clinical status and/or suspected complication
- Pancreatitis by history, (including pancreatic pseudocyst) with abdominal pain suspicious for worsening, or re-exacerbation
- Known necrotizing pancreatitis requiring follow-up
- In patients > 40 years of age who have pancreatitis with no identifiable cause (see Background), CT is indicated to exclude neoplasm²⁹

RENAL

- For an indeterminate renal mass on other imaging³⁰

Active surveillance for indeterminate cystic renal mass, not a simple renal cyst (Bosniak IIF (6 mos., 12 mos. then annually), III and IV lesions - see [Background](#))³¹

- Follow-up for solid renal masses under 3 cm at 6 and 12 months, then annually^{32,33}
- Surveillance for known angiomyolipoma (AML): annually if known tuberous sclerosis (TSC) or AML size is > 4 cm; every 2 years if AML size is 3-4 cm³⁴⁻³⁶ (if AML < 3 cm, CT or MRI not needed unless pt has TSC)

- For surveillance of patients with the following known genetic mutations at the following intervals (MRI preferred due to lifetime radiation risk, CT can be approved if needed for surgical planning or CI to MRI):
 - BAP1-TPDS (BAP-1 tumor predisposition syndrome) every 2 years starting at age 30
 - BHDS (Birt-Hogg-Dube) every 3 years starting at age 20
 - HLRCC (hereditary leiomyomatosis and renal cell cancer) annually starting at age 8
 - HPRC (hereditary papillary renal carcinoma) every 1-2 years starting at age 30
 - PGL/PCC (hereditary paraganglioma/pheochromocytoma) every 4-6 years starting at age 12
 - TSC (tuberous sclerosis complex) without known AML every 3-5 years starting at age 12
 - TSC + known AML annually
 - VHL (Von Hippel Lindau) every 2 years starting at age 15³⁷
- For evaluation of total kidney volume in polycystic kidney disease when MRI is contraindicated³⁸

SPLEEN

- Incidental findings of the spleen that are indeterminate on other imaging
- For evaluation and monitoring of Gaucher Disease at initial diagnosis and every 12 to 24 months when MRI is contraindicated²²

For evaluation of a suspected or known hernia³⁹

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, or incisional hernia (including recurrent hernias) when physical exam and prior imaging (such as ultrasound) is non-diagnostic or equivocal or if requested as a preoperative study and limited to the abdomen
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain, or guarding), physical exam (guarding, rebound) or prior imaging⁴⁰
- Lower esophageal hernias (such as hiatal, paraesophageal) for pre-operative planning (Abdomen CT preferred, only approve one study, chest CT can be approved instead of abdomen if specific reason given); CT is not a part of the typical workup for diagnosis⁴¹
- Deep intraabdominal hernia is suspected (post-Roux-en-Y, does not require US first; hernia type needs to be specified)

For evaluation of known or suspected non-aortic vascular disease (e.g., aneurysms, hematomas)^{42, 43}, CTA/MRA is the preferred study when ultrasound is inconclusive

- If a contraindication to CTA/MRA has been provided, CT can be approved

Transplants

- Prior to solid organ transplantation
- For initial workup prior to Bone Marrow Transplantation (BMT) (along with CT Chest⁴⁴, CT Pelvis, CT Sinus and Brain MRI)⁴⁵). Alternatively, PET might be sufficient to evaluate the abdomen and pelvis if indicated based on that malignancy (see PET Guideline)

Pre-operative planning

- For abdominal surgery or procedure

Post-operative/procedural evaluation

- Follow-up of known or suspected post-operative complication involving only the abdomen
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Indication for combination studies for the initial pre-therapy staging of cancer, evaluation before starting treatment OR active monitoring for recurrence as clinically indicated OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine, and MUGA

BACKGROUND

Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crests. CT uses x-rays and multiple detectors to create cross-sectional images of the normal anatomy, as well as demonstrate abnormal soft tissue densities, calcifications or fluid/gas patterns in the viscera or peritoneal space.

Ultrasound is clearly a safe imaging option and is the first imaging test of choice. CT or MRI can then be done as needed after equivocal ultrasound. Clinicians should exercise increased caution with CT

- Prior to solid organ transplantation
- For initial workup prior to Bone Marrow Transplantation (BMT) (along with CT Chest⁴⁴, CT Pelvis, CT Sinus and Brain MRI)⁴⁵). Alternatively, PET might be sufficient to evaluate the abdomen and pelvis if indicated based on that malignancy (see PET Guideline)

Pre-operative planning

- For abdominal surgery or procedure

Post-operative/procedural evaluation

- Follow-up of known or suspected post-operative complication involving only the abdomen
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Indication for combination studies for the initial pre-therapy staging of cancer, evaluation before starting treatment OR active monitoring for recurrence as clinically indicated OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine, and MUGA

BACKGROUND

Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crests. CT uses x-rays and multiple detectors to create cross-sectional images of the normal anatomy, as well as demonstrate abnormal soft tissue densities, calcifications or fluid/gas patterns in the viscera or peritoneal space.

Ultrasound is clearly a safe imaging option and is the first imaging test of choice. CT or MRI can then be done as needed after equivocal ultrasound. Clinicians should exercise increased caution with CT

imaging in children, pregnant women, and young adults due to the risks of exposure to ionizing radiation. Screening for pregnancy as part of a work-up is suggested to minimize the number of unexpected radiation exposures for women of childbearing age.

OVERVIEW

Ultrasound should be considered prior to a request for Abdomen CT for the following evaluations:

- Possible gallstones or abnormal liver function tests
- Evaluation of cholecystitis
- Follow up for aortic aneurysm

Liver

Hepatocellular carcinoma (HCC) Screening for Hepatocellular carcinoma (HCC) – AASLD (American Association for the Study of Liver Diseases) recommends screening for HCC with ultrasound every 6 months for patients with hepatitis C and B.⁴⁶ Advanced imaging is recommended when the AFP is rising, regardless of ultrasound results. The main risk factors for HCC are cirrhosis and Hepatitis B. Additional populations for which there is a benefit to surveillance for HCC include: Asian males Hepatitis B carriers ≥ 40 y, Asian female Hepatitis B carriers ≥ 50 y, Hepatitis B carriers with + family history of HCC and African and/or North American blacks with hepatitis B^{13, 47}.

Surveillance for HCC is required for patients who have received liver-directed therapy, surgical resection, medical treatment, or a transplant for HCC. However, because of the higher risk of tumor recurrence, US is not typically used for surveillance for HCC in the first 2 years after treatment. The European Association for the Study of the Liver recommends multiphase CT or MRI to assess response 1 month after resection or locoregional or systemic therapies, followed by one imaging technique every 3 months to complete at least 2 years, and then regular US every 6 months. This schedule is more frequent than some of the other society recommendations and the most common practice among interventional radiologists (every 3 months).

Imaging for pancreatitis – When acute pancreatitis is suspected, ultrasound is typically the first line imaging modality. The purpose of US is to identify other causes such as gallstones and/or biliary dilatation as well as help identify potential complications such as fluid collections. MRCP is preferred over CT for further evaluation of bile duct dilation. When a diagnosis other than pancreatitis is likely (such as when amylase and lipase are equivocal), CT or MRI may be indicated but would generally fall under indications for acute abdominal pain. In general, CT is not indicated in patients with mild pancreatitis who show rapid improvement with appropriate medical management. When a patient has or is at risk for severe pancreatitis, CT may be used after 72 hours to best assess the full extent of disease. CT should be repeated when the clinical picture drastically changes, such as with sudden onset of fever, decrease in hematocrit or sepsis. For prolonged symptoms (>4 weeks) with known fluid collection, CT or MRI is indicated. Common causes for pancreatitis include gallstones, alcohol,

hypertriglyceridemia, post-ERCP, trauma. In patients over 40 years old, when no cause for pancreatitis can be identified, advanced imaging is indicated to exclude neoplasm.

Adrenal incidentaloma – Adrenal masses detected on imaging for another reason (i.e., incidental finding) are becoming increasingly common. If there is no prior personal history of malignancy and no features concerning for malignancy on imaging, these patients should undergo hormonal (functional) evaluation and periodic imaging. If the mass is < 4 cm on imaging and has benign characteristic (homogenous, regular borders, HU < 10) a hormonal evaluation should be done. If that evaluation is negative, adrenal protocol/follow-up imaging can be performed at 6 months then annually for 1-2 years¹². Repeat functional studies are recommended annually (or sooner if symptoms) for 5 years. If the mass exhibits growth or becomes hormonally active, then surgery is recommended¹². Additional imaging beyond 2 years is reasonable if there has been growth and the mass is not resected; if stable, no further imaging is warranted unless the annual hormonal evaluation is positive. Masses ≥ 4cm generally are resected after hormonal evaluation is completed, additional imaging can be approved when needed for further characterization for surgical planning. If the decision is made not to resect the mass, then FU imaging in 6-12 months is reasonable.

Biochemically active tumors (adrenal and neuroendocrine): Laboratory evaluation prior to imaging - When neuroendocrine and hormonally active tumors are suspected, the required laboratory evaluation prior to advanced imaging is dependent on the tumor type that is suspected. The following list describes suspected syndrome/tumor and typical laboratory evaluation in parenthesis:

GI Carcinoid (24-hour urine or plasma 5-HIAA), Lung/Thymus Carcinoid (24-hour urine or plasma 5-HIAA AND one of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisol, 24-hour urinary free cortisol), PPoma (serum pancreatic polypeptide), Insulinoma (serum insulin, pro-insulin and C-peptide all drawn during a period of hypoglycemia (i.e. 72 hour fast)), VIPoma (serum VIP), glucagonoma (serum glucagon), gastrinoma (serum gastrin), somatostatinoma (serum somatostatin), pheochromocytoma/paraganglioma (plasma free or 24-hour urine fractionated metanephrines and normetanephrines +/- serum or urine catecholamines), pituitary tumor (serum IGF-1, prolactin, LH/FSH, alpha subunits, TSH and ONE of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisol, 24-hour urinary free cortisol), primary hyperaldosteronism (suppressed renin/renin activity in association with elevated plasma aldosterone (>10 ng/dL) and confirmatory testing if positive), adrenocortical carcinoma (testosterone, DHEA-S AND complete evaluation for hypercortisolemia or primary aldosteronism)⁴⁸.

If Cushing's (hypercortisolemia) is suspected, typical labs include a plasma ACTH AND one or more of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisol, OR 24-hour urinary free cortisol. The results of the suppression test then indicate whether brain imaging is needed (pituitary source) OR chest and abdominal imaging is needed (CXR + Adrenal CT/MRI). ACTH > 20 after suppression > 20 is suggestive of Cushing's Disease and Pituitary MRI is indicated. ACTH after suppression < 5 is suggestive of Cushing's Syndrome and CXR + Adrenal CT/MRI is indicated⁴⁹. If

indeterminate, a CRH or desmopressin test is then done. If there is no ACTH suppression with CRH/desmopressin, then adrenal imaging is indicated.

Genetic syndromes and adrenal tumors – Adrenal cortical carcinoma (ACC) diagnosed during childhood is known to be commonly associated with hereditary syndromes, including Beckwith-Wiedemann (BWS) and Li-Fraumeni syndrome (LFS). In adults, ACC may be associated with Multiple Endocrine Neoplasia 1 (MEN1), familial adenomatous polyposis coli and neurofibromatosis type 1 (NF1); however, there are currently no surveillance imaging recommendations.⁵⁰

High risk characteristics for mucinous pancreatic cysts include all of the following: Symptoms, Jaundice secondary to the cyst, acute pancreatitis secondary to the cyst, elevated serum CA 19-9 and no benign cause present, an enhancing mural nodule or solid component within the cyst or pancreas, main pancreatic duct of > 5mm, change in duct caliber with upstream atrophy, size over 3 cm, high grade dysplasia or cancer on cytology. These patients should undergo EUS + -FNA or be referred to a multidisciplinary group for further recommendations.⁵¹

Genetic syndromes and adrenal tumors - Adrenal cortical carcinoma (ACC) diagnosed during childhood is known to be commonly associated with hereditary syndromes including Beckwith-Wiedemann (BWS) and Li-Fraumeni syndrome (LFS). In adults, ACC may be associated with Multiple Endocrine Neoplasia 1 (MEN1), familial adenomatous polyposis coli and neurofibromatosis type 1 (NF1); however, there are currently no surveillance imaging recommendations.⁵⁰

CT of the kidney - Recommendations for follow up of a complex cystic renal mass are made using Bosniak criteria⁵²:

- Bosniak I (water density 0-20 HU); no further follow-up
- Bosniak II (one or a few thin septations, small or fine calcifications, hyperdense cysts up to 3 cm); no further follow-up
- Bosniak IIF felt to be benign but too complex to be diagnosed with certainty; image at 6 and 12 months, then annually for 5 years if no progression
- Bosniak III thick-walled cystic lesions with wall or septal enhancement; resection favored vs conservative management and RFA in select cases³¹
- Bosniak IV malignant cystic renal mass with enhancing soft tissue components; resection favored, malignant until proven otherwise

Insulinomas are rare pancreatic tumors. Localization of the tumor by ultrasound and CT are the preferred initial options once a diagnosis has been made, followed by endoscopic ultrasound or arterial stimulation with hepatic venous sampling. Whipple's triad includes symptoms of hypoglycemia, low blood glucose relieved by ingestion of glucose, and benign 90%. Work-up prior to imaging should include: a 72-hour fast with serial glucose and insulin levels over this period until the patient becomes symptomatic. An insulin/glucose ratio of greater than 0.3 has been found in virtually all patients with insulinoma or other islet cell disease.⁵³

High risk characteristics for mucinous pancreatic cysts include all of the following: Symptoms, Jaundice secondary to the cyst, acute pancreatitis secondary to the cyst, elevated serum CA 19-9 and no benign cause present, an enhancing mural nodule or solid component within the cyst or pancreas, main pancreatic duct of > 5mm, change in duct caliber with upstream atrophy, size over 3 cm, high grade dysplasia or cancer on cytology. These patients should undergo EUS + -FNA or be referred to a multidisciplinary group for further recommendations.⁵⁴

CT and elevated Liver Function Tests - For elevated bilirubin, or serum transaminases with or without bilirubin elevation, US is the initial recommended test to assess for duct dilatation which might lead to ERCP or MRCP, vs other causes which might necessitate further lab testing or liver biopsy.⁵⁵

Combination request of Abdomen CT/Chest CT - A chest CT will produce images to the level of L3. Documentation for combo is required.

Imaging of hernias - Most hernias are diagnosed clinically with imaging recommended for the diagnosis of occult hernias or in the evaluation of hernia complications, such as bowel obstruction or strangulation. To detect occult hernias, ultrasound is a first-line study with a sensitivity of 86% and specificity of 77%, compared to 80% sensitivity and 65% specificity for CT.⁵⁶ According to Miller, et al "Magnetic resonance imaging is generally not considered a first- or even second-line evaluation modality for hernias...."⁵⁷ Based on this analysis, MRI is recommended only when ultrasound and CT have been performed and fail to make a diagnosis.

REFERENCES

1. Lehtimäki TT, Valtonen H, Miettinen P, Juvonen P, Paajanen H, Vanninen R. A randomised clinical trial of routine versus selective CT imaging in acute abdomen: Impact of patient age on treatment costs and hospital resource use. *Eur J Radiol*. Feb 2017;87:1-7. doi:10.1016/j.ejrad.2016.11.031
2. American College of Radiology. ACR Appropriateness Criteria® Acute Nonlocalized Abdominal Pain. American College of Radiology (ACR). Updated 2018. Accessed November 16, 2022. <https://acsearch.acr.org/docs/69467/Narrative/>
3. American College of Radiology. ACR Appropriateness Criteria® Soft-Tissue Masses. American College of Radiology. Updated 2022. Accessed December 15, 2022. <https://acsearch.acr.org/docs/69434/Narrative/>
4. American College of Radiology. ACR Appropriateness Criteria® Palpable Abdominal Mass-Suspected Neoplasm. American College of Radiology. Updated 2019. Accessed November 16, 2022. <https://acsearch.acr.org/docs/69473/Narrative/>
5. Smereka P, Doshi AM, Ream JM, Rosenkrantz AB. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol*. May 2017;24(5):603-608. doi:10.1016/j.acra.2016.12.009
6. Bourgioti C, Chatoupis K, Moulopoulos LA. Current imaging strategies for the evaluation of uterine cervical cancer. *World J Radiol*. Apr 28 2016;8(4):342-54. doi:10.4329/wjr.v8.i4.342
7. NCCN Imaging Appropriate Use Criteria™. National Comprehensive Cancer Network (NCCN). Updated 2022. Accessed November 15, 2022. <https://www.nccn.org/professionals/imaging/default.aspx>
8. Cartwright SL, Knudson MP. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician*. Apr 1 2015;91(7):452-9.
9. Sartelli M, Moore FA, Ansaloni L, et al. A proposal for a CT driven classification of left colon acute diverticulitis. *World J Emerg Surg*. 2015;10:3. doi:10.1186/1749-7922-10-3
10. American College of Radiology. ACR Appropriateness Criteria® Right Upper Quadrant Pain. American College of Radiology. Updated 2022. Accessed November 15, 2022. <https://acsearch.acr.org/docs/69474/Narrative/>
11. Ecanow JS, Gore RM. Evaluating Patients with Left Upper Quadrant Pain. *Radiol Clin North Am*. Nov 2015;53(6):1131-57. doi:10.1016/j.rcl.2015.06.003
12. Zeiger MA, Thompson GB, Duh Q-Y, et al. American Association Of Clinical Endocrinologists And American Association Of Endocrine Surgeons Medical Guidelines For The Management Of Adrenal Incidentalomas. *Endocrine Practice*. 2009;15:1-20. doi:10.4158/EP.15.S1.1
13. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Hepatobiliary Cancers. NCCN; 2022 (Version 5.2022). Accessed February 2, 2023. https://www.nccn.org/professionals/physician_gls/pdf/hepatobiliary.pdf
14. Fassnacht M DO, Else T, Baudin E, Bertrt A, Krijger R, Haak H, Mihai R, Assie G, Terzolo M. European Society of Endocrinology Clinical Practice Guidelines on the management of adrenocortical carcinoma in adults, in collaboration with the European Network for the Study of Adrenal Tumors. *Eur J Endocrinol*. 2018;179(4):G1-G46. doi:10.1530/EJE-18-0608

15. Meek CL BV, Don A, Kaplan F. Polycystic ovary syndrome and the differential diagnosis of hyperandrogenism. *The Obstetrician & Gynaecologist*. 2013;15(3):171-176. doi:10.1111/tog.12030
16. Kamilaris CDC, Stratakis CA. Multiple Endocrine Neoplasia Type 1 (MEN1): An Update and the Significance of Early Genetic and Clinical Diagnosis. *Front Endocrinol (Lausanne)*. 2019;10:339. doi:10.3389/fendo.2019.00339
17. Varshney N, Kebede AA, Owusu-Dapaah H, Lather J, Kaushik M, Bhullar JS. A Review of Von Hippel-Lindau Syndrome. *J Kidney Cancer VHL*. 2017;4(3):20-29. doi:10.15586/jkcvhl.2017.88
18. Huber A, Ebner L, Heverhagen JT, Christe A. State-of-the-art imaging of liver fibrosis and cirrhosis: A comprehensive review of current applications and future perspectives. *Eur J Radiol Open*. 2015;2:90-100. doi:10.1016/j.ejro.2015.05.002
19. Kalish JM DL, Helman LJ, et al. Surveillance Recommendations for Children with Overgrowth Syndromes and Predisposition to Wilms Tumors and Hepatoblastoma. *Clin Cancer Res*. 2017;23(13):e115-e122. doi:10.1158/1078-0432.Ccr-17-0710
20. Farsad K, Kolbeck KJ. Clinical and radiologic evaluation of patients before TIPS creation. *AJR Am J Roentgenol*. Oct 2014;203(4):739-45. doi:10.2214/ajr.14.12999
21. Gaba RC, Khiatani VL, Knuttinen MG, et al. Comprehensive review of TIPS technical complications and how to avoid them. *AJR Am J Roentgenol*. Mar 2011;196(3):675-85. doi:10.2214/ajr.10.4819
22. Simpson WL, Hermann G, Balwani M. Imaging of Gaucher disease. *World J Radiol*. Sep 28 2014;6(9):657-68. doi:10.4329/wjr.v6.i9.657
23. Lee SS PS. Radiologic evaluation of nonalcoholic fatty liver disease. *World J Gastroenterol*. 2014;20(23):7392-7402. doi:doi:10.3748/wjg.v20.i23.7392
24. Marquardt JU, Nguyen-Tat M, Galle PR, Wörns MA. Surveillance of Hepatocellular Carcinoma and Diagnostic Algorithms in Patients with Liver Cirrhosis. *Visc Med*. Apr 2016;32(2):110-5. doi:10.1159/000445407
25. Alec J. Megibow M, MPHa, MEB, MDb, DEM, MDc, et al. Management of Incidental Pancreatic Cysts: A White Paper of the ACR Incidental Findings Committee. *Jouranl of the American College of Radiology*. 2017;14(7):911-923. doi:https://doi.org/10.1016/j.jacr.2017.03.010
26. Horowitz JM KI, Arif-Tiwari H, Asrani SK, Hindman NM, Kaur H, McNamara MM, Noto RB, Qayyum A, Lalani T. ACR Appropriateness Criteria® Chronic Liver Disease. *J Am Coll Radiol*. 2017;14(11S):S391-S405. doi:10.1016/j.jacr.2017.08.045
27. Marrero JA, Ahn J, Rajender Reddy K. ACG clinical guideline: the diagnosis and management of focal liver lesions. *Am J Gastroenterol*. Sep 2014;109(9):1328-47; quiz 1348. doi:10.1038/ajg.2014.213
28. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic. NCCN; 2023 (Version 3.2023):50. Accessed February 13, 2023. https://www.nccn.org/professionals/physician_gls/pdf/genetics_bop.pdf
29. Busireddy KK, Alobaidy M, Ramalho M, et al. Pancreatitis-imaging approach. *World J Gastrointest Pathophysiol*. Aug 15 2014;5(3):252-70. doi:10.4291/wjgp.v5.i3.252
30. American College of Radiology. ACR Appropriateness Criteria® Indeterminate Renal Mass. American College of Radiology (ACR). Updated 2020. Accessed November 16, 2022. <https://acsearch.acr.org/docs/69367/Narrative/>

31. Richard PO, Violette PD, Jewett MA, et al. CUA guideline on the management of cystic renal lesions. *Can Urol Assoc J*. Mar-Apr 2017;11(3-4):E66-e73. doi:10.5489/cuaj.4484
32. Herts BR, Silverman SG, Hindman NM, et al. Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee. *J Am Coll Radiol*. Feb 2018;15(2):264-273. doi:10.1016/j.jacr.2017.04.028
33. Campbell SC, Clark PE, Chang SS, Karam JA, Souter L, Uzzo RG. Renal Mass and Localized Renal Cancer: Evaluation, Management, and Follow-Up: AUA Guideline: Part I. *J Urol*. Aug 2021;206(2):199-208. doi:10.1097/ju.0000000000001911
34. Pandey P, Pandey A, Luo Y, et al. Follow-up of Incidentally Detected Pancreatic Cystic Neoplasms: Do Baseline MRI and CT Features Predict Cyst Growth? *Radiology*. Sep 2019;292(3):647-654. doi:10.1148/radiol.2019181686
35. Chan KE, Chedgy E, Bent CL, Turner KJ. Surveillance imaging for sporadic renal angiomyolipoma less than 40 mm: lessons learnt and recommendations from the experience of a large district general hospital. *Ann R Coll Surg Engl*. Jul 2018;100(6):480-484. doi:10.1308/rcsann.2018.0040
36. Ryan JW, Farrelly C, Geoghegan T. What Are the Indications for Prophylactic Embolization of Renal Angiomyolipomas? A Review of the Current Evidence in the Literature. *Canadian Association of Radiologists Journal*. 2018/08/01/ 2018;69(3):236-239. doi:https://doi.org/10.1016/j.carj.2018.01.002
37. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer. NCCN; 2023 (Version 4.2023):23. Accessed February 1, 2023. https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf
38. Magistroni R, Corsi C, Martí T, Torra R. A Review of the Imaging Techniques for Measuring Kidney and Cyst Volume in Establishing Autosomal Dominant Polycystic Kidney Disease Progression. *Am J Nephrol*. 2018;48(1):67-78. doi:10.1159/000491022
39. Radiology ACo. ACR Appropriateness Criteria® Hernia. American College of Radiology. Updated 2022. Accessed January 26, 2023. <https://acsearch.acr.org/docs/3158169/Narrative/>
40. Halligan S, Parker SG, Plumb AA, Windsor ACJ. Imaging complex ventral hernias, their surgical repair, and their complications. *Eur Radiol*. Aug 2018;28(8):3560-3569. doi:10.1007/s00330-018-5328-z
41. Laracca GG, Spota A, Perretta S. Optimal workup for a hiatal hernia. *Annals of Laparoscopic and Endoscopic Surgery*. 2020;6
42. Khosa F, Krinsky G, Macari M, Yucel EK, Berland LL. Managing incidental findings on abdominal and pelvic CT and MRI, Part 2: white paper of the ACR Incidental Findings Committee II on vascular findings. *J Am Coll Radiol*. Oct 2013;10(10):789-94. doi:10.1016/j.jacr.2013.05.021
43. Uberoi R, Tsetis D, Shrivastava V, Morgan R, Belli AM. Standard of practice for the interventional management of isolated iliac artery aneurysms. *Cardiovasc Intervent Radiol*. Feb 2011;34(1):3-13. doi:10.1007/s00270-010-0055-0
44. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation*. 2014/11/01/ 2014;20(11):1852-1856. doi:https://doi.org/10.1016/j.bbmt.2014.06.029

45. Kaste SC, Kaufman RA, Sunkara A, et al. Routine pre- and post-hematopoietic stem cell transplant computed tomography of the abdomen for detecting invasive fungal infection has limited value. *Biol Blood Marrow Transplant*. Jun 2015;21(6):1132-5. doi:10.1016/j.bbmt.2015.02.023
46. Lichtenstein GR, Loftus EV, Isaacs KL, Regueiro MD, Gerson LB, Sands BE. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Am J Gastroenterol*. Apr 2018;113(4):481-517. doi:10.1038/ajg.2018.27
47. Marrero JA, Kulik LM, Sirlin CB, et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. *Hepatology*. Aug 2018;68(2):723-750. doi:10.1002/hep.29913
48. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors. December 21, 2022. Accessed February 8, 2023. https://www.nccn.org/professionals/physician_gls/pdf/neuroendocrine.pdf
49. Consult A. Adrenal Hyperfunction (Cushing Syndrome) Testing Algorithm. ARUP Laboratories. Accessed February 9, 2023. <https://arupconsult.com/algorithm/adrenal-hyperfunction-cushing-syndrome-testing-algorithm>
50. Else T. Association of adrenocortical carcinoma with familial cancer susceptibility syndromes. *Mol Cell Endocrinol*. Mar 31 2012;351(1):66-70. doi:10.1016/j.mce.2011.12.008
51. Mayo-Smith WW SJ, Boland GL, Francis IR, Israel G, Mazzaglia PJ, Berland LL, Pandharipande PV. Management of Incidental Adrenal Masses: A White Paper of the ACR Incidental Findings Committee. *J Am Coll Radiol*. 2017;14(8):1038-1044. doi:10.1016/j.jacr.2017.05.001
52. Muglia VF, Westphalen AC. Bosniak classification for complex renal cysts: history and critical analysis. *Radiol Bras*. Nov-Dec 2014;47(6):368-73. doi:10.1590/0100-3984.2013.1797
53. Vinik A, Perry RR, Casellini C, Hughes MS, Feliberti E. Pathophysiology and Treatment of Pancreatic Neuroendocrine Tumors (PNETs): New Developments. MDText.com, Inc. Updated April 8, 2022. Accessed November 16, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK279074/>
54. Elta GH, Enestvedt BK, Sauer BG, Lennon AM. ACG Clinical Guideline: Diagnosis and Management of Pancreatic Cysts. *Am J Gastroenterol*. Apr 2018;113(4):464-479. doi:10.1038/ajg.2018.14
55. Kwo PY, Cohen SM, Lim JK. ACG Clinical Guideline: Evaluation of Abnormal Liver Chemistries. *Am J Gastroenterol*. Jan 2017;112(1):18-35. doi:10.1038/ajg.2016.517
56. Robinson A, Light D, Kasim A, Nice C. A systematic review and meta-analysis of the role of radiology in the diagnosis of occult inguinal hernia. *Surg Endosc*. Jan 2013;27(1):11-8. doi:10.1007/s00464-012-2412-3
57. Miller J, Cho J, Michael MJ, Saouaf R, Towfigh S. Role of imaging in the diagnosis of occult hernias. *JAMA Surg*. Oct 2014;149(10):1077-80. doi:10.1001/jamasurg.2014.484

POLICY HISTORY

Date	Summary
May 2023	<ul style="list-style-type: none"> • IBD: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication • Adrenal: additional guidance provided for imaging intervals and background given for functional tumors • Liver: clarified guidance for HCC surveillance imaging, follow up of specific conditions such as hepatic steatosis and focal nodular hyperplasia • Pancreas: updated pancreatic cystic lesion guidance, specified guidance for increased lifetime risk for pancreatic cancer and pancreatitis • Renal: specified guidance for increased lifetime risk of renal cancer • Hernia: Added indications for lower esophageal and deep intraabdominal hernias • Aneurysm: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication • Transplant: added section • Background: deleted some sections, added information to assist with adjudication/application of guideline statement • Aligned sections across body imaging guidelines • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging
March 2022	<ul style="list-style-type: none"> • In Follow-up of known cancer, added per surveillance imaging of NCCN recommendations • Clarified IPMN and MCN surveillance imaging • Added total kidney volume in polycystic kidney disease when MRI is contraindicated to Renal section • Clarified “and/or” prior imaging (such as US) in abdominal/pelvic pain due to suspected hernia

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***



EVOLENT CLINICAL GUIDELINE 069 FOR ABDOMEN PELVIS CTA

Guideline or Policy Number: Evolent_CG_069	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
CTA	3
SPECIAL NOTE	3
INDICATIONS FOR ABDOMEN PELVIS CT ANGIOGRAPHY/VENOGRAPHY (CTA/CTV).....	3
ABDOMINAL AORTIC DISEASE.....	3
<i>Abdominal Aortic Aneurysm</i>	<i>3</i>
<i>Aortic Syndromes.....</i>	<i>4</i>
<i>Postoperative Follow-up of Aortic Repair</i>	<i>4</i>
ISCHEMIA OR HEMORRHAGE	5
OTHER VASCULAR ABNORMALITIES	5
VENOUS DISEASE	5
EVALUATION OF TUMOR	6
PRE-OPERATIVE EVALUATION AND/OR PRE-PROCEDURAL EVALUATION	6
POST-OPERATIVE EVALUATION AND/OR POST-PROCEDURAL EVALUATION	6
GENETIC SYNDROMES AND RARE DISEASES.....	7
COMBINATION STUDIES	7
<i>Abdomen and Pelvis CTA and Abdomen and Pelvis CT (or MRI).....</i>	<i>7</i>
<i>Brain/Neck/Chest/Abdomen and Pelvis CTA</i>	<i>7</i>
<i>Chest and Abdomen or Abdomen and Pelvis CTA.....</i>	<i>8</i>
<i>Neck/Chest/Abdomen and Pelvis CTA.....</i>	<i>8</i>
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
CODING AND STANDARDS	9
CODING	9
CPT Codes	9
APPLICABLE LINES OF BUSINESS	9
BACKGROUND.....	9
<i>Abdominal Aneurysms and General Guidelines for Follow-Up</i>	<i>9</i>
<i>Ultrasound Screening Intervals.....</i>	<i>9</i>
<i>Iliac Artery Aneurysm</i>	<i>10</i>

<i>Contraindications and Preferred Studies</i>	10
POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL.....	11
<i>Committee</i>	11
DISCLAIMER.....	11
REFERENCES	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

CTA

Computed tomography angiography (CTA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms with the use of ionizing radiation, which is a potential hazard in patients with impaired renal function.

Special Note

When vascular imaging of the aorta and both legs is desired (sometimes incorrectly requested as Abdomen and Pelvis CTA & Lower Extremity CTA), only one authorization request is required, using CPT Code 75635 CT Angiography, Abdominal Aorta with Lower Extremity Runoff. This study provides for imaging of the abdomen, pelvis, and both legs.

INDICATIONS FOR ABDOMEN PELVIS CT ANGIOGRAPHY/VENOGRAPHY (CTA/CTV)

Abdominal Aortic Disease

Abdominal Aortic Aneurysm

- **Asymptomatic** known or suspected abdominal aortic aneurysms when prior ultrasound is inconclusive or insufficient **AND** a reason CTA is needed rather than CT has been provided, such as complex vascular anatomy or suspected complications.
- **Symptomatic** known or suspected Abdominal Aortic Aneurysm ^(1,2,3)
 - Symptoms may include:

- Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
- Acute abdominal or back pain with a pulsatile or epigastric mass
- Acute abdominal or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve) ^(1,2,4)

Aortic Syndromes

For initial diagnosis of suspected and follow-up of known aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer

- Frequency for follow up is as clinically indicated

Postoperative Follow-up of Aortic Repair ^(1,2)

Follow-up for post-endovascular repair (EVAR) or open repair of AAA or abdominal extent of iliac artery aneurysms at the following intervals (CT preferred for routine follow-up):

- Routine, baseline post-EVAR study when a reason CTA rather than CT is needed has been provided such as complex anatomy or suspected complications:
 - Within one month of procedure
 - Continued follow up imaging at the following intervals:
 - If no endoleak or sac enlargement is seen:
 - Annually monitor with ultrasound
 - ◆ When US is abnormal or insufficient CT/MR can be using to monitor annually
 - Every 5 years monitor with CT/MR
 - If type II endoleak or sac enlargement is seen at any point in time (US not needed):
 - Monitor every 6 months x 2 years, then annually (does not require US)
- Routine follow up after open repair of AAA when a reason CTA is needed rather than CT has been provided such as complex vascular anatomy or suspected complications:
 - Within 1 year postoperatively then
 - Annually monitor with ultrasound
 - When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR

- If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed as clinically indicated
- Suspected complications such as: new onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair.

Ischemia or Hemorrhage

- To determine the vascular source of retroperitoneal hematoma or hemorrhage when CT is insufficient to determine the source (CT rather than MRA/CTA is the modality of choice for diagnosing hemorrhage) ⁽⁵⁾
- Evaluation of known or suspected mesenteric ischemia/ischemic colitis ⁽⁶⁾
- To localize active lower gastrointestinal bleeding, or non-localized intermittent bleeding in a hemodynamically stable patient when colonoscopy was unsuccessful, contraindicated or unavailable ^(7,8,9)

Other Vascular Abnormalities

- Initial evaluation of inconclusive vascular findings on prior imaging
- For evaluation or monitoring of non-aortic large vessel or visceral vascular disease when ultrasound is inconclusive and imaging of both the abdomen and pelvis are needed ^(1,2,4,10)
 - Includes abnormalities such as aneurysm, dissection, arteriovenous malformations (AVM), vascular fistula, intramural hematoma, compression syndromes and vasculitis involving any of the following: inferior vena cava, superior/inferior mesenteric, celiac, hepatic, splenic or renal arteries/veins
- As part of an extracardiac vascular assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography ⁽¹¹⁾
- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of abdominal pain

Venous Disease

- Suspected venous thrombosis (including renal vein thrombosis and/or portal venous thrombosis) if previous studies (such as ultrasound) have not resulted in a clear diagnosis ⁽¹²⁾
- Known/suspected May-Thurner syndrome (iliac vein compression syndrome) ^(13,14)
- Evaluation of suspected pelvic vascular disease or pelvic congestive syndrome with prior inconclusive ultrasound ⁽¹⁵⁾

- For unexplained lower extremity edema (typically unilateral or asymmetric) with negative or inconclusive Abdomen and/or Pelvis CT ⁽¹⁶⁾

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis) ⁽¹⁷⁾
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery

Pre-Operative Evaluation and/or Pre-Procedural Evaluation

- Evaluation of interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- For imaging of the deep inferior epigastric arteries for surgical planning (breast reconstructive surgery) ⁽¹⁵⁾
- Evaluation of vascular anatomy prior to solid organ transplantation
- Prior to repair of abdominal aortic aneurysm
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) ⁽¹⁸⁾

Post-Operative Evaluation and/or Post-Procedural Evaluation

Unless otherwise specified within the guideline:

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in abdomen and pelvis
- Suspected complications of IVC filters

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):^(19,20)
 - One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:^(21,22)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Marfan syndrome:⁽²³⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(1,24)
- Loeys-Dietz:
 - At diagnosis and then every two years
 - More frequently if abnormalities are found⁽²⁵⁾
- Williams Syndrome:⁽²⁶⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Neurofibromatosis Type 1 (NF-1):⁽²⁷⁾
 - Development of hypertension (including concern for renal artery stenosis)
- Takayasu's Arteritis:⁽²⁸⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Combination Studies

Abdomen and Pelvis CTA and Abdomen and Pelvis CT (or MRI)

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)

Brain/Neck/Chest/Abdomen and Pelvis CTA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis^(19,20)

- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found^(21,22)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found⁽²⁹⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽¹¹⁾

Chest and Abdomen or Abdomen and Pelvis CTA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR)⁽¹⁸⁾
- Marfan syndrome:⁽²³⁾
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(1,24)
- Williams Syndrome⁽²⁶⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection⁽³⁰⁾
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Neck/Chest/Abdomen and Pelvis CTA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated⁽²⁸⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance needed unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

74174

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Abdominal Aneurysms and General Guidelines for Follow-Up

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5 x the normal diameter. Evaluation of AAA can be accurately made by ultrasound which can detect and size AAA with the advantage of being relatively inexpensive, noninvasive, and not requiring iodinated contrast. The limitations are overlying bowel gas which can obscure findings and the technique is operator dependent. Ultrasound is used to screen for and to monitor aneurysms*. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred.

Risk factors for AAA include smoking history, age, male gender, family history of AAA (first degree relative) and personal history of vascular disease. Risk factors for rupture include female gender, large initial aneurysm diameter, low FEV, current smoking history, elevated mean blood pressure and patients on immunosuppression after major organ transplantation. The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk. ⁽²⁾

Ultrasound Screening Intervals

From ⁽¹⁾

- Aneurysm size 2.5–3 cm, every 10 years
- Aneurysm size 3.0–3.9 cm, every 3 years

- Aneurysm size 4.0-4.9 cm, annually
- Aneurysm size 5.0-5.4 cm, every 6 months

Iliac Artery Aneurysm

An iliac artery aneurysm is dilatation of the iliac artery to more than 1.5 times its normal diameter (common iliac artery ≥ 17 mm in men, ≥ 15 mm in women, internal iliac artery > 8 mm.) Surveillance is extrapolated from AAA surveillance and can be done by CTA if ultrasound is not successful. ⁽¹⁰⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Aortic Revised: separated out aortic syndromes to be more clear • Added Genetic Syndromes and Tumors Section • Statement put for contraindications and preferred studies; put in indications and background sections • Combo section adjusted and made uniform • Updated references and background sections
March 2023	<ul style="list-style-type: none"> • Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

	<ul style="list-style-type: none">• Added statement regarding further evaluation of indeterminate findings on prior imaging• Aligned sections across body imaging guidelines
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Isselbacher E M, Preventza O, III J H B, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Journal of the American College of Cardiology*. 2022; 80: e223-e393. doi:10.1016/j.jacc.2022.08.004.
2. Chaikof E L, Dalman R L, Eskandari M K, Jackson B M, Lee W A et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *Journal of Vascular Surgery*. 2018; 67: 2-77.e2. 10.1016/j.jvs.2017.10.044.
3. Murillo H, Molvin L, Chin A, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings from Acute to Chronic Longitudinal Progression. *RadioGraphics*. 2021; 41: 425 - 446. 10.1148/rg.2021200138.
4. Juntermanns B, Bernheim J, Karaindros K, Walensi M, Hoffmann J. Visceral artery aneurysms. *Gefasschirurgie*. 2018; 23: 19-22. 10.1007/s00772-018-0384-x.
5. Verma N, Steigner M L, Aghayev A, Azene E M, Chong S T et al. ACR Appropriateness Criteria® Suspected Retroperitoneal Bleed. *Journal of the American College of Radiology*. 2021; 18: S482 - S487. 10.1016/j.jacr.2021.09.003.
6. Lam A, Kim Y, Fidelman N, Higgins M, Cash B et al. ACR Appropriateness Criteria® Radiologic Management of Mesenteric Ischemia: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S433 - S444. 10.1016/j.jacr.2022.09.006.
7. Strate L, Gralnek I. ACG Clinical Guideline: Management of Patients with Acute Lower Gastrointestinal Bleeding. *Am J Gastroenterol*. Apr 2016; 111: 459-74. 10.1038/ajg.2016.41.
8. American College of Radiology. ACR Appropriateness Criteria® Radiologic Management of Lower Gastrointestinal Tract Bleeding. 2020; 2022:
9. Clerc D, Grass F, Schäfer M, Denys A, Demartines N. Lower gastrointestinal bleeding-Computed Tomographic Angiography, Colonoscopy or both? *World J Emerg Surg*. 2017; 12: 1. 10.1186/s13017-016-0112-3.
10. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *European Journal of Vascular and Endovascular Surgery*. 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
11. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. 2021; 10: 10.3390/jcm10245925.
12. Mazhar H R, Aeddula N R. Renal Vein Thrombosis [Updated 2023 Jun 12]. *StatPearls* [Internet]. Treasure Island (FL). 2023;
13. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164.
14. Shammass N, Jones-Miller S, Kovach T, Radaideh Q, Patel N et al. Predicting Significant Iliac Vein Compression Using a Probability Scoring System Derived from Minimal Luminal Area on Computed Tomography Angiography in Patients 65 Years of Age or Younger. *The Journal of invasive cardiology*. 2021; 33: E16-E18.
15. American College of Radiology. ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery). 2023; 2023:
16. Gasparis A, Kim P, Dean S, Khilnani N, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. Oct 2020; 35: 650-655. 10.1177/0268355520938283.

17. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa*. 2015; 57: e95 - e100. <https://doi.org/10.1016/j.crvasa.2015.02.015>.
18. Hedgire S, Saboo S, Galizia M S, Aghayev A, Bolen M A et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic Valve Replacement: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S501 - S512. 10.1016/j.jacr.2023.08.009.
19. Gornik H L, Persu A, Adlam D, Aparicio L S, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
20. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556.
21. Bowen J M, Hernandez M, Johnson D S, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European journal of human genetics : EJHG*. 2023; 31: 749-760. 10.1038/s41431-023-01343-7.
22. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. *GeneReviews®* [Internet]. 2019;
23. Dietz H. FBN1-Related Marfan Syndrome. [Updated 2022 Feb 17]. *GeneReviews®* [Internet]. 2022;
24. Weinrich J M, Lenz A, Schön G, Behzadi C, Molwitz I et al. Magnetic resonance angiography derived predictors of progressive dilatation and surgery of the aortic root in Marfan syndrome. *PLOS ONE*. 2022; 17: true. <https://doi.org/10.1371/journal.pone.0262826>.
25. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 Mar 1]. *GeneReviews®* [Internet]. 2018;
26. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. *GeneReviews®* [Internet]. 2023;
27. Friedman J. Neurofibromatosis 1. [Updated 2022 Apr 21]. *GeneReviews®* [Internet]. 2022;
28. Maz M, Chung S A, Abril A, Langford C A, Gorelik M et al. 2021 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol*. (Hoboken, N.J.). 2021; 73: 1349-1365. 10.1002/art.41774.
29. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 Mar 1]. *GeneReviews®* [Internet]. 2018;
30. Kicska G, Hurwitz Koweek L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. *Journal of the American College of Radiology*. 2021; 18: S474 - S481. 10.1016/j.jacr.2021.09.004.

EVOLENT CLINICAL GUIDELINE 034-1 FOR ABDOMEN CTA (ANGIOGRAPHY)

Guideline or Policy Number: Evolent_CG_034-1		<u>Applicable Codes</u>
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 All rights Reserved		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
CTA	3
SPECIAL NOTE	3
INDICATIONS FOR ABDOMEN CT ANGIOGRAPHY/CT VENOGRAPHY (CTA/CTV)	4
ABDOMINAL AORTIC DISEASE.....	4
<i>Abdominal Aortic Aneurysm</i>	4
<i>Aortic Syndromes</i>	4
<i>Postoperative Follow-Up of Aortic Repair</i>	4
RENAL ARTERY STENOSIS	5
OTHER VASCULAR ABNORMALITIES	6
VENOUS DISEASE	6
EVALUATION OF TUMOR	6
PRE-OPERATIVE EVALUATION AND/OR PRE-PROCEDURAL EVALUATION	6
POST-OPERATIVE EVALUATION AND/OR POST-PROCEDURAL EVALUATION	7
GENETICS AND RARE DISEASES	7
COMBINATION STUDIES	7
<i>Abdomen CT and Abdomen CTA</i>	7
<i>Abdomen CT (or MRI) and Abdomen CTA (or MRA) and PET</i>	8
<i>Chest/Abdomen CTA</i>	8
<i>Chest and Abdomen or Abdomen and Pelvis CTA</i>	8
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	8
CODING AND STANDARDS	9
CODING	9
<i>CPT Codes</i>	9
APPLICABLE LINES OF BUSINESS	9
BACKGROUND	9
<i>Contraindications and Preferred Studies</i>	9
ABDOMINAL ANEURYSMS	9



<i>General Guidelines for Follow-Up</i>	9
POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	10
GUIDELINE APPROVAL	10
<i>Committee</i>	10
DISCLAIMER	10
REFERENCES	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

CTA

Computed tomography angiography (CTA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms. It is used to evaluate the arteries of the abdominal aorta and the renal arteries. CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function. Abdominal CTA is not used as a screening tool, e.g., evaluation of asymptomatic patients without a previous diagnosis.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

Special Note

For conditions where both abdomen and pelvis imaging are needed and/or the disease process is reasonably expected to involve both the abdomen and pelvis, requests should be resubmitted as Abdomen and Pelvis CTA (CPT 74174). See Evolent Clinical Guideline 069 for Abdomen/Pelvis CTA for coverage indications.

When vascular imaging of the aorta and both legs with Runoff is desired (sometimes incorrectly requested as Abd/Pelvis CTA & Lower Extremity CTA), only one authorization request is required, using CPT Code 75635 (CT Angiography, Abdominal Aorta with Lower Extremity Runoff). This study provides for imaging of the abdomen, pelvis, and both legs. See Evolent Clinical Guideline 035 for Abdominal Aorta CT Angiography with Lower Extremity Runoff for coverage indications.

INDICATIONS FOR ABDOMEN CT ANGIOGRAPHY/CT VENOGRAPHY (CTA/CTV)

Abdominal Aortic Disease

Abdominal Aortic Aneurysm

Asymptomatic known or suspected abdominal aortic aneurysms when prior ultrasound is inconclusive or insufficient **AND** a reason CTA is needed rather than CT has been provided, such as complex vascular anatomy or suspected complications.

- **Symptomatic** known or suspected Abdominal Aortic Aneurysm ^(1,2)
 - Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Acute abdominal or back pain with a pulsatile or epigastric mass
 - Acute abdominal or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve ⁽³⁾)

Aortic Syndromes

- For initial diagnosis of suspected and follow-up of known aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer.
- Frequency for follow up is as clinically indicated

Postoperative Follow-Up of Aortic Repair

Follow-up for post-endovascular repair (EVAR) or open repair of AAA ⁽¹⁾ or abdominal extent of iliac artery aneurysms at the following intervals (CT preferred for routine follow up):

- Routine, baseline post-EVAR study when a reason CTA rather than CT is needed has been provided such as complex anatomy or suspected complications:
 - Within one month of procedure
 - Continued follow up imaging at the following intervals:
 - If no endoleak or sac enlargement is seen:
 - Annually monitor with ultrasound
 - ◆ When US is abnormal or insufficient CT/MR can be using to monitor annually
 - Every 5 years monitor with CT/MR

- If type II endoleak or sac enlargement is seen at any point in time (US not needed):
 - Monitor every 6 months x 2 years, then annually (does not require US)
- Routine follow up after open repair of AAA when a reason CTA is needed rather than CT has been provided such as complex vascular anatomy or suspected complications:⁽²⁾
 - Within 1 year postoperatively then
 - Annually monitor with ultrasound
 - When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR
- If symptomatic or imaging shows increasing or new findings related to stent graft – more frequent imaging may be needed as clinically indicated
- Suspected complications such as: new onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair.

Renal Artery Stenosis

In a patient with hypertension unrelated to recent medication use **AND** prior abnormal or inconclusive ultrasound **AND** any of the following: ^(4,5,6)

- Onset of hypertension prior to the age of 30 without a family history of hypertension and when there is suspicion of fibromuscular dysplasia or a vasculitis
- Failure to obtain adequate blood pressure control on 3 antihypertensive medications, including one diuretic
- Recurrent episodes of sudden onset of congestive heart failure (also known as cardiac disturbance syndrome; may have normal left ventricular function)
- Renal failure of uncertain cause with normal urinary sediment and < 1g of urinary protein per day
- Coexisting diffuse atherosclerotic vascular disease, especially in heavy smokers
- Acute elevation of creatinine after initiation of an angiotensin converting enzyme inhibitor (ACE inhibitor) or angiotensin receptor blocker (ARB)
- Malignant or difficult to control hypertension and unilateral small kidney size (noted on prior imaging)
- New onset of difficult to control or labile hypertension after age 55
- Abdominal bruit lateralizing to one side of the abdomen
- Diagnosis of a syndrome with a higher risk of vascular disease, such as neurofibromatosis ⁽⁷⁾ and Williams' syndrome ⁽⁸⁾

Other Vascular Abnormalities

- Initial evaluation of inconclusive vascular findings on prior imaging
- For evaluation or monitoring of non-aortic large vessel or visceral vascular disease when ultrasound is inconclusive, and finding is limited to the abdomen ^(9,10,11,12)
 - Includes abnormalities such as aneurysm, dissection, arteriovenous malformations (AVM), vascular fistula, intramural hematoma, compression syndromes and vasculitis involving any of the following: inferior vena cava, superior/inferior mesenteric, celiac, hepatic, splenic or renal arteries/veins
- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of abdominal pain, and finding is limited to the abdomen

Venous Disease

Suspected venous thrombosis (including renal vein thrombosis and/or portal venous thrombosis) if previous studies (such as ultrasound) have not resulted in a clear diagnosis and location of disease is confined to the abdomen ⁽¹³⁾

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis) ⁽¹⁴⁾
- Prior to Y90 treatment ⁽¹⁵⁾

Pre-Operative Evaluation and/or Pre-Procedural Evaluation

- Evaluation of transjugular intrahepatic portosystemic shunt (TIPS) when Doppler ultrasound indicates suspected complications ^(16,17,18)
- Evaluation prior to interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of vascular anatomy prior to solid organ transplantation
- Evaluation prior to endovascular aneurysm repair (EVAR) and imaging of the pelvis is not needed
- Evaluation of anatomy (lower pole crossing vessel) prior to UPJ (ureteropelvic junction) obstruction surgery
- Prior to Y90 treatment ⁽¹⁵⁾

Post-Operative Evaluation and/or Post-Procedural Evaluation

Unless Otherwise Specified within the Guideline:

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in abdomen

Genetics and Rare Diseases

- Marfan syndrome:⁽¹⁹⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e. advanced imaging is needed to monitor the thoracic aorta)^(2,20)
- Williams Syndrome:⁽⁸⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Neurofibromatosis Type 1 (NF-1):⁽⁷⁾
 - Development of hypertension (including concern for renal artery stenosis)
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Abdomen CT and Abdomen CTA

- When needed for clarification of vascular invasion from tumor (including renal vein thrombosis)

Abdomen CT (or MRI) and Abdomen CTA (or MRA) and PET

- Prior to Y90 treatment⁽¹⁵⁾

Chest/Abdomen CTA

- Evaluation of extensive vascular disease involving the chest and abdominal cavities when pelvic imaging is not needed
- Significant post-traumatic or post-procedural vascular complications when pelvic imaging is not needed

Chest and Abdomen or Abdomen and Pelvis CTA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR)⁽²¹⁾
- Marfan syndrome:⁽¹⁹⁾
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e. advanced imaging is needed to monitor the thoracic aorta)^(2,20)
- Williams Syndrome⁽⁸⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection⁽²²⁾
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

74175

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).

Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Abdominal Aneurysms

General Guidelines for Follow-Up

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5 x the normal diameter. Ultrasound can detect and size AAA, with the advantage of being relatively inexpensive, noninvasive, and not requiring iodinate contrast. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Separated out aortic syndromes to be more clear • EVAR studies clarified order of which studies would be ordered • Renal artery stenosis: updated per new clinical guidance • Added Genetic Syndromes and Tumors Section • Statement put in all Guidelines for contraindications put in indications and background sections • Combo section adjusted and made uniform • Updated references and background section
March 2023	<ul style="list-style-type: none"> • Redirected vascular requests for abdomen alone or pelvis imaging alone to resubmit as abdomen and pelvis CTA required unless condition limited to abdomen • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its



sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Chaikof E, Dalman R, Eskandari M, Jackson B, Lee W et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg.* Jan 2018; 67: 2-77.e2. 10.1016/j.jvs.2017.10.044.
2. Isselbacher E M, Preventza O, Hamilton Black J 3, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation.* 2022; 146: e334-e482. 10.1161/CIR.0000000000001106.
3. Murillo H, Molvin L, Chin A, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings from Acute to Chronic Longitudinal Progression. *Radio Graphics.* 2021; 41: 425 - 446. 10.1148/rg.2021200138.
4. Harvin H, Verma N, Nikolaidis P, Hanley M, Dogra V et al. ACR Appropriateness Criteria(®) Renovascular Hypertension. *J Am Coll Radiol.* Nov 2017; 14: S540-s549. 10.1016/j.jacr.2017.08.040.
5. Matsumoto A, Brejt S, Caplin D, Ignacio E, Kaufman C et al. ACR–SIR PRACTICE PARAMETER FOR THE PERFORMANCE OF ANGIOGRAPHY, ANGIOPLASTY, AND STENTING FOR THE DIAGNOSIS AND TREATMENT OF RENAL ARTERY STENOSIS IN ADULTS. The American College of Radiology. 2021 [Revised]; <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/RenalArteryStenosis.pdf>.
6. Samadian F, Dalili N, Jamalain A. New Insights Into Pathophysiology, Diagnosis, and Treatment of Renovascular. *Iranian journal of kidney diseases.* 2017; 11: 79-89.
7. Friedman J. Neurofibromatosis 1. Adam MP, Feldman J, Mirzaa GM, et al./editors. *GeneReviews* [Internet]. 1998 [Updated 2022].
8. Morris C. Williams Syndrome. Adam MP, Feldman J, Mirzaa GM, et al., *GeneReviews* [Internet]. 1999 [Updated 2023];
9. Juntermanns B, Bernheim J, Karaindros K, Walensi M, Hoffmann J. Visceral artery aneurysms. *Gefasschirurgie.* 2018; 23: 19-22. 10.1007/s00772-018-0384-x.
10. Makazu M, Koizumi K, Masuda S, Jinushi R, Shionoya K. Spontaneous retroperitoneal hematoma with duodenal obstruction with diagnostic use of endoscopic ultrasound: A case series and literature review. *Clinical Journal of Gastroenterology.* 2023; 16: 377 - 386. 10.1007/s12328-023-01780-3.
11. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *Eur J Vasc Endovasc Surg.* 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
12. Knuttinen M, Xie K, Jani A, Palumbo A, Carrillo T. Pelvic Venous Insufficiency: Imaging Diagnosis, Treatment Approaches, and Therapeutic Issues. *American Journal of Roentgenology.* 2015; 204: 448 - 458. 10.2214/AJR.14.12709.
13. Mazhar H, Aeddula N. Renal Vein Thrombosis [Updated 2023 Jun 12]. *StatPearls* [Internet]. Treasure Island (FL). 2023; <https://www.ncbi.nlm.nih.gov/books/NBK536971/>.
14. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa.* 2015; 57: e95 - e100. <https://doi.org/10.1016/j.crvasa.2015.02.015>.
15. Kim S, Cohalan C, Kopek N, Enger S. A guide to (90)Y radioembolization and its dosimetry. *Phys Med.* Dec 2019; 68: 132-145. 10.1016/j.ejmp.2019.09.236.
16. Darcy M. Evaluation and management of transjugular intrahepatic portosystemic shunts. *AJR Am J Roentgenol.* Oct 2012; 199: 730-6. 10.2214/ajr.12.9060.

17. Dariushnia S R, Haskal Z J, Midia M, Martin L G, Walker T G et al. Quality Improvement Guidelines for Transjugular Intrahepatic Portosystemic Shunts. *J Vasc Interv Radiol*. 2016; 27: 1-7. 10.1016/j.jvir.2015.09.018.
18. Farsad K, Kolbeck K. Clinical and radiologic evaluation of patients before TIPS creation. *AJR Am J Roentgenol*. Oct 2014; 203: 739-45. 10.2214/ajr.14.12999.
19. Dietz H. FBN1-Related Marfan Syndrome [Updated 2022 Feb 17]. *GeneReviews®* [Internet]. 2022.
20. Weinrich J M, Lenz A, Schön G, Behzadi C, Molwitz I et al. Magnetic resonance angiography derived predictors of progressive dilatation and surgery of the aortic root in Marfan syndrome. *PLOS ONE*. 2022; 17: true. <https://doi.org/10.1371/journal.pone.0262826>.
21. Hedgire S S, Saboo S S, Galizia M S, Aghayev A, Bolen M A et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic Valve Replacement: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S501 - S512. 10.1016/j.jacr.2023.08.009.
22. Kicska G, Hurwitz Kowek L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. *Journal of the American College of Radiology*. 2021; 18: S474 - S481. 10.1016/j.jacr.2021.09.004.



EVOLENT CLINICAL GUIDELINE 068 FOR ABDOMEN PELVIS CT

Guideline or Policy Number: Eovlent_CG_068	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS FOR ABDOMEN/PELVIS CT	3
EVALUATION OF ABDOMINAL PAIN OF UNKNOWN ETIOLOGY	3
INFLAMMATORY BOWEL DISEASE.....	4
EVALUATION OF INFLAMMATION AND INFECTION	4
<i>Peritonitis.....</i>	<i>4</i>
<i>Diverticulitis or Acute Appendicitis</i>	<i>4</i>
<i>Pancreatitis</i>	<i>5</i>
<i>Other Causes of Inflammation or Infection</i>	<i>5</i>
GASTROINTESTINAL	6
<i>Suspected Small Bowel Obstruction</i>	<i>6</i>
<i>Gastrointestinal Hemorrhage and Ischemia</i>	<i>6</i>
GENITOURINARY	6
<i>Evaluation of Hematuria</i>	<i>6</i>
<i>Evaluation of Known/Suspected Kidney or Ureteral Stone</i>	<i>6</i>
<i>Preoperative Urinary Stone Planning.....</i>	<i>7</i>
<i>Postoperative Urinary Stone Follow-up CT</i>	<i>7</i>
<i>Evaluation of Pyelonephritis</i>	<i>7</i>
<i>Evaluation of Complicated Urinary Tract Infection.....</i>	<i>8</i>
ABDOMINAL AORTIC DISEASE.....	8
<i>Abdominal Aortic Aneurysm (AAA)</i>	<i>8</i>
SUSPECTED OR KNOWN HERNIA	9
OTHER INDICATIONS FOR ABDOMEN/PELVIC CT COMBO	10
<i>Transplants</i>	<i>10</i>
<i>Trauma</i>	<i>10</i>
SUSPECTED MALIGNANCY	10
KNOWN MALIGNANCY.....	11
<i>Initial Staging</i>	<i>11</i>
<i>Restaging.....</i>	<i>12</i>
<i>Surveillance</i>	<i>12</i>



PRE-OPERATIVE EVALUATION	14
POST-OPERATIVE/PROCEDURAL EVALUATION	14
GENETIC SYNDROMES AND RARE DISEASES.....	14
COMBINATION STUDIES	15
<i>Abdomen and Pelvis CTA and Abdomen and Pelvis CT (or MRI)</i>	15
<i>Chest/Abdomen and Pelvis CT</i>	15
<i>Chest/Abdomen and Pelvis CT and PET</i>	15
<i>Sinus/Chest/Abdomen and Pelvis CT and Brain MRI</i>	15
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	15
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	16
CODING AND STANDARDS	16
CODING	16
<i>CPT Codes</i>	16
APPLICABLE LINES OF BUSINESS	16
BACKGROUND	16
CANCER IMAGING	16
<i>Bladder Cancer</i>	16
FEVER OF UNKNOWN ORIGIN	16
PARANEOPLASTIC SYNDROMES.....	17
WEIGHT LOSS	17
CONTRAINDICATIONS AND PREFERRED STUDIES	18
POLICY HISTORY	18
<i>Summary</i>	18
LEGAL AND COMPLIANCE	19
GUIDELINE APPROVAL.....	19
<i>Committee</i>	19
DISCLAIMER.....	19
REFERENCES.....	20

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Abdomen and Pelvis Computed Tomography (CT) uses radiation to generate images of the organs and structures in the abdomen and pelvis.

INDICATIONS FOR ABDOMEN/PELVIS CT

Evaluation of Abdominal Pain of Unknown Etiology

- After initial workup of abdominal pain including laboratory evaluation and initial imaging has not revealed a cause when results of the following are provided:⁽¹⁾
 - Appropriate laboratory testing (chemistry profile, complete blood count, and/or urinalysis) for the patient's presentation (e.g., suprapubic pain – UA, suspected pancreatitis – amylase/lipase etc.) **AND**
 - Initial imaging (such as ultrasound, barium study, nuclear medicine, or scope study) appropriate to the symptoms
 - Not all of the above tests need to be performed, but both labs and initial imaging need to be performed
 - E.g., for GI bleeding, CBC and a scope study would be appropriate initial testing (however, a UA and ultrasound would not be)
- For acute abdominal pain in a patient over the age of 65⁽²⁾
- Initial evaluation of abnormal findings seen on other imaging, such as ultrasound (US) or x-ray, both the abdomen and pelvis are likely affected, and CT is the most reasonable next step for that diagnosis

Inflammatory Bowel Disease ^(3,4,5)

- For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis (includes CT enterography (CTE), however, MRE should be considered for age < 35 to reduce radiation exposure)
 - For suspected inflammatory bowel disease after complete work up including physical exam, labs, and recent colonoscopy
 - Known inflammatory bowel disease with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy

Evaluation of Inflammation and Infection

Peritonitis

Suspected or known recent peritonitis **AND** at least one of the following:

- Rebound, guarding (not voluntary) or rigid abdomen, **OR**
- Severe tenderness to palpation present over entire abdomen

Diverticulitis or Acute Appendicitis ^(6,7)

- Suspected diverticulitis or acute appendicitis** for initial imaging with at least **ONE** of the following:⁽⁸⁾
 - WBC Elevated
 - Fever
 - Anorexia
 - Nausea and vomiting
- **Use ultrasound or MRI in pregnant women with suspected appendicitis⁽⁹⁾
- Suspected appendicitis in a child (< age 18)⁽¹⁰⁾ when ultrasound is inconclusive or cannot be completed due to body habitus or inability to cooperate **OR** when peritoneal signs are present (guarding, rebound) or other red flags
- Suspected diverticulitis when:⁽¹¹⁾
 - Pain is present in the LLQ (<3 months duration), medical records note suspicion for diverticulitis, the patient has no prior history of diverticulitis **AND** either:
 - LLQ tenderness is present on exam; **OR**
 - Patient is immunocompromised; **OR**
 - Patient has a history of diverticulitis, symptoms are similar to prior episodes, **AND** patient has failed treatment currently (treatment could be liquid diet or antibiotic)

- Complications of diverticulitis (diagnosed either clinically or by imaging) with severe abdominal/pelvic pain or severe tenderness or mass not responding to antibiotic treatment⁽⁷⁾

Pancreatitis ⁽¹²⁾

Suspected or known acute pancreatitis when there is a reason to suspect extension beyond abdomen, into pelvis

- Initial imaging for suspected acute pancreatitis due to epigastric pain with elevated amylase and/or lipase:
 - Mild presentation when symptom improvement is not seen after 72 hours of treatment and either:
 - Ultrasound has been performed and did not show an abnormality such as gallstones, dilated bile duct
 - Ultrasound suggests complications (such as fluid collection)
 - Severe presentation (such as fever, elevated WBC)
 - Decline in clinical status and/or suspected complication
- Known necrotizing pancreatitis requiring follow-up
- Pancreatitis by history (including pancreatic pseudocyst) with continued abdominal pain, early satiety, nausea, vomiting, or signs of infection greater than 4 weeks from initial presentation when there is reason to suspect extensive disease extending into the pelvis (otherwise CT abdomen)⁽¹²⁾

Other Causes of Inflammation or Infection

- Any known infection that is clinically suspected to have created an abscess in the abdomen and pelvis
- For acute non-localized abdominal pain and fever⁽¹³⁾
- Any history of fistula that requires re-evaluation or is suspected to have recurred in the abdomen and pelvis
- Abnormal fluid collection seen on prior imaging that needs follow-up evaluation
- For suspected retroperitoneal fibrosis after labs and ultrasound have been completed and other etiologies for symptoms have been excluded (is a diagnosis of exclusion)⁽¹⁴⁾
- For known retroperitoneal fibrosis to determine extent of disease

Gastrointestinal

Suspected Small Bowel Obstruction

- Crampy pain, vomiting, distention, high pitched or absent bowel sounds, prior history of abdominal surgery, or based on initial x-ray⁽¹⁵⁾

Gastrointestinal Hemorrhage and Ischemia

- Suspected colonic or mesenteric ischemia (CTA also appropriate)⁽¹⁶⁾
- Suspected small bowel bleeding when endoscopy and capsule endoscopy are inconclusive or negative⁽¹⁷⁾

Genitourinary

Evaluation of Hematuria ^(18,19)

For evaluation of hematuria when stone is **NOT** suspected (includes CT urography (CTU))

- Documented by 3 or more red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick test **AND** at least one of the following:
 - Age > 60; **OR**
 - 30+ pack year smoking history
- > 25 RBC/hpf and infection has been excluded
- If not high risk (based on age, smoking history or > 25 RBC/hpf as above) need equivocal or abnormal renal ultrasound prior to CT
- Gross hematuria
 - UA must be negative for infection
 - UA can be negative for blood if hematuria is witnessed by patient or provider

NOTE: If a previous "routine" CT abdomen/pelvis has been done (with or with/without contrast), and a CTU is later requested, the previous CT must show a clear reason that additional delayed post-contrast images of the collecting system are needed.

Evaluation of Known/Suspected Kidney or Ureteral Stone

For evaluation of known or suspected kidney or ureteral stone in a patient with acute flank pain⁽²⁰⁾

- CT is indicated if one or more of the following is present:
 - Atypical presentation (i.e., fever or WBC >15,000)
 - Inadequate analgesia

- Abnormal or indeterminate ultrasound (with findings needing further evaluation with CT)
- KUB has been provided and is highly suggestive of kidney or ureteral stone (US is the preferred initial imaging test but if provided, information on KUB can be used to make decision)
- Ultrasound should be performed PRIOR to CT in the following situations (CT is needed only if US is inconclusive or has findings that need further imaging):
 - Pediatric and pregnant patients (MRU preferred if further imaging indicated)
 - Typical presentation without signs/symptoms of infection in a patient < 65
- CT is allowed for acute abdominal pain, in general, for patients >65

Preoperative Urinary Stone Planning ⁽²¹⁾

- CT is indicated when no imaging has been done in the last 30 days, or if passage or movement of stones will change management

Postoperative Urinary Stone Follow-up CT ⁽²²⁾

- Symptomatic patients following:
 - Ureteroscopic extraction of an intact stone
 - Ureteroscopy with lithotripsy/fragmentation of a radiolucent stone
 - Percutaneous Nephrolithotomy
- Further evaluation of hydronephrosis seen on post-operative ultrasound (following ureteroscopy or ESWL)

Evaluation of Pyelonephritis ^(23,24)

When other imaging such as ultrasound is abnormal

- For a patient who remains febrile after 72 hours of treatment or has deterioration in clinical status
- With the following co-morbid conditions: personal history of stone disease or renal obstruction, recurrent pyelonephritis, vesicoureteral reflux, immune compromise, prior renal transplant with native kidneys in place, advanced age or lack of response to initial therapy (based on culture)

Evaluation of Complicated Urinary Tract Infection

- **Women:** UTI is considered complicated (and therefore imaging (ultrasound and/or CT) is warranted) in any of the following situations (may be done after resolution of infection)
 - Immunocompromised host
 - Persistence of bacteria or symptoms after culture specific treatment,
 - Rapid recurrence with same bacteria after treatment,
 - Multidrug resistant bacteria
 - When there is suspicion of renal calculi or obstruction^(23,25)
- **Men:** Any UTI is considered complicated due to high likelihood of anatomic abnormalities; therefore imaging (ultrasound and/or CT) is warranted⁽²⁶⁾

Abdominal Aortic Disease

Abdominal Aortic Aneurysm (AAA)

- **Asymptomatic** known or suspected AAA: CT is indicated **ONLY** when prior ultrasound is inconclusive or insufficient^(27,28,29) at the following intervals.
 - Aneurysm size 2.5–3 cm: every 10 years
 - Aneurysm size 3.0–3.9 cm: every 3 years
 - Aneurysm size 4.0–4.9 cm: annually
 - Aneurysm size 5.0–5.4 cm: every 6 months
- **Symptomatic** known or suspected AAA (such as recent-onset abdominal pain or back pain, particularly in the presence of a pulsatile or epigastric mass, suspected dissection, or significant risk factors for AAA) CTA/MRA is appropriate and generally preferred over CT/MRI. (If contrast is contraindicated or other clinical indications for abdomen and/or pelvic imaging are present, then CT/MR may be approved rather than CTA/MRA)
- If there is known complex anatomy, CTA/MRA may be needed.
- Suspected complications of known aneurysm as evidenced by signs/symptoms such as new onset of abdominal or pelvic pain (MRA/CTA preferred)
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA) or abdominal extent of iliac artery aneurysms⁽³⁰⁾
 - Routine, baseline post-EVAR study:
 - Within 1 month of the procedure
 - Continued follow-up at the following intervals:
 - If no endoleak or sac enlargement is seen:

- ◆ Annually monitor with ultrasound
 - ◇ When US is abnormal or insufficient CT/MR can be used to monitor annually
- ◆ Every 5 years monitor with CT/MR
 - If type II endoleak or sac enlargement is seen at any point in time:
 - ◆ Every 6 months x 2 years, then annually (does not require US)
- Routine follow-up after open repair of AAA:
 - Within 1 year postoperatively then
 - Annually monitor with ultrasound
 - When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR
 - If symptomatic or imaging shows increasing, or new findings related to stent graft - more frequent imaging may be needed
 - Suspected complication such as: new-onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in the peritoneal cavity

Suspected or Known Hernia ⁽³¹⁾

- Abdominal/pelvic pain suspected to be due to an occult, Spigelian, or incisional hernia when physical exam and prior imaging is non-diagnostic or equivocal **OR** if requested as a preoperative study
 - If inguinal hernia is suspected, reason to suspect abdominal involvement is needed (otherwise CT Pelvis is indicated)
 - If umbilical hernia is suspected, reason to suspect pelvic involvement is needed (otherwise CT Abdomen is indicated)
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain, or guarding), physical exam (guarding, rebound) or prior imaging ⁽³²⁾
- For confirming the diagnosis of a recurrent hernia when ultrasound is negative or non-diagnostic
- Complex ventral hernia that is ≥ 10 cm for pre-operative planning ⁽³²⁾

- Deep intraabdominal/pelvic hernia is suspected (post-Roux-en-Y, obturator, sciatic or perineal) (does not require US first but this type of hernia needs to be specified in notes)

Other Indications for Abdomen/Pelvic CT Combo ⁽³³⁾

- For fever of unknown origin (temperature of ≥ 101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see **Background** section)⁽³⁴⁾
- For acute unilateral (or asymmetric) lower extremity edema with negative or inconclusive doppler US
- For chronic unilateral (or asymmetric) lower extremity edema and suspicion of malignant cause⁽³⁵⁾
- For evaluation of suspected May-Thurner syndrome (CTV/MRV preferred)⁽³⁶⁾
- For further evaluation of a new onset or non-reducible varicocele⁽³⁷⁾

Transplants

- Prior to solid organ transplantation
- For initial workup prior to Bone Marrow Transplantation (BMT)

Trauma ⁽³⁸⁾

- Suspected retroperitoneal hematoma or hemorrhage based on lab or physical findings
- Blunt injury with suspicion of multisystem trauma and hematuria
- Penetrating abdominal injury with suspicion of multisystem trauma with or without hematuria

Suspected Malignancy

Unconfirmed diagnosis of cancer, for further evaluation of indeterminate or questionable findings:

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study, such as ultrasound (US)^(39,40)
 - One follow-up exam to ensure no suspicious change has occurred in a tumor. No further surveillance imaging unless tumor(s) is/are specified as highly suspicious, or change was found on exam or last follow-up imaging.

- For abnormal incidental abdominopelvic lymph nodes when follow-up is recommended based on prior imaging (initial 3-month FU)⁽⁴¹⁾
- For follow-up of mesenteric panniculitis^(42,43,44) or lymphadenitis⁽⁴⁵⁾ when another diagnosis is suspected after initial imaging or there is a failure of symptom resolution
- For further evaluation of any of the following:
 - Clinically significant unintentional weight loss i.e., $\geq 5\%$ of body weight in less than 12 months, with signs or symptoms suggestive of an abdominal cause (see **Background**)
 - Weight loss of $\geq 5\%$ over 12 months when initial evaluation with Chest X-ray, age-appropriate cancer screening (such as colonoscopy and mammography), labs (including CBC, CMP, HbA1C, TSH, stool hemocult, ESR/CRP, HIV, Hepatitis C) fail to identify a cause **AND** there is documented further decline in weight
 - Suspected paraneoplastic syndrome (including dermatomyositis) when appropriate workup has been done and there is a suspicion of malignancy
 - To locate a pheochromocytoma once there is clear biochemical evidence⁽⁴⁶⁾
 - For suspected gestational trophoblastic disease when chest imaging suggests distant disease⁽⁴⁷⁾
 - For elevation of persistently elevated carcinoembryonic antigen (CEA) in a patient with no cancer history after completing clinical workup (including laboratory evaluation (including CBC, CMP, repeat CEA), initial imaging (ultrasound) and colonoscopy), no cause identified and CEA is >10 ng/ml, or fails to drop below 5 ng/ml after 3-6 months intervals
 - For evaluation of thrombocytosis or thrombocytopenia when one or more of the following are present:
 - Any additional cytopenia (i.e., leukopenia, anemia)
 - LDH elevation
 - Splenomegaly on exam or imaging
 - Palpable lymphadenopathy
 - Bone marrow biopsy has been completed and concern for myeloproliferative disorder persists
 - Genetic mutation increasing risk of myeloproliferative disorder (such as JAK-2 mutation) on peripheral smear or bone marrow biopsy⁽⁴⁸⁾

Known Malignancy

Initial Staging

- Abdomen and Pelvis CT is appropriate for initial staging of the majority of malignancies when either biopsy proven or suspected based on prior imaging

Restaging

- Abdomen and Pelvis CT is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the majority of cancers
- Abdomen and Pelvis CT is indicated **in addition to PET** while on active treatment every 2-3 cycles of chemo or immunotherapy for the following: Hodgkin Lymphoma, Pediatric Aggressive Mature B-Cell Lymphomas, Pediatric Hodgkin Lymphoma

Surveillance

Abdomen and Pelvis CT is indicated during surveillance for the following malignancies at the intervals defined below:

- Adrenocortical Carcinoma: every 3-12 months for 5 years then as clinically indicated
- Anal Carcinoma: every 3-6 months for 1-2 years, then every 6-12 months for an additional year
- Biliary Tract Cancers (Ampullary Adenocarcinoma, Cholangiocarcinomas and Gallbladder): every 3-6 months for 2 years then every 6-12 months for up to 5 years then as clinically indicated
- Bone Tumors and Sarcomas (Chondrosarcoma, Chordoma, Giant Cell Tumor of Bone, Ewing Sarcoma, Soft Tissue Sarcoma, Osteosarcoma)
 - Every 3-6 months for 5 years, then annually for an additional 5 years then as clinically indicated
- Bladder Cancer:
 - Non-muscle invasive:
 - Low risk and Intermediate risk: once at baseline at end of treatment then at clinically indicated
 - **High risk***: once at baseline then annually until 10 years from end of treatment then as clinically indicated
 - Muscle Invasive: every 3-6 months for 2 years, then annually for up to 5 years then as clinically indicated
- Colon Cancer (Stage II or higher): every 6-12 months for 5 years, then as clinically indicated
- Esophageal and Esophagogastric Junction Cancers: every 3-6 months for 2 years, then annually for up to 5 years
- Gastric Cancer: every 6 months for 2 years, then annually up to 5 years then as clinically indicated
- Hepatocellular Carcinoma: every 3-6 months for 2 years, then every 6 months indefinitely

- Lymphoma (Follicular, Diffuse Large B-Cell, Burkitt, Hodgkin, Marginal Zone, T-Cell) and Hairy Cell Leukemia:
 - Every 3-6 months for 2 years, then annually
- Melanoma (stage II or higher): every 3-12 months for 2 years then every 6-12 months for 3 years, then as clinically indicated
- Merkel Cell Carcinoma every 3-6 months for 3 years, then every 6-12 months indefinitely
- Mesothelioma (Pleural and Peritoneal): every 3-6 months for 5 years then annually until 10 years, then as clinically indicated
- Neuroblastoma: every 3 months for 1 year, then every 6-12 months for 2 years, then as clinically indicated
- Neuroendocrine Tumors: every 3-6 months for 5 years then every 6-12 months for 5 years, then as clinically indicated
- Occult Primary Tumors: every 3-6 months for 2 years, then every 6-12 months for 3 years then annually
- Ovarian cancer: every 3-6 months for 2 years then every 6-12 months for 3 years, then as clinically indicated
- Pancreatic cancer: every 3-6 months for 2 years, then every 6-12 months as clinically indicated
- Penile cancer: Every 3-6 months for 2 years, then every 6-12 months for an additional 3 years, then as clinically indicated
- Prostate Cancer (observation): as clinically indicated for rising PSA or symptoms suggestive of progression
- Renal Cell Carcinoma:
 - Stage I - within 3-6 months of treatment then annually for 5 years, then as clinically indicated
 - Stage II and higher - every 3-6 months for 3 years, then annually for 2 years, then as clinically indicated
- Rectal Cancer:
 - Stage II, III - every 6-12 months for 5 years, then as clinically indicated
 - Stage IV - every 3-6 months for 2 years, every 6-12 months for a total of 5 years then as clinically indicated
- Small Bowel Adenocarcinoma: every 6-12 months for 5 years then as clinically indicated
- Small Cell Lung Cancer: every 2 months for the first year, every 3-4 months for years 2 and 3 then every 6 months during years 4 and 5 then annually then as clinically indicated

- Testicular cancer: every 3 months for 1 year, then every 6 months for 1 year then annually for 2 years then as clinically indicated
- Urothelial Carcinoma of the Prostate, Primary Carcinoma of the Urethra): high risk patients only: every 3-6 months for 2 years then annually then as clinically indicated
- Uveal Melanoma: every 6-12 months for 10 years then as clinically indicated
- Wilm's Tumor: every 3 months for 2 years then every 6 months for 2 years then as clinically indicated

NOTE: For any patient with stage IV cancer (any type) that is either in remission or on a treatment break, Abdomen and Pelvis CT is indicated every 3-6 months

When a cancer is not listed above, Abdomen and Pelvis CT is not routinely a part of surveillance for that cancer in an asymptomatic patient. There would need to be a sign or symptom of recurrence to consider Abdomen and Pelvis CT.

When the timeframe above for routine surveillance has elapsed, there would need to be a sign or symptom of recurrence to consider Abdomen and Pelvis CT.

Pre-Operative Evaluation

- For abdominal/pelvic surgery or procedure

Post-Operative/Procedural Evaluation ⁽¹³⁾

- Follow-up of known or suspected post-operative complication
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Genetic Syndromes and Rare Diseases

- FAP (Familial Adenomatous Polyposis, annual screening of abdomen and pelvis with MRI or CT for one or more of the following: personal history of desmoid tumor, family history of desmoid tumor or abdominal symptoms suggestive of desmoid tumor⁽⁴⁹⁾)
- MEN1 (Multiple Endocrine Neoplasia type 1): annually if MRI is contraindicated or cannot be performed⁽⁵⁰⁾
- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes/SDHx mutations) every 2-3 years IF whole body MRI (unlisted MRI CPT 76498) is not available **AND** CI to MRI exists. ⁽⁵¹⁾
- William's Syndrome⁽⁵²⁾ **AND** acute abdominal pain
- Vascular Ehlers-Danlos (vEDS)^(53,54) **AND** acute abdominal pain

- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

NOTE: For syndromes for which imaging starts in the pediatric age group, MRI preferred

Combination Studies

Abdomen and Pelvis CTA and Abdomen and Pelvis CT (or MRI)

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)

Chest/Abdomen and Pelvis CT

- As numerous disease processes, including but not limited to malignancy, may affect the chest, abdomen and pelvis, this combination is indicated when the guideline criteria for **BOTH** Chest CT and Abdomen and Pelvis CT have been met.

Chest/Abdomen and Pelvis CT and PET

- CT of the original sites of disease is indicated **in addition to PET** while on active treatment every 2-3 cycles of chemo or immunotherapy for the following: Hodgkin Lymphoma, Pediatric Aggressive Mature B-Cell Lymphomas, Pediatric Hodgkin Lymphoma

Sinus/Chest/Abdomen and Pelvis CT and Brain MRI

- Prior to Bone Marrow Transplantation

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:

- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

74176, 74177, 74178, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Cancer Imaging

Bladder Cancer

Bladder cancer high risk is defined as high grade (Grade 3) tumor AND any one of the following: associated CIS, T1, tumor > 3 cm or multifocal, BCG refractory (unresponsive to BCG), variant histology (micropapillary, plasmacytoid, small cell), presence of lymphovascular invasion, or prostatic urethral invasion.

Fever of Unknown Origin

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete

metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test. Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

Paraneoplastic Syndromes

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging.

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For SIADH (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.

For hypercalcemia (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen, and pelvis imaging as appropriate.

For Cushing syndrome (hypokalemia, normal-high midnight serum ACTH NOT suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test DOES suppress ACTH, pituitary MRI is reasonable.

For hypoglycemia, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-peptide, and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrant CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrant chest and abdominal imaging.

When a paraneoplastic neurologic syndrome is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Weight Loss

Unintentional weight loss is considered clinically significant if the amount of weight lost over 12 months is $\geq 5\%$. Older age and higher percentage of weight loss correlates with higher likelihood of malignancy. A targeted evaluation is recommended when there are signs or symptoms suggestive of a specific source. For example, when there is clinically significant weight loss with abdominal pain that prompts an evaluation for an abdominal source of the weight loss; CXR and labs such as TSH would not be needed prior to abdominal imaging.

Conversely a smoker with a cough and weight loss would not start with abdominal imaging, a chest x-ray (CXR) would be the first test to start with. When there is no suspected diagnosis, initial evaluation includes CXR, age-appropriate cancer screening (such as colonoscopy and mammography) and labs (including CBC, CMP, HbA1C, TSH, stool hemoccult, ESR/CRP, HIV, Hepatitis C). If this initial evaluation fails to identify a cause of weight loss, then the patient is monitored and if progressive weight loss is seen on subsequent visits/weights, then CT Abdomen/Pelvis is reasonable (MRI if there is a contraindication to CT such as contrast allergy or impaired renal function). Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Combination studies section adjusted to make uniform with all other guidelines • Added Genetic Syndromes and Tumors Section • Added contraindications and preferred studies section • Moved sections/indications throughout for better indications grouping • Updated references and background
March 2023	<ul style="list-style-type: none"> • Prostate cancer: updated guidance based on new NCCN criteria • IBD: clarified indications • Pancreas: specified guidance on pancreatitis • Pyelonephritis: clarified risk factors and indications • Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging • Hernia: clarified hernia types and indicated studies

	<ul style="list-style-type: none"> • Transplant: added section • Other: specified guidance for weight loss, paraneoplastic syndrome, edema; added indications for thrombocytopenia, gestational trophoblastic disease, cancer predisposition syndromes • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Basta Nikolic M, Spasic A, Hadnadjev Simonji D, Stojanović S, Nikolic O. Imaging of acute pelvic pain. *The British journal of radiology*. 2021; 94: 10.1259/bjr.20210281.
2. Henrichsen T, Maturen K, Robbins J, Akin E, Ascher S et al. ACR Appropriateness Criteria® Postmenopausal Acute Pelvic Pain. *Journal of the American College of Radiology*. 2021; 18: S119 - S125. <https://doi.org/10.1016/j.jacr.2021.02.003>.
3. Lichtenstein G, Loftus E, Isaacs K, Regueiro M, Gerson L. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Official journal of the American College of Gastroenterology | ACG*. 2018; 113: 10.1038/ajg.2018.27.
4. Kim D, Chang K, Fowler K, Cash B, Garcia E et al. ACR Appropriateness Criteria® Crohn Disease. *Journal of the American College of Radiology*. 2020; 17: S81 - S99. 10.1016/j.jacr.2020.01.030.
5. Rubin D, Ananthakrishnan A, Siegel C, Sauer B, Long M. ACG Clinical Guideline: Ulcerative Colitis in Adults. *Official journal of the American College of Gastroenterology | ACG*. 2019; 114: 10.14309/ajg.0000000000000152.
6. Cartwright S, Knudson M. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician*. 2015; 91: 452-9.
7. Weinstein S, Kim D, Fowler K, Birkholz J, Cash B et al. ACR Appropriateness Criteria® Left Lower Quadrant Pain: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S471 - S480. 10.1016/j.jacr.2023.08.013.
8. Linzay C, Pandit S. Acute Diverticulitis. [Updated 2023 Aug 8]. StatPearls Publishing [Internet]. 2023; Accessed May 2024:
9. Kambadakone A, Santillan C, Kim D, Fowler K, Birkholz J et al. ACR Appropriateness Criteria® Right Lower Quadrant Pain: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S445 - S461. 10.1016/j.jacr.2022.09.011.
10. Koberlein G, Trout A, Rigsby C, Iyer R, Alazraki A et al. ACR Appropriateness Criteria® Suspected Appendicitis-Child. *Journal of the American College of Radiology*. 2019; 16: S252 - S263. 10.1016/j.jacr.2019.02.022.
11. Peery A, Shaukat A, Strate L. AGA Clinical Practice Update on Medical Management of Colonic Diverticulitis: Expert Review. *Gastroenterology*. 2021; 160: 906 - 911.e1. 10.1053/j.gastro.2020.09.059.
12. Porter K, Zaheer A, Kamel I, Horowitz J, Arif-Tiwari H et al. ACR Appropriateness Criteria® Acute Pancreatitis. *Journal of the American College of Radiology*. 2019; 16: S316 - S330. 10.1016/j.jacr.2019.05.017.
13. Scheirey C, Fowler K, Therrien J, Kim D, Al-Refaie W et al. ACR Appropriateness Criteria® Acute Nonlocalized Abdominal Pain. *Journal of the American College of Radiology*. 2018; 15: S217 - S231. 10.1016/j.jacr.2018.09.010.
14. Engelskjerd J, LaGrange C. Retroperitoneal Fibrosis. [Updated 2022 Sep 12]. In: StatPearls Publishing [Internet]. 2022;
15. Chang K, Marin D, Kim D, Fowler K, Camacho M et al. ACR Appropriateness Criteria® Suspected Small-Bowel Obstruction. *Journal of the American College of Radiology*. 2020; 17: S305 - S314. 10.1016/j.jacr.2020.01.025.
16. Ginsburg M, Obara P, Lambert D, Hanley M, Steigner M et al. ACR Appropriateness Criteria® Imaging of Mesenteric Ischemia. *Journal of the American College of Radiology*. 2018; 15: S332 - S340. 10.1016/j.jacr.2018.09.018.

17. Pasha S, Leighton J. Evidence-Based Guide on Capsule Endoscopy for Small Bowel Bleeding. *Gastroenterol Hepatol (N Y)*. 2017; 13: 88-93.
18. Wolfman D J, Marko J, Nikolaidis P, Khatri G, Dogra V S et al. ACR Appropriateness Criteria® Hematuria. *Journal of the American College of Radiology*. 2020; 17: S138 - S147. 10.1016/j.jacr.2020.01.028.
19. Barocas D, Boorjian S, Alvarez R, et al. Microhematuria: AUA/SUFU Guideline (2020). *J Urol*. 2020; 204: 778.
20. Hughes T, Ho H, Pietropaolo A, Somani B. Guideline of guidelines for kidney and bladder stones. *Turkish journal of urology*. 2020; 46: S104-S112. 10.5152/tud.2020.20315.
21. Assimos D, Krambeck A, Miller N, Monga M, Murad M et al. Surgical Management of Stones: American Urological Association/Endourological Society Guideline, PART I. *The Journal of urology*. 2016; 196: 1153-60. 10.1016/j.juro.2016.05.090.
22. Fulgham P F, Assimos D G, Pearle M S, Preminger G M. Clinical effectiveness protocols for imaging in the management of ureteral calculous disease: AUA technology assessment. *The Journal of urology*. 2013; 189: 1203-13. 10.1016/j.juro.2012.10.031.
23. Bonkat G, Bartoletti R, Bruyere F, Cai T, Geerlings S et al. EAU Guidelines on Urological Infections. *European Association of Urology*. 2024;
24. Smith A D, Nikolaidis P, Khatri G, Chong S T, De Leon A D et al. ACR Appropriateness Criteria® Acute Pyelonephritis: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S224 - S239. 10.1016/j.jacr.2022.09.017.
25. Anger J, Lee U, Ackerman A, Chou R, Chughtai B et al. Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline. *The Journal of urology*. 2019; 202: 282-289. 10.1097/JU.0000000000000296.
26. Schaeffer A, Nicolle L. CLINICAL PRACTICE. Urinary Tract Infections in Older Men. *The New England journal of medicine*. 2016; 374: 562-71. 10.1056/NEJMcp1503950.
27. Chaikof E, Dalman R, Eskandari M, Jackson B, Lee W et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *Journal of Vascular Surgery*. 2018; 67: 2 - 77.e2. 10.1016/j.jvs.2017.10.044.
28. Isselbacher E, Preventza O, Hamilton Black III J, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Journal of the American College of Cardiology*. 2022; 80: e223 - e393. <https://doi.org/10.1016/j.jacc.2022.08.004>.
29. Murillo H, Molvin L, Chin A, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings from Acute to Chronic Longitudinal Progression. *Radio Graphics*. 2021; 41: 425 - 446. 10.1148/rg.2021200138.
30. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *European journal of vascular and endovascular surgery : the official journal of*. 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
31. Garcia E, Pietryga J, Kim D, Fowler K, Chang K et al. ACR Appropriateness Criteria® Hernia. *Journal of the American College of Radiology*. 2022; 19: S329 - S340. 10.1016/j.jacr.2022.09.016.
32. Halligan S, Parker S, Plumb A, Windsor A. Imaging complex ventral hernias, their surgical repair, and their complications. *Eur Radiol*. 2018; 28: 3560-3569. 10.1007/s00330-018-5328-z.

33. Khosa F, Krinsky G, Macari M, Yucel E, Berland L. Managing incidental findings on abdominal and pelvic CT and MRI, Part 2: white paper of the ACR Incidental Findings Committee II on vascular findings. *J Am Coll Radiol*. 2013; 10: 789-94. 10.1016/j.jacr.2013.05.021.
34. Brown I, Finnigan N. Fever of Unknown Origin. [Updated 2023 Aug 14]. In: StatPearls Publishing [Internet]. 2023; Accessed May 2024:
35. Gasparis A, Kim P, Dean S, Khilnani N, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. 2020; 35: 650-655. 10.1177/0268355520938283.
36. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164. 10.21037/cdt.2017.10.14.
37. Schlegel P, Sigman M, Collura B, De Jonge C, Eisenberg M et al. Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline Part I. *Journal of Urology*. 2021; 205: 36 - 43. 10.1097/JU.0000000000001521.
38. Shyu J, Khurana B, Soto J, Biffl W, Camacho M et al. ACR Appropriateness Criteria® Major Blunt Trauma. *Journal of the American College of Radiology*. 2020; 17: S160 - S174. 10.1016/j.jacr.2020.01.024.
39. Fowler K, Garcia E, Kim D, Cash B, Chang K et al. ACR Appropriateness Criteria® Palpable Abdominal Mass-Suspected Neoplasm. *Journal of the American College of Radiology*. 2019; 16: S384 - S391. 10.1016/j.jacr.2019.05.014.
40. Garner H, Wessell D, Lenchik L, Ahlawat S, Baker J et al. ACR Appropriateness Criteria® Soft Tissue Masses: 2022 Update. *Journal of the American College of Radiology*. 2023; 20: S234 - S245. 10.1016/j.jacr.2023.02.009.
41. Smereka P, Doshi A, Ream J, Rosenkrantz A. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol*. 2017; 24: 603-608. 10.1016/j.acra.2016.12.009.
42. Kaya C, Bozkurt E, Yazıcı P, İdiz U, Tanal M. Approach to the diagnosis and treatment of mesenteric panniculitis from the surgical point of view. *Turkish journal of surgery*. 2018; 34: 121-124.
43. McLaughlin P, Filippone A, Maher M. The misty mesentery: mesenteric panniculitis and its mimics. *AJR. American journal of roentgenology*. 2013; 200: W116-23.
44. van Putte-Katier N, van Bommel E F H, Elgersma O E, Hendriksz T R. Mesenteric panniculitis: prevalence, clinicoradiological presentation and 5-year follow-up. *The British journal of radiology*. 2014; 87: 20140451.
45. Helbling R, Conficconi E, Wyttenbach M, Benetti C, Simonetti G et al. Acute Nonspecific Mesenteric Lymphadenitis: More Than No Need for Surgery. *BioMed research international*. 2017; 2017: 9784565.
46. Čtvrtlík F, Koranda P, Schovánek J, Škarda J, Hartmann I. Current diagnostic imaging of pheochromocytomas and implications for therapeutic strategy. *Experimental and therapeutic medicine*. 2018; 15: 3151-3160. 10.3892/etm.2018.5871.
47. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Gestational Trophoblastic Neoplasia Version 1.2024. National Comprehensive Cancer Network®. 2023;
48. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Myeloproliferative Neoplasms Version 1.2024. National Comprehensive Cancer Network®. 2023;
49. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colorectal Cancer Screening Version 1.2024. National Comprehensive Cancer Network®. 2024;

50. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors V1.2023. National Comprehensive Cancer Network®. 2023; Version 1.2023: 70-71.
51. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. 2008 May 21 [Updated 2023 Sep 21]. GeneReviews® [Internet]. 2023;
52. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. GeneReviews® [Internet]. 2023;
53. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. European Journal of Human Genetics. 2023; 31:
54. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. GeneReviews® [Internet]. 2019;

*Evolent	
Clinical guideline ABDOMEN/PELVIS CT COMBO	Original Date: September 1997
CPT Codes: 74176, 74177, 74178	Last Revised Date: March 2023
Guideline Number: Evolent_CG_068	Implementation Date: January 2024

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

Note: For syndromes for which imaging starts in the pediatric age group, MRI preferred

Note: CT Abdomen/Pelvis Combo (CPT Codes: 74176, 74177, 74178) is the better study when the indication(s) include both the abdomen AND pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease, or neoplasm.

When separate requests for CT Abdomen and CT Pelvis are encountered for processes involving both the abdomen and pelvis, they need to be resubmitted as a single Abdomen/Pelvis CT (to avoid unbundling). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen **OR** Pelvis) which includes the specific organ, area of known disease/abnormality, or the area of concern.

INDICATIONS FOR ABDOMEN/PELVIS COMPUTED TOMOGRAPHY (CT)

Evaluation of Abdominal and Pelvis Pain for Unknown Etiology

- CT allowed after initial workup is inconclusive and must include results of the following:
 - Appropriate laboratory testing (chemistry profile, complete blood count, and/or urinalysis) for the patient's presentation (e.g., suprapubic pain – UA, suspected pancreatitis – amylase/lipase etc.) **AND**
 - Initial imaging (such as ultrasound, barium study, nuclear medicine, or scope study) appropriate to the symptoms
 - Not all of the above tests need to be performed, but both labs and initial imaging need to be performed

- E.g., for GI bleeding, CBC and a scope study would be appropriate initial testing (however, a UA and ultrasound would not be)
- For acute abdominal pain in a patient over the age of 65^{1, 2}
- Initial evaluation of abnormal findings seen on other imaging, such as ultrasound (US) or x-ray, both the abdomen and pelvis are likely affected, and CT is the most reasonable next step for that diagnosis

Evaluation of suspicious or known mass/tumors (unconfirmed diagnosis of cancer) for further evaluation of indeterminate or questionable findings

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study, such as ultrasound (US), and both the abdomen and pelvis are likely affected^{3, 4}
- One follow-up exam to ensure no suspicious change has occurred in a tumor. No further surveillance imaging unless tumor(s) is/are specified as highly suspicious, or change was found on exam or last follow-up imaging.
- For abnormal incidental abdominopelvic lymph nodes when follow-up is recommended based on prior imaging (initial 3-month FU)⁵
- For follow-up of mesenteric panniculitis⁶⁻⁸ or lymphadenitis⁹ when another diagnosis is suspected after initial imaging or there is a failure of symptom resolution

Evaluation of known cancer^{10, 11} (see exception for prostate cancer*)

- Initial staging of known cancer
- Follow-up of known cancer
 - Follow-up of known cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
 - New evidence of an unknown primary¹²
 - Known cancer with suspected abdominal/pelvic metastasis based on a sign, symptom, (e.g., anorexia, early satiety, intestinal obstruction, night sweats, pelvic pain, weight loss, vaginal bleeding) or an abnormal lab value (alpha-fetoprotein, CEA, CA 19-9, p53 mutation)

***Initial staging of prostate cancer for the following risk groups:** (MRI Pelvis preferred for pelvic imaging; only consider CT Abdomen and Pelvis approval if PSMA PET not requested)

- Unfavorable intermediate risk, high risk and very high-risk disease:
 - Gleason 8, 9, 10 disease
 - Gleason 4+3=7 disease (primary pattern 4)
 - Gleason 3+4=7 disease **AND** PSA > 10 or clinical stage ≥T2b
 - Gleason 3+3=6 disease **AND** PSA > 20 or clinical stage ≥T3
 - >50% cores positive for cancer in a random (non-targeted) biopsy^{1, 13}

Note: In patients who have been on a 5-alpha reductase inhibitor (such as Proscar) in the past 12 months, an “adjusted PSA” should be used. To adjust, multiply PSA by a factor of 2 (e.g., PSA 6 on finasteride adjusts to a PSA of 12)

***Known prostate cancer for workup of recurrence and response to treatment** (MRI Pelvis preferred for pelvic imaging; only consider CT Abdomen and Pelvis approval if PSMA PET not requested)

- Initial treatment with radical prostatectomy
 - Failure of PSA to fall to undetectable levels or PSA detectable and rising on at least 2 subsequent determinations
- Initial treatment with radiation therapy
 - Post-RT rising PSA on at least 2 subsequent determinations or positive digital exam and is candidate for local therapy
 - Known metastatic disease with progression on therapy does not require CI to MRI or PET if CT is requested

Suspected or known recent peritonitis and at LEAST ONE of the following:

- Rebound, guarding (not voluntary) or rigid abdomen, **OR**
- Severe tenderness to palpation present over entire abdomen

For evaluation of suspected infection or inflammatory disease^{14, 15}

- Suspected diverticulitis or acute appendicitis** for initial imaging with at least **ONE** of the following¹⁶:
 - WBC Elevated
 - Fever
 - Anorexia
 - Nausea and vomiting
- **Use ultrasound or MRI in pregnant women with suspected appendicitis¹⁷**
- Suspected diverticulitis¹⁸ when
 - Pain is present in the LLQ (<3 months duration), medical records note suspicion for diverticulitis, the patient has no prior history of diverticulitis, **AND** LLQ tenderness is present on exam; **OR**
 - Patient is immunocompromised; **OR**
 - Patient has a history of diverticulitis, symptoms are similar to prior episodes, **AND** patient has failed treatment currently (treatment could be liquid diet/anti-inflammatories or antibiotic)
 - Suspected appendicitis in a child (< age 18)¹⁹⁻²³ when ultrasound is inconclusive or cannot be completed due to body habitus or inability to cooperate **OR** when peritoneal signs are present (guarding, rebound) or other red flags
 - For acute non-localized abdominal pain and fever²⁴
 - For suspected retroperitoneal fibrosis after labs and ultrasound have been completed and other etiologies for symptoms have been excluded (is a diagnosis of exclusion)^{25,26}

For follow-up evaluation of known infection or inflammatory disease involving the abdomen and pelvis^{14, 27}

- Complications of diverticulitis (diagnosed either clinically or by imaging) with severe abdominal/pelvic pain or severe tenderness or mass not responding to antibiotic treatment^{14, 15}
- Pancreatitis by history (including pancreatic pseudocyst) with continued abdominal pain, early satiety, nausea, vomiting, or signs of infection greater than 4 weeks from initial presentation²⁷ when there is reason to suspect extensive disease extending into the pelvis (otherwise CT abdomen)
- Any known infection that is clinically suspected to have created an abscess in the abdomen and pelvis
- Any history of fistula that requires re-evaluation or is suspected to have recurred in the abdomen and pelvis
- Abnormal fluid collection seen on prior imaging that needs follow-up evaluation
- For known retroperitoneal fibrosis to determine extent of disease

Suspected or known acute pancreatitis²⁷ when have reason to suspect extension beyond abdomen, into pelvis

- Initial imaging for suspected acute pancreatitis due to epigastric pain with elevated amylase and/or lipase:
 - For mild presentation when symptom improvement is not seen after 72 hours of treatment and either:
 - ultrasound has been performed and did not show an abnormality such as gallstones, dilated bile duct
 - ultrasound suggests complications (such as fluid collection)
 - For severe presentation (such as fever, elevated WBC)
 - For a decline in clinical status and/or suspected complication
- Pancreatitis by history, (including pancreatic pseudocyst) with abdominal pain suspicious for worsening, or re-exacerbation
- Known necrotizing pancreatitis requiring follow-up

For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis, (includes CT enterography (CTE), however, MRE should be considered for age < 35 to reduce radiation exposure)²⁸⁻³³

- For suspected inflammatory bowel disease after complete work up including physical exam, labs, and recent colonoscopy
- Known inflammatory bowel disease with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy

For evaluation of hematuria when stone is NOT suspected (includes CT urography (CTU))³⁴⁻³⁶

- Documented by 3 or more red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick test³⁴ **AND ONE** or more of the following:
 - Age > 60; **OR**
 - 30+ pack year smoking history
- > 25 RBC/hpf and infection has been excluded
- If not high risk (based on age, smoking history or > 25 RBC/hpf as above) need equivocal or abnormal renal ultrasound prior to CT
- Gross hematuria
 - UA must be negative for infection
 - UA can be negative for blood if hematuria is witnessed by patient or provider

NOTE: If a previous "routine" CT abdomen/pelvis has been done (with or with/without contrast), and a CTU is later requested, the previous CT must show a clear reason that additional delayed post-contrast images of the collecting system are needed.

For evaluation of known or suspected kidney or ureteral stone in a patient with acute flank pain

- **CT is indicated if one or more of the following is present:**
 - Atypical presentation (i.e., fever or WBC >15,000)
 - Inadequate analgesia
 - Abnormal or indeterminate ultrasound (with findings needing further evaluation with CT)
 - KUB has been provided and is highly suggestive of kidney or ureteral stone (US is the preferred initial imaging test but if provided, information on KUB can be used to make decision)
- **Ultrasound should be performed PRIOR to CT in the following situations (CT is needed only if US is inconclusive or has findings that need further imaging):**
 - Pediatric and pregnant patients (MRU preferred if further imaging indicated)
 - Typical presentation without signs/symptoms of infection in a patient < 65
- **CT is allowed for acute abdominal pain, in general, for patients >65**

Preoperative urinary stone planning

- CT is indicated when no imaging has been done in the last 30 days, or if passage or movement of stones will change management³⁷

Postoperative urinary stone follow-up CT

- Symptomatic patients following:
 - Ureteroscopic extraction of an intact stone³⁸
 - Ureteroscopy with lithotripsy/fragmentation of a radiolucent stone³⁸
- Further evaluation of hydronephrosis seen on post-operative ultrasound (following ureteroscopy or ESWL)³⁸

For evaluation of pyelonephritis in the following situations³⁹

- When other imaging such as ultrasound is abnormal
- For a patient who remains febrile after 72 hours of treatment⁴⁰ or has deterioration in clinical status⁴⁰
- With the following co-morbid conditions: personal history of stone disease or renal obstruction, recurrent pyelonephritis, vesicoureteral reflux, immune compromise, prior renal transplant with native kidneys in place, advanced age³⁹ or lack of response to initial therapy (based on culture)

For evaluation of Complicated Urinary tract Infection: (see above section for pyelonephritis)

- **Women:** UTI is considered complicated (and therefore imaging (ultrasound and/or CT) is warranted) in any of the following situations (may be done after resolution of infection),
 - Immunocompromised host
 - Persistence of bacteria or symptoms after culture specific treatment,
 - Rapid recurrence with same bacteria after treatment,
 - Multidrug resistant bacteria
 - When there is suspicion of renal calculi or obstruction^{40, 41}
- **Men:** Any UTI is considered complicated due to high likelihood of anatomic abnormalities,⁴² therefore imaging (ultrasound and/or CT) is warranted

Suspected small bowel obstruction when there is a strong clinical suspicion

- Crampy pain, vomiting, distention, high pitched or absent bowel sounds, prior history of abdominal surgery, or based on initial x-ray^{43, 44}

Suspected colonic or mesenteric ischemia⁴⁵ CTA also appropriate⁴⁶

For suspected small bowel bleeding when endoscopy and capsule endoscopy are inconclusive or negative⁴⁷

For known or suspected abdominal aneurysm

- For known or suspected, **asymptomatic** abdominal aortic aneurysms, ultrasound should be done prior to advanced imaging. Only when the ultrasound is inconclusive, is advanced imaging with CT or MRI needed
 - Aneurysm size 2.5–3 cm, every 10 years
 - Aneurysm size 3.0–3.9 cm, every 3 years
 - Aneurysm size 4.0–4.9 cm, annually
 - Aneurysm size 5.0–5.4 cm, every 6 months
- For **symptomatic** known or suspected AAA (such as recent-onset abdominal pain or back pain, particularly in the presence of a pulsatile or epigastric mass, suspected dissection, or significant risk factors for AAA) CTA/MRA is appropriate and generally preferred over CT/MRI. (If contrast

is contraindicated or other clinical indications for abdomen and/or pelvic imaging are present, then CT/MR may be approved rather than CTA/MRA)

- If there is known complex anatomy, CTA/MRA may be needed.
- Suspected complications of known aneurysm as evidenced by signs/symptoms such as new onset of abdominal or pelvic pain (MRA/CTA preferred)
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA)⁴⁸ or abdominal extent of iliac artery aneurysms (CT preferred unless MRA/CTA is needed for procedural planning or to evaluate complex anatomy)
 - Routine, baseline study (post-op/intervention) is warranted within the first month after EVAR:
 - Repeat in 6 months if type II endoleak is seen (continue every 6 months x 24 months, then annually)
 - Repeat in 12 months if no endoleak or sac enlargement is seen
 - If neither endoleak nor AAA enlargement is seen on imaging one year after EVAR, CT is needed only if US is not feasible for annual surveillance (until year 5 as below)
 - Non-contrast CT of entire aorta (Abdomen and Pelvis) is needed every 5 years after open repair of AAA or EVAR
 - If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed
 - For suspected complication such as: new-onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in the peritoneal cavity
 - Symptomatic/complications related to stent graft – more frequent imaging may be needed
- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

For evaluation of trauma⁴⁹

- Suspected retroperitoneal hematoma or hemorrhage based on lab or physical findings
- Blunt injury with suspicion of multisystem trauma and hematuria
- Penetrating abdominal injury with suspicion of multisystem trauma with or without hematuria⁴⁹

For evaluation of a suspected or known hernia

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, or incisional hernia when physical exam and prior imaging is non-diagnostic or equivocal or if requested as a preoperative study
 - If inguinal hernia, approve CT Pelvis only (needs reason to include abdomen)
 - If umbilical hernia, approve CT Abdomen (needs reason to include pelvis)
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain, or guarding), physical exam (guarding, rebound) or prior imaging⁵⁰
- For confirming the diagnosis of a recurrent hernia when ultrasound is negative or non-diagnostic
- Complex ventral hernia that is ≥ 10 cm for pre-operative planning⁵⁰
- Deep intraabdominal/pelvic hernia is suspected (post-Roux-en-Y, obturator, sciatic or perineal) (does not require US first but this type of hernia needs to be specified in notes)⁵¹

Transplants

- Prior to solid organ transplantation
- For initial workup prior to Bone Marrow Transplantation (BMT) (along with CT Chest⁵², CT Sinus and Brain MRI⁵³). Alternatively, PET might be sufficient to evaluate the abdomen and pelvis if indicated based on that malignancy (see PET Guideline)

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Other Indications for Abdomen/Pelvic CT Combo

- To locate a pheochromocytoma once there is clear biochemical evidence
- For one or more of the following B symptoms: fevers more than 101° F, drenching night sweats, and/or unexplained weight loss of more than 10% of body weight over 6 months with documented concern for lymphoma/malignancy⁵⁴
- Clinically significant unintentional weight loss i.e., $\geq 5\%$ of body weight in less than 12 months, with signs or symptoms suggestive of an abdominal cause (see [Background](#))
- Ongoing unexplained clinically significant weight loss i.e., $\geq 5\%$ of body weight in less than 12 months,⁵⁵⁻⁵⁷ after initial workup (see [Background](#)) has been completed, no cause identified, and second visit documenting further decline in weight⁵⁸

- For suspected paraneoplastic syndrome (including dermatomyositis) with high suspicion of abdominal malignancy and appropriate workup has been done (see [Background](#) for details)
- For acute unilateral (or asymmetric) lower extremity edema with negative or inconclusive doppler US
- For chronic unilateral (or asymmetric) lower extremity edema and suspicion of malignant cause^{59, 60}
- For evaluation of suspected May-Thurner syndrome (CTV/MRV preferred)^{61, 62}
- For elevation of carcinoembryonic antigen (CEA) in a patient with no cancer history after completing clinical workup (including organ-specific investigations, such as colonoscopy, gastroscopy, mammography, cystoscopy, ultrasound) that fails to demonstrate a reason and CEA is >10 ng/ml, or fails to drop below 5 ng/ml after 3-6 months intervals (see [Background](#) section)
- For fever of unknown origin (temperature of ≥ 101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see [Background](#) section)⁶³
- For evaluation of thrombocytosis or thrombocytopenia when one or more of the following are present:
 - Any additional cytopenia (i.e., leukopenia, anemia)
 - LDH elevation
 - Splenomegaly on exam or imaging
 - Palpable lymphadenopathy
 - Bone marrow biopsy has been completed and concern for myeloproliferative disorder persists
 - Genetic mutation increasing risk of myeloproliferative disorder (such as JAK-2 mutation) on peripheral smear or bone marrow⁶⁴⁻⁶⁷ biopsy
- For further evaluation of a new onset or non-reducible varicocele^{68, 69}
- For suspected gestational trophoblastic disease when chest x-ray suggests distant disease (may include Chest CT)⁷⁰
- For confirmed gestational trophoblastic disease when hcg fails to decline appropriately following surgery (may include Chest CT)⁷⁰
- For patients with MEN-1, surveillance of abdomen and pelvis every 1-3 years (MRI preferred)
- Multiple Endocrine Neoplasia type 1 (MEN1) every 1-3 years (chest CT or MRI also approvable for this syndrome at same interval)^{8, 71}
- Hereditary Paraganglioma syndromes every 2-3 years IF whole body MRI (unlisted MRI CPT 76498) is not available and CI to MRI exists. (WB MRI is the preferred study; if unable to do whole body MRI may approve abdomen MRI, skull base and neck MRI and chest CT). SDHB mutation may start at age 6, all other SDHx start at age 10
- For patients with FAP (Familial Adenomatous Polyposis, annual screening of abdomen and pelvis with MRI or CT for one or more of the following: personal history of desmoid tumor, family history of desmoid tumor or abdominal symptoms suggestive of desmoid tumor⁷²

Pre-operative evaluation

- For abdominal/pelvic surgery or procedure

Post-operative/procedural evaluation

- Follow-up of known or suspected post-operative complication
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed.

Indication for combination studies for the initial pre-therapy staging of cancer, evaluation before starting treatment OR active monitoring for recurrence as clinically indicated OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine, or Lumbar Spine, and MUGA

BACKGROUND

CT provides direct visualization of anatomic structures in the abdomen and pelvis and is a fast-imaging tool used to detect and characterize disease. Abdomen/pelvis imaging begins at the diaphragmatic dome through pubic symphysis. CT uses x-rays and multiple detectors to create cross-sectional images of the normal anatomy as well as demonstrate abnormal soft tissue densities, calcifications or fluid/gas patterns in the viscera or peritoneal space.

In general, ionizing radiation from CT should be avoided during pregnancy. Ultrasound is clearly a safer imaging option and is the first imaging test of choice; although, CT or MRI after equivocal ultrasound has been validated for diagnosis. Clinicians should exercise increased caution with CT imaging in children, pregnant women, and young adults due to the risks of exposure to ionizing radiation. Screening for pregnancy as part of a work-up is suggested to minimize the number of unexpected radiation exposures for women of childbearing age.

OVERVIEW

CT Imaging for renal colic and hematuria

More than 2 million emergency visits in the US are for suspected renal colic, and CT is performed in over 90% of patients diagnosed with kidney stones.⁷³ Evidence now supports ultrasound or no further imaging in specific clinical scenarios as renal colic is often self-limited. CT can guide therapy in a subset of patients who require intervention or who have other conditions that mimic renal colic (i.e., appendicitis). CT protocols include: "stone protocol" for detecting urinary tract calculi, "renal mass protocol" for characterizing known renal masses, and CT urography for evaluating hematuria. Non-contrast CT can be used for detecting most ureteral and renal stones but sometimes an intravenous contrast agent is needed to determine the relationship of the calculus to the opacified ureter.

CT imaging for recurrent urinary tract infections

Imaging in patients without risk factors and less than two infections a year on average and who respond promptly to therapy, is of low yield. Risk factors include but are not limited to: Infection with urea-splitting organism, previous pyelonephritis, history of calculi or obstruction, obstructive symptoms, elevated creatinine, severe diabetes, childhood UTI, neurogenic bladder dysfunction, history of GU surgery, suspected bladder diverticula or urethral, urinary incontinence, pelvic floor dysfunction, post void residual.⁷⁴

CT Imaging for abdominal aortic aneurysms

NOTE: For known or suspected abdominal aneurysm, CT/MRI should not be approvable without a contraindication to CTA/MRA, such as severe renal dysfunction, contrast allergy, or another specific reason CT/MRI (rather than CTA/MRA) is preferred.

If a pulsatile abdominal mass is found in an asymptomatic patient, **abdominal ultrasonography** is an inexpensive and noninvasive technique for **initial evaluation**. For further examination, CT may be performed to better define the shape and extent of the aneurysm and the local anatomic relationships of the visceral and renal vessels. CT has high level of accuracy in sizing aneurysms; however, CTA and MRA are the gold standards for imaging. The majority of evidence regarding AAA surveillance using CT is based on CTA data and is primarily related to contrast bolus timing. Contrast-enhanced CT is well established in the literature and is capable of identifying aortic aneurysms, with many papers discussing incidental AAA identification.^{75, 76} Risk of rupture in 6 years for an AAA < 4 cm is 1%. For a 4-5 cm AAA, the risk of rupture increases to 1-3% per year and becomes 6-11% per year for AAA 5-7 cm in cross sectional diameter. For any AAA >7 cm, the risk of rupture goes to 7% per year.

Initial evaluation of abdominal aortic aneurysm (AAA)

Initial evaluation of AAA is accurately made by ultrasound.

****Abdominal aneurysms and general guidelines for follow-up**

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5 x the normal diameter. Ultrasound can detect and size AAA, with the advantage of being relatively inexpensive, noninvasive, and not require iodinate contrast. The limitations are that overlying bowel gas can obscure findings and the technique is operator dependent. Ultrasound is used to screen for and to monitor aneurysms*. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred. Risk factors for AAA include smoking history, age, male gender, family history of AAA (first degree relative) and personal history of vascular disease. Risk factors for rupture include female gender, large initial aneurysm diameter, low FEV, current smoking history, elevated mean blood pressure and patients on immunosuppression after major organ transplantation. The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk.¹

Ultrasound screening intervals*:

- Aneurysm size 2.5–3 cm, every 10 years
- Aneurysm size 3.0–3.9 cm, every 3 years
- Aneurysm size 4.0–4.9 cm, annually⁷⁷
- Aneurysm size 5.0–5.4 cm, every 6 months

CT for Mesenteric Ischemia

CT of the abdomen and pelvis with intravenous (IV) contrast performed during the venous phase has been less well-studied compared with CTA in diagnosing mesenteric ischemia. CT with IV contrast can assess nonvascular findings, major arterial lesions, and mesenteric veins; however, the lack of arterial phase may lead to suboptimal evaluation of the mesenteric arteries compared to CTA.⁴⁶

CT for elevation of CEA with no history of a previous CEA-producing tumor

CEA is not normally elevated after birth, but elevated CEA levels increases the chance of finding colon cancer from 1.3% to 4.6%. It is also a predictor of other diseases, including other cancers (e.g., mucinous adenocarcinomas of the endocervix and ovary, as well as keratinising squamous cell carcinoma of the cervix), diabetes, chronic lung, and liver disease.

Evaluation should begin with a thorough history, including smoking history, and clinical exam. Investigation would include repeat CEA, full blood count, iron, liver function and renal function tests, CA 125 levels, and calcitonin. If CEA <10ng/ml and clinical review is negative, repeat the clinical evaluation in 3 months and CEA for changes. If level falls, repeat at 6-month intervals until normal or 2 consecutive decreases. If CEA level remains above 5 ng/ml after 3–6-month intervals or exceeds 10ng/ml at any stage, consider CT imaging.⁷⁸

CT and Fever of Unknown Origin

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test.⁶³ Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For SIADH (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.

For hypercalcemia (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen, and pelvis imaging as appropriate.

For Cushing syndrome (hypokalemia, normal-high midnight serum ACTH **NOT** suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test **DOES** suppress ACTH, pituitary MRI is reasonable.

For hypoglycemia, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-peptide, and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrant CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrant chest and abdominal imaging.

When a paraneoplastic neurologic syndrome is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Weight loss definitions and initial evaluation

Unintentional weight loss is considered clinically significant^{55, 79} if the amount of weight lost over 12 months is $\geq 5\%$. Older age and higher percentage of weight loss correlates with higher likelihood of malignancy. A targeted evaluation is recommended when there are signs or symptoms suggestive of a specific source. For example, when there is clinically significant weight loss with abdominal pain that prompts an evaluation for an abdominal source of the weight loss; CXR and labs such as TSH would not be needed prior to abdominal imaging. Conversely a smoker with a cough and weight loss would not start with abdominal imaging, a chest x-ray (CXR) would be the first test to start with. When there is no suspected diagnosis, initial evaluation includes CXR, age-appropriate cancer screening (such as colonoscopy and mammography) and labs (including CBC, CMP, HbA1C, TSH, stool hemoccult, ESR/CRP, HIV, Hepatitis C). If this initial evaluation fails to identify a cause of weight loss, then the patient is monitored and if progressive weight loss is seen on subsequent visits/weights, then CT Abdomen/Pelvis is reasonable (MRI if there is a contraindication to CT such as contrast allergy or impaired renal function)⁸⁰. Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.

Combination request of Abdomen CT/Chest CT

A Chest CT will produce images to the level of L3. Documentation for combo is required.

Evaluation for appendicitis following clinical and laboratory evaluation

Sonography of the right upper quadrant and pelvis followed by graded compression and color Doppler sonography of the right lower quadrant was used by Gaitini and colleagues as the initial imaging study in 420 consecutive patients referred for emergency evaluation of acute appendicitis. This method correctly diagnosed acute appendicitis in 66 of 75 patients (88%) and excluded it correctly in 312 of 326 patients (96%). It was inconclusive in 19 patients (<5%). Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 74.2%, 97%, 88%, 93%, and 92%, respectively and comparable to CT.⁸¹

Appropriate and timely diagnosis of acute appendicitis is needed. Negative laparotomy rates can range from 16% to 47% when based on clinical and laboratory data alone, while perforation rate can reach 35% when surgery is delayed. Appropriate initial imaging can lower the negative laparotomy rate to 6-10%. Ultrasound has a higher non-diagnostic rate (4%) vs. 0.8% for MDCT. In a prospective study operator experience and patient BMI did not affect diagnostic accuracy.^{81, 82}

Consider alternatives to CT imaging in patients with Crohn disease

In facilities where the technical and clinical expertise exists, MR enterography is emerging as the study of choice (replacing CT) for patients requiring frequent follow-up examinations to determine disease extent or progression. The technique also allows evaluation of extramucosal and extraluminal disease.

Consider the role of capsule endoscopy

Small bowel capsule endoscopy allows for direct visualization of the mucosa of the small intestine and has been found to be superior to barium studies, CTE and ileocolonoscopy. However, the specificity has been questioned. There is a high negative predictive value of 96%. Also, it may identify a site for selected biopsy to establish a diagnosis.

Lab tests used in diagnosing IBD

Anti-glycan antibodies are more prevalent in CD than UC, but this test has a low sensitivity. Fecal calprotectin is a helpful test that can help differentiate IBD from irritable bowel syndrome as well as in assessment of disease activity, including response to therapy. Data supports the use of fecal calprotectin to predict relapse in CD. Those who relapsed in one year had significantly higher levels at baseline. Fecal lactoferrin and fecal PMN-elastase are also used for monitoring disease activity in Crohn's.⁸³

Imaging of hernias

Most hernias are diagnosed clinically with imaging recommended for the diagnosis of occult hernias or in the evaluation of hernia complications, such as bowel obstruction or strangulation. To detect occult hernias, ultrasound is a first-line study with a sensitivity of 86% and specificity of 77%, compared to 80% sensitivity and 65% specificity for CT.⁸⁴ According to Miller, et al "Magnetic resonance imaging is generally not considered a first- or even second-line evaluation modality for hernias...."⁸⁵ Based on this analysis, MRI is recommended only when ultrasound and CT have been performed and fail to make a diagnosis.

REFERENCES

1. Lehtimäki TT, Valtonen H, Miettinen P, Juvonen P, Paaajanen H, Vanninen R. A randomised clinical trial of routine versus selective CT imaging in acute abdomen: Impact of patient age on treatment costs and hospital resource use. *Eur J Radiol.* Feb 2017;87:1-7. doi:10.1016/j.ejrad.2016.11.031
2. American College of Radiology. ACR Appropriateness Criteria® Postmenopausal Acute Pelvic Pain. American College of Radiology (ACR). Updated 2020. Accessed November 20, 2022. <https://acsearch.acr.org/docs/3102398/Narrative/>
3. American College of Radiology. ACR Appropriateness Criteria® Palpable Abdominal Mass-Suspected Neoplasm. Updated 2019. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69473/Narrative/>
4. American College of Radiology. ACR Appropriateness Criteria® Soft-Tissue Masses. American College of Radiology. Updated 2022. Accessed January 6, 2023. <https://acsearch.acr.org/docs/69434/Narrative/>
5. Smereka P, Doshi AM, Ream JM, Rosenkrantz AB. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol.* May 2017;24(5):603-608. doi:10.1016/j.acra.2016.12.009
6. Kaya C, Bozkurt E, Yazıcı P, İdiz UO, Tanal M, Mihmanlı M. Approach to the diagnosis and treatment of mesenteric panniculitis from the surgical point of view. *Turk J Surg.* 2018;34(2):121-124. doi:10.5152/turkjsurg.2018.3881
7. McLaughlin PD, Filippone A, Maher MM. The "misty mesentery": mesenteric panniculitis and its mimics. *AJR Am J Roentgenol.* Feb 2013;200(2):W116-23. doi:10.2214/ajr.12.8493
8. van Putte-Katier N, van Bommel EF, Elgersma OE, Hendriksz TR. Mesenteric panniculitis: prevalence, clinicoradiological presentation and 5-year follow-up. *Br J Radiol.* Dec 2014;87(1044):20140451. doi:10.1259/bjr.20140451
9. Helbling R, Conficconi E, Wyttenbach M, et al. Acute Nonspecific Mesenteric Lymphadenitis: More Than "No Need for Surgery". *Biomed Res Int.* 2017;2017:9784565. doi:10.1155/2017/9784565
10. Bourgioti C, Chatoupis K, Mouloupoulos LA. Current imaging strategies for the evaluation of uterine cervical cancer. *World J Radiol.* Apr 28 2016;8(4):342-54. doi:10.4329/wjr.v8.i4.342
11. NCCN Imaging Appropriate Use Criteria™. National Comprehensive Cancer Network (NCCN). Updated 2022. Accessed December 15, 2022. <https://www.nccn.org/professionals/imaging/default.aspx>
12. Greco FA, Oien K, Erlander M, et al. Cancer of unknown primary: progress in the search for improved and rapid diagnosis leading toward superior patient outcomes. *Ann Oncol.* Feb 2012;23(2):298-304. doi:10.1093/annonc/mdr306
13. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines(r)) Prostate Cancer NCCN Evidence Blocks (tm) Version 1.2023. National Comprehensive Cancer Network. Updated November 4, 2022. Accessed December 17, 2022. https://www.nccn.org/professionals/physician_gls/pdf/prostate_blocks.pdf
14. Cartwright SL, Knudson MP. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician.* Apr 1 2015;91(7):452-9.

15. American College of Radiology. ACR Appropriateness Criteria® Left Lower Quadrant Pain-Suspected Diverticulitis. American College of Radiology. Updated 2018. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69356/Narrative/>
16. Linzay CD, Pandit S. Acute Diverticulitis. StatPearls Publishing Updated August 8, 2022. Accessed November 20, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK459316/>
17. American College of Radiology. ACR Appropriateness Criteria® Right Lower Quadrant Pain. American College of Radiology. Updated 2022. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69357/narrative/>
18. Peery AF, Shaukat A, Strate LL. AGA Clinical Practice Update on Medical Management of Colonic Diverticulitis: Expert Review. *Gastroenterology*. Feb 2021;160(3):906-911.e1. doi:10.1053/j.gastro.2020.09.059
19. American College of Surgeons. Five things physicians and patients should question: Don't do computed tomography (CT) for the evaluation of suspected appendicitis in children until after ultrasound has been considered as an option. Choosing Wisely Initiative ABIM Foundation. Updated 2013. Accessed November 20, 2022. <https://www.choosingwisely.org/clinician-lists/american-college-surgeons-computed-tomography-to-evaluate-appendicitis-in-children/>
20. American Academy of Pediatrics. Five things physicians and patients should question: Avoid using computed tomography (CT scan) as the first-line imaging modality in the evaluation of suspected appendicitis in children. Choosing Wisely Initiative ABIM Foundation. Updated November 4, 2019. Accessed November 20, 2022. <https://www.choosingwisely.org/clinician-lists/aap-sosu-avoid-ct-scan-as-first-line-imaging-in-suspected-appendicitis/>
21. Baker RD. Acute abdominal pain. *Pediatrics in Review*. 2018;39(3):130-9.
22. Sanchez TR, Corwin MT, Davoodian A, Stein-Wexler R. Sonography of Abdominal Pain in Children: Appendicitis and Its Common Mimics. *J Ultrasound Med*. Mar 2016;35(3):627-35. doi:10.7863/ultra.15.04047
23. American College of Radiology. ACR Appropriateness Criteria® Suspected Appendicitis—Child. American College of Radiology. Updated 2018. Accessed November 20, 2022. <https://acsearch.acr.org/docs/3105874/Narrative/>
24. American College of Radiology. ACR Appropriateness Criteria® Acute Nonlocalized Abdominal Pain. American College of Radiology. Updated 2018. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69467/Narrative/>
25. Runowska M, Majewski D, Puszczewicz M. Retroperitoneal fibrosis - the state-of-the-art. *Reumatologia*. 2016;54(5):256-263. doi:10.5114/reum.2016.63667
26. Farias J, Davis R. Lesson 40: Evaluation and Management of Retroperitoneal Fibrosis. Series Lesson. Accessed February 9, 2023. <https://auau.auanet.org/content/update-series-2016-lesson-40-evaluation-and-management-retroperitoneal-fibrosis>
27. American College of Radiology. ACR Appropriateness Criteria® Acute Pancreatitis. American College of Radiology. Updated 2019. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69468/Narrative/>

28. Lichtenstein GR, Loftus EV, Isaacs KL, Regueiro MD, Gerson LB, Sands BE. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Am J Gastroenterol*. Apr 2018;113(4):481-517. doi:10.1038/ajg.2018.27
29. Siddiki HA, Fidler JL, Fletcher JG, et al. Prospective comparison of state-of-the-art MR enterography and CT enterography in small-bowel Crohn's disease. *AJR Am J Roentgenol*. Jul 2009;193(1):113-21. doi:10.2214/ajr.08.2027
30. Rubin DT, Ananthakrishnan AN, Siegel CA, Sauer BG, Long MD. ACG Clinical Guideline: Ulcerative Colitis in Adults. *Am J Gastroenterol*. Mar 2019;114(3):384-413. doi:10.14309/ajg.0000000000000152
31. Arif-Tiwari H, Taylor P, Kalb BT, Martin DR. Magnetic resonance enterography in inflammatory bowel disease. *Applied Radiology*. 2019;48(1):9-16.
32. American College of Radiology. ACR Appropriateness Criteria® Crohn Disease. American College of Radiology. Updated 2019. Accessed March 21, 2023. <https://acsearch.acr.org/docs/69470/Narrative/>
33. He L, Sun Y, Hu X, Yao Q. Diagnostic performance of magnetic resonance enterography and ultrasound in children with inflammatory bowel diseases: a diagnostic test accuracy meta-analysis. *Eur Radiol*. Feb 2022;32(2):1330-1341. doi:10.1007/s00330-021-08172-6
34. Davis R, Jones JS, Barocas DA, et al. Diagnosis, evaluation and follow-up of asymptomatic microhematuria (AMH) in adults: AUA guideline. *J Urol*. Dec 2012;188(6 Suppl):2473-81. doi:10.1016/j.juro.2012.09.078
35. Sharp VJ, Barnes KT, Erickson BA. Assessment of asymptomatic microscopic hematuria in adults. *Am Fam Physician*. Dec 1 2013;88(11):747-54.
36. American College of Radiology. ACR Appropriateness Criteria® Hematuria. American College of Radiology. Updated 2019. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69490/Narrative/>
37. Assimos D, Krambeck A, Miller NL, et al. Surgical Management of Stones: American Urological Association/Endourological Society Guideline, PART I. *J Urol*. Oct 2016;196(4):1153-60. doi:10.1016/j.juro.2016.05.090
38. Fulgham PF, Assimos DG, Pearle MS, Preminger GM. Clinical effectiveness protocols for imaging in the management of ureteral calculous disease: AUA technology assessment. *J Urol*. Apr 2013;189(4):1203-13. doi:10.1016/j.juro.2012.10.031
39. American College of Radiology. ACR Appropriateness Criteria® Acute Pyelonephritis American College of Radiology. Updated 2022. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69489/Narrative/>
40. Bonkat G, Bartoletti R, Bruyère F, et al. EAU Guidelines on Urological Infections. EAU Guidelines Office. Updated March 2022. Accessed February 9, 2023. <https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Urological-Infections-2022.pdf>
41. Anger J, Lee U, Ackerman AL, et al. Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline (2019). American Urological Association (AUA). Updated 2019. Accessed November 20, 2022. <https://www.auajournals.org/doi/10.1097/JU.0000000000000296>
42. Schaeffer AJ, Nicolle LE. CLINICAL PRACTICE. Urinary Tract Infections in Older Men. *N Engl J Med*. Feb 11 2016;374(6):562-71. doi:10.1056/NEJMcp1503950

43. Paulson EK, Thompson WM. Review of small-bowel obstruction: the diagnosis and when to worry. *Radiology*. May 2015;275(2):332-42. doi:10.1148/radiol.15131519
44. American College of Radiology. ACR Appropriateness Criteria® Suspected Small-Bowel Obstruction. American College of Radiology. Updated 2019. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69476/Narrative/>
45. Dhatt HS, Behr SC, Miracle A, Wang ZJ, Yeh BM. Radiological Evaluation of Bowel Ischemia. *Radiol Clin North Am*. Nov 2015;53(6):1241-54. doi:10.1016/j.rcl.2015.06.009
46. American College of Radiology. ACR Appropriateness Criteria® Imaging of Mesenteric Ischemia. American College of Radiology. Updated 2018. Accessed November 19, 2022. <https://acsearch.acr.org/docs/70909/Narrative/>
47. Pasha SF, Leighton JA. Evidence-Based Guide on Capsule Endoscopy for Small Bowel Bleeding. *Gastroenterol Hepatol (N Y)*. Feb 2017;13(2):88-93.
48. Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg*. Jan 2018;67(1):2-77.e2. doi:10.1016/j.jvs.2017.10.044
49. American College of Radiology. ACR Appropriateness Criteria® Major Blunt Trauma. American College of Radiology. Updated 2019. Accessed December 30, 2022. <https://acsearch.acr.org/docs/3102405/Narrative/>
50. Halligan S, Parker SG, Plumb AA, Windsor ACJ. Imaging complex ventral hernias, their surgical repair, and their complications. *Eur Radiol*. Aug 2018;28(8):3560-3569. doi:10.1007/s00330-018-5328-z
51. American College of Radiology. ACR Appropriateness Criteria® Hernia. American College of Radiology. Updated New 2022. Accessed January 26, 2023. <https://acsearch.acr.org/docs/3158169/Narrative/>
52. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation*. 2014/11/01/ 2014;20(11):1852-1856. doi:https://doi.org/10.1016/j.bbmt.2014.06.029
53. Kaste SC, Kaufman RA, Sunkara A, et al. Routine pre- and post-hematopoietic stem cell transplant computed tomography of the abdomen for detecting invasive fungal infection has limited value. *Biol Blood Marrow Transplant*. Jun 2015;21(6):1132-5. doi:10.1016/j.bbmt.2015.02.023
54. Cheson BD, Fisher RI, Barrington SF, et al. Recommendations for initial evaluation, staging, and response assessment of Hodgkin and non-Hodgkin lymphoma: the Lugano classification. *J Clin Oncol*. Sep 20 2014;32(27):3059-68. doi:10.1200/jco.2013.54.8800
55. Nicholson BD, Thompson MJ, Hobbs FDR, et al. Measured weight loss as a precursor to cancer diagnosis: retrospective cohort analysis of 43 302 primary care patients. *J Cachexia Sarcopenia Muscle*. Oct 2022;13(5):2492-2503. doi:10.1002/jcsm.13051
56. Wong CJ. Involuntary weight loss. *Med Clin North Am*. May 2014;98(3):625-43. doi:10.1016/j.mcna.2014.01.012
57. Gaddey HL, Holder K. Unintentional weight loss in older adults. *Am Fam Physician*. May 1 2014;89(9):718-22.
58. Gupta R, Evans AT. Approach to the patient with unintentional weight loss. *UpToDate* <https://www.uptodate-com>. 2018;

43. Paulson EK, Thompson WM. Review of small-bowel obstruction: the diagnosis and when to worry. *Radiology*. May 2015;275(2):332-42. doi:10.1148/radiol.15131519
44. American College of Radiology. ACR Appropriateness Criteria® Suspected Small-Bowel Obstruction. American College of Radiology. Updated 2019. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69476/Narrative/>
45. Dhatt HS, Behr SC, Miracle A, Wang ZJ, Yeh BM. Radiological Evaluation of Bowel Ischemia. *Radiol Clin North Am*. Nov 2015;53(6):1241-54. doi:10.1016/j.rcl.2015.06.009
46. American College of Radiology. ACR Appropriateness Criteria® Imaging of Mesenteric Ischemia. American College of Radiology. Updated 2018. Accessed November 19, 2022. <https://acsearch.acr.org/docs/70909/Narrative/>
47. Pasha SF, Leighton JA. Evidence-Based Guide on Capsule Endoscopy for Small Bowel Bleeding. *Gastroenterol Hepatol (N Y)*. Feb 2017;13(2):88-93.
48. Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg*. Jan 2018;67(1):2-77.e2. doi:10.1016/j.jvs.2017.10.044
49. American College of Radiology. ACR Appropriateness Criteria® Major Blunt Trauma. American College of Radiology. Updated 2019. Accessed December 30, 2022. <https://acsearch.acr.org/docs/3102405/Narrative/>
50. Halligan S, Parker SG, Plumb AA, Windsor ACJ. Imaging complex ventral hernias, their surgical repair, and their complications. *Eur Radiol*. Aug 2018;28(8):3560-3569. doi:10.1007/s00330-018-5328-z
51. American College of Radiology. ACR Appropriateness Criteria® Hernia. American College of Radiology. Updated New 2022. Accessed January 26, 2023. <https://acsearch.acr.org/docs/3158169/Narrative/>
52. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation*. 2014/11/01/ 2014;20(11):1852-1856. doi:https://doi.org/10.1016/j.bbmt.2014.06.029
53. Kaste SC, Kaufman RA, Sunkara A, et al. Routine pre- and post-hematopoietic stem cell transplant computed tomography of the abdomen for detecting invasive fungal infection has limited value. *Biol Blood Marrow Transplant*. Jun 2015;21(6):1132-5. doi:10.1016/j.bbmt.2015.02.023
54. Cheson BD, Fisher RI, Barrington SF, et al. Recommendations for initial evaluation, staging, and response assessment of Hodgkin and non-Hodgkin lymphoma: the Lugano classification. *J Clin Oncol*. Sep 20 2014;32(27):3059-68. doi:10.1200/jco.2013.54.8800
55. Nicholson BD, Thompson MJ, Hobbs FDR, et al. Measured weight loss as a precursor to cancer diagnosis: retrospective cohort analysis of 43 302 primary care patients. *J Cachexia Sarcopenia Muscle*. Oct 2022;13(5):2492-2503. doi:10.1002/jcsm.13051
56. Wong CJ. Involuntary weight loss. *Med Clin North Am*. May 2014;98(3):625-43. doi:10.1016/j.mcna.2014.01.012
57. Gaddey HL, Holder K. Unintentional weight loss in older adults. *Am Fam Physician*. May 1 2014;89(9):718-22.
58. Gupta R, Evans AT. Approach to the patient with unintentional weight loss. *UpToDate* <https://www.uptodate-com>. 2018;

59. Ely JW, Osherooff JA, Chambliss ML, Ebell MH. Approach to leg edema of unclear etiology. *J Am Board Fam Med*. Mar-Apr 2006;19(2):148-60. doi:10.3122/jabfm.19.2.148
60. Gasparis AP, Kim PS, Dean SM, Khilnani NM, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. Oct 2020;35(9):650-655. doi:10.1177/0268355520938283
61. Ibrahim W, Al Safran Z, Hasan H, Zeid WA. Endovascular management of may-thurner syndrome. *Ann Vasc Dis*. 2012;5(2):217-21. doi:10.3400/avd.cr.12.00007
62. Wu WL, Tzeng WS, Wu RH, et al. Comprehensive MDCT evaluation of patients with suspected May-Thurner syndrome. *AJR Am J Roentgenol*. Nov 2012;199(5):W638-45. doi:10.2214/ajr.11.8040
63. Brown I, Finnigan NA. Fever of Unknown Origin. StatPearls Publishing. Updated August 22, 2022. Accessed November 19, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK532265/>
64. Palandri F, Derenzini E, Ottaviani E, et al. Association of essential thrombocythemia and non-Hodgkin lymphoma: a single-centre experience. *Leuk Lymphoma*. Mar 2009;50(3):481-4. doi:10.1080/10428190802713521
65. Vannucchi AM, Masala G, Antonioli E, et al. Increased risk of lymphoid neoplasms in patients with Philadelphia chromosome-negative myeloproliferative neoplasms. *Cancer Epidemiol Biomarkers Prev*. Jul 2009;18(7):2068-73. doi:10.1158/1055-9965.Epi-09-0353
66. Rumi E, Passamonti F, Elena C, et al. Increased risk of lymphoid neoplasm in patients with myeloproliferative neoplasm: a study of 1,915 patients. *Haematologica*. Mar 2011;96(3):454-8. doi:10.3324/haematol.2010.033779
67. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Myeloproliferative Neoplasms. National Comprehensive Cancer Network. Updated August 11, 2022. Accessed January 27, 2023. https://www.nccn.org/professionals/physician_gls/pdf/mpn.pdf
68. Schlegel PN, Sigman M, Collura B, et al. Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline Part I. *Journal of Urology*. 2021;205(1):36-43. doi:doi:10.1097/JU.0000000000001521
69. Elmer DeWitt M, Greene DJ, Gill B, Nyame Y, Haywood S, Sabanegh E, Jr. Isolated Right Varicocele and Incidence of Associated Cancer. *Urology*. Jul 2018;117:82-85. doi:10.1016/j.urology.2018.03.047
70. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Gestational Trophoblastic Neoplasia. National Comprehensive Cancer Network. Updated December 20, 2022. Accessed February 13, 2023. https://www.nccn.org/professionals/physician_gls/pdf/gtn.pdf
71. Shah MH, Goldner WS, Benson AB, et al. Neuroendocrine and Adrenal Tumors, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. *Journal of the National Comprehensive Cancer Network*. 01 Jul. 2021 2021;19(7):839-868. doi:10.6004/jnccn.2021.0032
72. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Colorectal. National Comprehensive Cancer Network. Updated December 7, 2022. Accessed February 16, 2023. https://www.nccn.org/professionals/physician_gls/pdf/genetics_colon.pdf
73. Moore CL, Carpenter CR, Heilbrun ME, et al. Imaging in Suspected Renal Colic: Systematic Review of the Literature and Multispecialty Consensus. *J Am Coll Radiol*. Sep 2019;16(9 Pt A):1132-1143. doi:10.1016/j.jacr.2019.04.004
74. American College of Radiology. ACR Appropriateness Criteria® Recurrent Lower Urinary Tract Infections in Females. American College of Radiology (ACR). Updated 2020. Accessed November 20, 2022. <https://acsearch.acr.org/docs/69491/Narrative/>

75. American College of Radiology. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm: Interventional Planning and Follow-up. American College of Radiology. Updated 2017. Accessed December 28, 2022. <https://acsearch.acr.org/docs/70548/Narrative/>
76. American College of Radiology. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm Follow-up (Without Repair). American College of Radiology. Updated 2018. Accessed November 20, 2022. <https://acsearch.acr.org/docs/3102391/Narrative/>
77. Isselbacher EM, Preventza O, III JHB, et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Journal of the American College of Cardiology*. 2022;80(24):e223-e393. doi:doi:10.1016/j.jacc.2022.08.004
78. Hall C, Clarke L, Pal A, et al. A Review of the Role of Carcinoembryonic Antigen in Clinical Practice. *Ann Coloproctol*. Dec 2019;35(6):294-305. doi:10.3393/ac.2019.11.13
79. Zawada ET, Jr. Malnutrition in the elderly. Is it simply a matter of not eating enough? *Postgrad Med*. Jul 1996;100(1):207-8, 211-4, 220-2 passim. doi:10.3810/pgm.1996.07.17
80. Ritchie C, Yukawa M. Geriatric nutrition: Nutritional issues in older adults. In: Schmader KE, Seres, D., Givens, J., ed. *UpToDate*. 2023.
81. Gaitini D, Beck-Razi N, Mor-Yosef D, et al. Diagnosing acute appendicitis in adults: accuracy of color Doppler sonography and MDCT compared with surgery and clinical follow-up. *AJR Am J Roentgenol*. May 2008;190(5):1300-6. doi:10.2214/ajr.07.2955
82. Keyzer C, Zalcman M, De Maertelaer V, et al. Comparison of US and unenhanced multi-detector row CT in patients suspected of having acute appendicitis. *Radiology*. Aug 2005;236(2):527-34. doi:10.1148/radiol.2362040984
83. Cappello M, Morreale GC. The Role of Laboratory Tests in Crohn's Disease. *Clin Med Insights Gastroenterol*. 2016;9:51-62. doi:10.4137/CGast.S38203
84. Robinson A, Light D, Kasim A, Nice C. A systematic review and meta-analysis of the role of radiology in the diagnosis of occult inguinal hernia. *Surg Endosc*. Jan 2013;27(1):11-8. doi:10.1007/s00464-012-2412-3
85. Miller J, Cho J, Michael MJ, Saouaf R, Towfigh S. Role of imaging in the diagnosis of occult hernias. *JAMA Surg*. Oct 2014;149(10):1077-80. doi:10.1001/jamasurg.2014.484

POLICY HISTORY

Date	Summary
March 2023	<ul style="list-style-type: none"> Prostate cancer: updated guidance based on new NCCN criteria IBD: clarified indications Pancreas: specified guidance on pancreatitis Pyelonephritis: clarified risk factors and indications Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging Hernia: clarified hernia types and indicated studies Transplant: added section Other: specified guidance for weight loss, paraneoplastic syndrome, edema; added indications for thrombocytopenia, gestational trophoblastic disease, cancer predisposition syndromes General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline Added statement regarding further evaluation of indeterminate findings on prior imaging Aligned sections across body imaging guidelines
March 2022	<ul style="list-style-type: none"> Moved “New evidence of an unknown primary” from Evaluation of suspicious or known mass section to Initial staging of known cancer. Clarified suspected diverticulitis Added immunocompromised patients to suspected diverticulitis Added “OR when peritoneal signs are present (guarding, rebound) or other red flags” to suspected appendicitis in a child Clarified note regarding MRE for patients under 35 years of age Removed “For CT Enterography (CTE) if a CT scan is inconclusive” from section on Suspected IBD Clarified evaluation of hematuria Clarified concern for lymphoma/malignancy with B symptoms and removed if CXR, labs, and Abd/Pelvis US have been completed

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***



EVOLENT CLINICAL GUIDELINE 031 FOR ABDOMEN MRI, MRCP (MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY), MRE (MAGNETIC RESONANCE ENTEROGRAPHY), AND MRU (MAGNETIC RESONANCE UROGRAPHY)

Guideline or Policy Number: Evolent_CG_031	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
INDICATIONS FOR ABDOMEN MRI	3
ORGAN SPECIFIC IMAGING.....	3
Adrenal	3
Liver.....	4
Pancreas.....	5
Renal	5
Spleen	6
EVALUATION OF IRON OVERLOAD	6
INFLAMMATORY BOWEL DISEASE.....	7
EVALUATION OF INFLAMMATION AND INFECTION	7
Fistula	7
Known or Suspected Infection When CT is Contraindicated or Cannot Be Performed	7
OTHER INDICATIONS FOR ABDOMINAL MRI	7
For any of the following:	7
For Any of the Following When CT is Inconclusive or when CT is Contraindicated or Cannot be Performed.....	8
INDICATIONS FOR MRCP.....	9
FOLLOW-UP OF KNOWN CANCER	9
Initial Staging	9
Restaging.....	10
Surveillance	10
PRE-OPERATIVE EVALUATION.....	11

POST-OPERATIVE/PROCEDURAL EVALUATION	11
GENETIC SYNDROMES AND RARE DISEASES.....	11
<i>Surveillance Screening Abdomen MRI for the following KNOWN Genetic Syndromes</i>	11
<i>Screening Based on KNOWN Genetic Syndrome in combination with Family History:</i>	12
<i>Surveillance Screening Based on Family History</i>	12
COMBINATION STUDIES	12
<i>Abdomen MRA and Abdomen MRI or CT</i>	12
<i>Abdomen MRI (or CT) and Abdomen MRA (or CTA) and PET</i>	13
<i>Abdomen MRI and MR Elastography</i>	13
<i>Abdomen/Pelvis MRI</i>	13
<i>Brain/Cervical/Thoracic/Lumbar/Abdomen MRI</i>	13
<i>Chest CT and Brain/Abdomen/Pelvis MRI</i>	13
<i>Neck/Abdomen/Pelvis MRI and Chest CT</i>	13
<i>Combination Studies for Malignancy for Initial Staging or Restaging</i>	13
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	14
CODING AND STANDARDS	14
CODING	14
CPT Codes	14
APPLICABLE LINES OF BUSINESS	14
BACKGROUND	14
ADRENAL AND NEUROENDOCRINE	14
<i>Biochemical Evaluation</i>	14
LIVER	15
<i>MRI of the Liver</i>	15
<i>Screening for Hepatocellular Carcinoma (HCC)</i>	16
KIDNEY	16
<i>PRO-PKD Score</i>	16
FEVER OF UNKNOWN ORIGIN	16
PARANEOPLASTIC SYNDROMES.....	17
WEIGHT LOSS	17
CONTRAINDICATIONS AND PREFERRED STUDIES	18
POLICY HISTORY	18
<i>Summary</i>	18
LEGAL AND COMPLIANCE	19
GUIDELINE APPROVAL.....	19
<i>Committee</i>	19
DISCLAIMER	19
REFERENCES.....	21

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Abdominal Magnetic Resonance Imaging (MRI) generates images of the organs and structures within the abdomen without the use of ionizing radiation.

Special Note

A single authorization for CPT codes 74181, 74182, 74183, S8037 covers imaging of the biliary tree and its attached organs, i.e., the liver, gallbladder (GB), and pancreas. These same codes also cover MRI abdomen, Magnetic Resonance Enterography (MRE), and Magnetic Resonance Urography (MRU). Multiple authorizations are not typically required. When both Magnetic Resonance Cholangiopancreatography (MRCP) and MRI abdomen are requested, documentation requires a medical reason clearly indicating why both are needed, i.e., that meets guidelines for imaging of bowel, kidneys, or areas other than liver, pancreas, GB, and biliary tree as well.

Note: There are no MRI Abdomen/Pelvis combo (comparable to a CT Abdomen/Pelvis) such that if imaging of both the abdomen and pelvis are indicated, two separate exams (and authorization) are required (i.e., MRI Abdomen and MRI Pelvis)

INDICATIONS FOR ABDOMEN MRI

Organ Specific Imaging

Adrenal ⁽¹⁾

- Indeterminate adrenal lesion seen on prior imaging
- For further evaluation of suspected adrenal tumors and/or endocrine disorders when there is clinical and laboratory evidence to suggest an adrenal source; see

Background for specific laboratory testing that is needed based on suspected diagnosis⁽²⁾

- Adrenal mass < 4 cm incidentally discovered with benign characteristics (homogenous, regular borders, HU < 10), one follow-up at 6 months then annually x 2 years (no further imaging if stable)
- Adrenal mass ≥ 4 cm and no diagnosis of cancer, can approve for either pre-operative planning **OR** if surgery is not done, can repeat imaging in 6-12 months then as clinically indicated (if there is known malignancy, biopsy is typically the next step rather than surveillance imaging)
- For follow up of known adrenal mass when a change in tumor is suspected by either imaging, laboratory evaluation and/or symptoms
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Liver

- Indeterminate liver lesion seen on prior imaging⁽³⁾
- Rising AFP (requires a ≥7 ng/mL increased in AFP per month) in patients at high risk for HCC (known cirrhosis and/or chronic hepatitis B, see **Background** for additional risk categories)⁽⁴⁾
- Screening in patients at high risk for HCC (see above) every 6 months when prior ultrasound is insufficient to evaluate the liver due to steatosis/fatty liver or nodular liver
 - The finding of steatosis/fatty liver and/or nodular liver alone on an ultrasound report is insufficient for approval; the report must specify that those findings prevent adequate visualization of the liver by ultrasound
- Jaundice or abnormal liver function tests after equivocal or abnormal ultrasound^(5,6)
- Follow-up of suspected hepatocellular adenomas every 6 months for 2 years, then annually (sooner if change was noted on last imaging study)^(7,8)
- Surveillance of patients with primary sclerosing cholangitis, every 6 months after the age of 20 (MRI and MRCP preferred over CT)⁽⁹⁾
- Follow-up of focal nodular hyperplasia (FNH), repeat imaging in 6-12 months to ensure stability. Additional imaging beyond that is needed only if atypical features or diagnosis is still in question⁽⁸⁾
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Pancreas

- Pancreatic cystic lesion found on initial imaging, approve for initial characterization of lesion⁽¹⁰⁾
- Follow-up for pancreatic cyst as below:^(10,11)
 - Incidental and asymptomatic cysts <1.5 cm, **AND**:
 - Age < 65, image annually x 5 years, then every 2 years if stable
 - Age 65-79, imaging every 2 years x 5, then stop if stable
 - Cysts 1.5-1.9 cm with main pancreatic duct communication (MPD), image annually x 5 years, then every 2 years x 2, stop if stable at year 9
 - Cysts 2.0-2.5 cm with MPD communication, image every 6 months x 4, then annually x 2, then every 2 years x 3, stop if stable at year 10
 - Cysts 1.5-2.5 cm with **NO** MPD communication (or cannot be determined), image every 6 mos. x 4, then annually x 2 then every 2 years x 3, stop if stable at year 10
 - Cyst > 2.5 cm on surveillance (i.e., intervention has not been chosen), image every 6 mos. x 4, then annually x 2 years, then every 2 years x 3. Stop if stable at year 10
 - Patients > 80 years of age at presentation are imaged less frequently: image every 2 years x 2, stop if stable at year 4 (intervals are the same regardless of size if surveillance chosen)
 - Growth or suspicious change on a surveillance imaging scan may warrant more frequent surveillance
- Localization of a functional pancreatic tumor, see **Background** (endocrine) once diagnosis is confirmed (or highly suspected)⁽¹⁰⁾
- See **Genetic Syndromes and Rare Diseases** for additional screening indications

Renal

- Indeterminate renal mass on other imaging⁽¹²⁾
- Follow-up for solid renal masses under 3 cm at 6 and 12 months, then annually⁽¹³⁾
- Active surveillance for follow-up of a Bosniak IIF, III and IV complex cystic renal lesions:
 - Every 6 months for the first year then
 - Annually for 5 years if no progression
 - If progression or change is seen, then follow-up imaging may be indicated prior to the above intervals.

- **NOTE:** Bosniak I and II cysts need no further follow-up. (Bosniak I cysts are simple non-enhancing cysts with thin walls, no septa, calcifications or solid components, Bosniak II cysts may contain thin septa, small or fine calcification, minimal enhancement and/or hyperdense and < 3 cm)⁽¹⁴⁾
- Surveillance of known angiomyolipoma (AML):
 - Size > 4 cm: Annually
 - Size 3-4 cm: Every 2 years
 - **NOTE:** if < 3 cm monitoring with advanced imaging (CT/MRI) is not needed unless the pt has known Tuberous Sclerosis ^(15,16,17)
 - AML (any size) in an individual **with** known tuberous sclerosis (TSC)⁽¹⁸⁾: Annually
 - Post-embolization imaging for AML:
 - One study within the first 6 months, then
 - At one-year post-embolization
 - If stable, further imaging reverts to the above imaging frequency for monitoring (based on size and/or presence of known TSC)^(19,20)
- MRU (may also approve MR pelvis for MR urography) when ultrasound is inconclusive, and CT (CTU) cannot be done or is inconclusive and MRI is recommended
- Polycystic Kidney Disease⁽²¹⁾
 - To assess total kidney volume (TKV) at diagnosis and prior to treatment
 - To monitor total kidney volume annually if PRO-PKD score is ≥ 4 ⁽²²⁾
- See **Genetic Syndromes and Rare Diseases** for additional indications

Spleen

- Incidental findings of the spleen that are indeterminate on ultrasound or CT imaging⁽²³⁾
- See **Genetic Syndromes and Rare Diseases** for additional indications

Evaluation of Iron Overload ^(24,25)

- Initial evaluation of liver iron in Hemochromatosis diagnosed in lieu of liver biopsy
- Annual evaluation for high-risk patients: transfusion-dependent thalassemia major, sickle cell disease, and other congenital anemias

Inflammatory Bowel Disease ^(26,27)

- For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis (includes MR Enterography)
 - For suspected inflammatory bowel disease after complete work up including physical exam, labs, and recent colonoscopy
 - Known inflammatory bowel disease with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy

Evaluation of Inflammation and Infection ^(28,29)

Fistula

- For history of fistula in the abdomen that requires re-evaluation or is suspected to have recurred (MRI Preferred)

Known or Suspected Infection When CT is Contraindicated or Cannot Be Performed

- Any known infection that is clinically suspected to have created an abscess in the abdomen
- Abnormal fluid collection limited to the abdomen seen on prior imaging that needs follow-up evaluation
- Suspected peritonitis when abdominal pain and tenderness to palpation are present, and at **LEAST** one of the following:
 - Rebound, guarding or rigid abdomen, **OR**
 - Severe tenderness to palpation over the entire abdomen
- Complications of diverticulitis (diagnosed either clinically or by imaging) with severe abdominal pain or severe tenderness or mass, not responding to antibiotic treatment)

Other Indications for Abdominal MRI ⁽³⁰⁾

For any of the following:

- To locate a pheochromocytoma once there is clear biochemical evidence (See Background)⁽³¹⁾
- Prior to liver transplantation (MRI and MRCP), may repeat studies immediately prior to transplantation with known HCC, PSC, or cholangiocarcinoma
- Prior to solid organ transplantation

For Any of the Following When CT is Inconclusive or when CT is Contraindicated or Cannot be Performed

- Persistent abdominal/pelvic pain not explained by previous imaging
- Suspected or known hernia and either:
 - Occult, spigelian, incisional or epigastric hernia when physical exam and prior imaging (Ultrasound **AND** CT) is non-diagnostic or equivocal and limited to the abdomen **OR**
 - Suspected incarceration or strangulation based on physical exam (guarding, rebound) or prior imaging
- For fever of unknown origin (temperature of ≥ 101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see **Background**)
- Any B-symptoms of fevers more than 101° F, drenching night sweats, or unexplained weight loss of more than 10% of body weight over 6 months with documented concern for lymphoma/malignancy⁽³²⁾
- Weight loss:
 - Clinically significant unintentional weight loss i.e., $\geq 5\%$ of body weight in less than 12 months (or $\geq 2\%$ in one month), with signs or symptoms suggestive of an abdominal cause (see Background) **OR**
 - Ongoing unexplained clinically significant weight loss i.e., $\geq 5\%$ of body weight in less than 12 months (or $\geq 2\%$ in one month)⁽³³⁾ after initial workup (see Background) has been completed, no cause identified, and second visit documenting further decline in weight⁽³⁴⁾
- Suspected or known retroperitoneal fibrosis after complete workup and ultrasound to determine extent of disease⁽³⁵⁾
- Suspected paraneoplastic syndrome (including dermatomyositis) with high suspicion of abdominal malignancy and appropriate workup has been done (see Background for details)
- Diffuse, unexplained lower extremity edema with negative or inconclusive ultrasound⁽³⁶⁾
- Suspected May-Thurner syndrome (CTV/MRV preferred)⁽³⁷⁾
- Further evaluation of a new onset or non-reducible varicocele⁽³⁸⁾
- Prior to Bone Marrow Transplant (BMT)⁽³⁹⁾⁽⁴⁰⁾
- Follow-up of abnormal lymph nodes with no prior history of malignancy
 - Follow-up imaging at 3 months⁽⁴¹⁾

Indications for MRCP ^(42,43)

- To confirm choledocholithiasis in patients in the acute setting after ultrasound has been completed
- Suspected acute pancreatitis with atypical signs and symptoms, including equivocal amylase and lipase and diagnosis other than pancreatitis may be possible. (MRCP and CT/MRI may be ordered simultaneously in this setting and may be approved)
- Pancreatitis by history (greater than 4 weeks), (including pancreatic pseudocyst) with continued pain suspicious for worsening, or re-exacerbation. (MRCP and CT/MRI may be ordered simultaneously in this setting and may be approved)
- Evaluation of suspected congenital anomaly of the pancreaticobiliary tract, e.g., aberrant ducts, pancreas divisum or related complications
- Suspected choledochal cyst after ultrasound has been done
- Long-term postoperative surveillance for patients with history of choledochal cyst
- Post-surgical biliary anatomy and complications when ERCP is not possible or contraindicated
- Assessment of benign or malignant biliary strictures
- Evaluation of persistent symptoms when abnormalities are identified on other imaging (e.g., ultrasound, CT, or MRI)
- Evaluation of abnormality related to the pancreatic or biliary tree based on symptoms or laboratory findings and initial imaging has been performed or is contraindicated (e.g., renal failure prevents contrast CT or body habitus limits US)
- Evaluation of pancreatobiliary disease in pregnant patients after ultrasound has been done
- Prior to liver transplantation, may repeat studies immediately prior to transplantation with known HCC, PSC, or cholangiocarcinoma

Follow-Up of Known Cancer ⁽⁴⁴⁾

Initial Staging

- Abdomen MRI is indicated when there are indeterminate findings on initial staging (such as for suspected liver metastases) imaging in need further evaluation with MRI.
- For the following malignancies, Abdomen MRI is indicated for initial staging:
 - Biliary Tract Cancers
 - Primary Liver Cancers
 - Uveal Melanoma

Restaging

- Abdomen MRI is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the following malignancies:
 - Breast Cancer when there are suspected or known liver metastases
 - Colon Cancer when there are suspected or known liver metastases
 - Primary Liver Cancers
 - Neuroendocrine tumors when there are suspected or known liver metastases
 - Pancreatic Cancer
 - Uveal Melanoma
- For further evaluation of known liver metastases including prior to liver directed therapy or to assess treatment response
- MRCP is indicated for restaging during active treatment (every 2-3 cycles of chemo or immunotherapy, following radiation and/or after surgery) for the following:
 - Biliary Tract Cancers (Ampullary Adenocarcinoma, Cholangiocarcinomas and Gallbladder Cancer)

Surveillance

Abdomen MRI is indicated during surveillance for the following malignancies at the intervals defined below:

- Breast Cancer every 3-6 months when there are suspected or known liver metastases⁽⁴⁵⁾
- Colon Cancer every 3-6 months when there are suspected or known liver metastases⁽⁴⁶⁾
- Hepatocellular Carcinoma every 3-6 months for 2 years then every 6 months indefinitely⁽⁴⁾
- Pancreatic Cancer every 3-6 months for 2 years then every 6-12 months as clinically indicated⁽⁴⁷⁾
- Uveal Melanoma: every 6-12 months for 10 years then as clinically indicated⁽⁴⁸⁾
- When CT is contraindicated or cannot be performed **AND** the medical necessity criteria have been met (see CG 068 Abd Pelvis CT) for that malignancy, Abdomen MRI can be used during surveillance instead of CT.

Pre-Operative Evaluation

- For abdominal surgery or procedure

Post-Operative/Procedural Evaluation ⁽⁴⁹⁾

When not otherwise addressed in the guideline

- Follow-up of known or suspected post-operative complication (within 6 months) involving only the abdomen
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Genetic Syndromes and Rare Diseases

Surveillance Screening Abdomen MRI for the following KNOWN Genetic Syndromes

- ADPKD (Autosomal Dominant Polycystic Kidney Disease): To assess total kidney volume (TKV) at diagnosis **AND** prior to treatment **AND** to monitor total kidney volume annually if PRO-PKD score is ≥ 4 ⁽²²⁾
- BAP1-TPDS (BAP-1 tumor predisposition syndrome) every 2 years starting at age 30 ⁽⁵⁰⁾
- Beckwith-Wiedemann syndrome: when ultrasound is abnormal, or AFP is rising ⁽⁵¹⁾
- BHDS (Birt-Hogg-Dube) every 3 years starting at age 20 ⁽⁵⁰⁾
- CDKN2A variant: Annually starting at age 40 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) ⁽⁴⁷⁾
- FAP (Familial Adenomatous Polyposis, annual screening of abdomen and pelvis with MRI or CT for one or more of the following: personal history of desmoid tumor, family history of desmoid tumor or abdominal symptoms suggestive of desmoid tumor ⁽⁵²⁾
- Gaucher Disease: At initial diagnosis and then annually ⁽⁵³⁾
- HLRCC (hereditary leiomyomatosis and renal cell cancer) annually starting at age 8 ⁽⁵⁰⁾
- HPRCC (hereditary papillary renal carcinoma) annually starting at age 30 ⁽⁵⁰⁾
- Multiple Endocrine Neoplasia type 1 (MEN1): annually ⁽⁵⁴⁾ ⁽⁵⁵⁾
- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **not** available ⁽⁵⁶⁾ (see Unlisted Studies Evolent_CG_063) ⁽⁵⁰⁾

- PRSS1 (Hereditary Pancreatitis; including PRSS1, SPINK1 and other hereditary pancreatitis genes): Annually starting 20 years after onset of pancreatitis, or at age 40 years, whichever is earlier⁽⁴⁷⁾
- SKT11 variant (including Peutz-Jeghers): Annually starting at age 30 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier)⁽⁴⁷⁾
- TSC (tuberous sclerosis complex)⁽⁵⁰⁾
 - TSC **without** known AML: every 3 years starting at age 12
 - TSC **with** known AML: annually
- Von Hippel Lindau (VHL) every 2 years starting at age 15^(50,54)
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance.

Screening Based on KNOWN Genetic Syndrome in combination with Family History:

- Other variants **AND** family history of pancreatic cancer as detailed below: Starting at age 50 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) for the following:
 - ≥ 1 first- or second-degree relative with history of pancreatic cancer from the same side of the family as the identified variant **AND** known mutation in other pancreatic susceptibility genes (ATM, BRCA1, BRCA2, MLH1 (Lynch), MSH2, MSH6, EPCAM, PALB2, TP53): Annually

Surveillance Screening Based on Family History

- To Screen for Pancreatic Cancer in patients with no identified mutation listed above **AND** the following family history:
 - ≥ 2 first-degree relatives with a history of pancreatic cancer from the same side of the family: Annually
 - ≥ 3 first- and/or second-degree relatives with a history of pancreatic cancer from the same side of the family: Annually

Combination Studies

Abdomen MRA and Abdomen MRI or CT

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)

Abdomen MRI (or CT) and Abdomen MRA (or CTA) and PET

- Prior to Y90 treatment

Abdomen MRI and MR Elastography

- MRI Abdomen can be used for HCC Screening and MR Elastography can be used to stage hepatic fibrosis. While each indication requires an insufficient ultrasound, that ultrasound needs to be insufficient for only one of the two indications to meet medical necessity for both studies

Abdomen/Pelvis MRI

- As a dedicated CPT code does not exist for Abdomen and Pelvis MRI (unlike CT), when a disease process is reasonably expected to involve both the abdomen and pelvis **AND** the guideline criteria have been met, two separate authorizations are required: Abdomen MRI (CPT 74181, 74182, 74183) and Pelvis MRI (CPT 72195, 72196, 72197).

Brain/Cervical/Thoracic/Lumbar/Abdomen MRI

- Von Hippel Lindau (VHL) every 2 years starting at age 15⁽⁵⁷⁾

Chest CT and Brain/Abdomen/Pelvis MRI

- Multiple Endocrine Neoplasia Syndrome Type 1 (MEN-1)
 - Chest/Abdomen/Pelvis annually
 - Brain/Chest/Abdomen/Pelvis every 3 years

Neck/Abdomen/Pelvis MRI and Chest CT

- PGL/PCC (Hereditary Paraganglioma/Pheochromocytoma syndromes or SDHx mutations): every 2 years **IF** whole body MRI (unlisted MRI CPT 76498) **NOT** available ⁽⁵⁶⁾ (see Unlisted Studies Evolent_CG_063)⁽⁵⁰⁾

Combination Studies for Malignancy for Initial Staging or Restaging

Unless otherwise specified in this guideline, indication for combination studies for malignancy for initial staging or restaging:



- Concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Abdomen, Brain, Chest, Neck, Pelvis, Cervical Spine, Thoracic Spine or Lumbar Spine.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

CODING AND STANDARDS

Coding

CPT Codes

74181, 74182, 74183, S8037, +0698T, +0724T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Adrenal and Neuroendocrine

Biochemical Evaluation

Laboratory evaluation prior to imaging when neuroendocrine and hormonally active tumors are suspected, the required laboratory evaluation prior to advanced imaging is dependent on the tumor type that is suspected. The following list describes suspected syndrome/tumor and typical laboratory evaluation in parenthesis:

GI Carcinoid (24-hour urine or plasma 5-HIAA), Lung/Thymus Carcinoid (24-hour urine or plasma 5-HIAA and one of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), PPoma (serum pancreatic polypeptide), Insulinoma (serum insulin, pro-insulin and C-peptide all drawn during a period of hypoglycemia (i.e. 72 hour fast)), VIPoma (serum VIP), glucagonoma (serum glucagon), gastrinoma (serum gastrin), somatostatinoma (serum somatostatin), pheochromocytoma/paraganglioma (plasma free or 24-hour urine fractionated metanephrines and normetanephrines +/- serum or urine catecholamines), pituitary tumor (serum IGF-1, prolactin, LH/FSH, alpha subunits, TSH and one of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), primary hyperaldosteronism (suppressed renin/renin activity in association with elevated plasma aldosterone (>10 ng/dL) and confirmatory testing if positive), adrenocortical carcinoma (testosterone, DHEA-S and complete evaluation for hypercortisolemia or primary aldosteronism)⁽⁵⁴⁾

If Cushing's (hypercortisolemia) is suspected, typical labs include a plasma ACTH and one or more of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, or 24-hour urinary free cortisol. The results of the suppression test then indicate whether brain imaging is needed (pituitary source) or chest and abdominal imaging is needed (CXR + Adrenal CT/MRI). ACTH > 20 after suppression > 20 is suggestive of Cushing's Disease and Pituitary MRI +/- CXR is indicated. ACTH after suppression < 5 is suggestive of Cushing's Syndrome and CXR + Adrenal CT/MRI is indicated.⁽⁵⁸⁾ If indeterminate, a CRH or desmopressin test is then done. If there is no ACTH suppression with CRH/desmopressin, then adrenal imaging is indicated.⁽⁵⁹⁾

Liver

MRI of the Liver

The liver is a common site of metastatic spread. Patients with a history of known or suspected malignancy, especially tumors from the colon, lung, pancreas, and stomach, are at risk for developing hepatocellular carcinoma. Patients with chronic liver disease are also at risk for developing liver cancer and undergo periodic liver screening for focal liver lesion detection, usually with ultrasonography (US). Liver-specific contrast agents (gadobenate dimeglumine (Gd-BOPTA, MultiHance) and gadoxetate disodium (Eovist) are taken up by functionally intact hepatocytes, allowing increased visualization of both tumors and liver metastases. As metastatic liver lesions do not take up these contrast agents, a dedicated liver MRI can help identify tumors as it allows more contrast differentiation between the tumor and normal liver tissue. In patients undergoing PET scans for active malignancies and there are either known liver metastases in need of restaging or indeterminate liver lesions on other imaging (such as PET or CT), a dedicated liver MRI is considered complimentary **NOT** overlapping and can be approved in addition to PET if the patient otherwise meets criteria for PET approval (see PET Guideline for further guidance).

Screening for Hepatocellular Carcinoma (HCC)

AASLD (American Association for the Study of Liver Diseases) recommends screening for HCC with ultrasound every 6 months for patients with hepatitis C and B. Advanced imaging is recommended when the AFP is rising, regardless of ultrasound results. The main risk factors for HCC are cirrhosis and Hepatitis B. Additional populations for which there is a benefit to surveillance for HCC include: Asian males Hepatitis B carriers ≥ 40 y, Asian female Hepatitis B carriers ≥ 50 y, Hepatitis B carriers with + family history of HCC and African and/or North American blacks with hepatitis B.^(4,7)

Kidney

PRO-PKD Score^(22,60)

The PRO-PKD score is to assess prognosis in ADPKD, risk scoring system is on the basis of PKD mutation and clinical parameters.

Risk Category	Points
Being Male	1
Hypertension before 35 years of age	2
First Urological event (macroscopic hematuria, flank pain or cyst infection) before 35 years of age	2
PKD2 mutation	0
Non-truncating PKD1 mutation	2
Truncating PKD1 mutation	4
A score of > 6 predicts rapid disease progression with ESRD onset before the age of 60 years with a positive predictive value of 90.0%	
For those with an intermediate score (4-6 points), the prognosis is unclear	

Fever of Unknown Origin

Initial work up prior to CT/MRI would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test.⁽⁶¹⁾ Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

Paraneoplastic Syndromes

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For SIADH (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.

For hypercalcemia (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen, and pelvis imaging as appropriate.

For Cushing syndrome (hypokalemia, normal-high midnight serum ACTH not suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test does suppress ACTH, pituitary MRI is reasonable.

For hypoglycemia, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-peptide, and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrants CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrants chest and abdominal imaging.

When a paraneoplastic neurologic syndrome is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Weight Loss

Unintentional weight loss is considered clinically significant if the amount of weight lost over 12 months is $\geq 5\%$. Older age and higher percentage of weight loss correlates with higher likelihood of malignancy. A targeted evaluation is recommended when there are signs or symptoms suggestive of a specific source. For example, when there is clinically significant weight loss with abdominal pain that prompts an evaluation for an abdominal source of the weight loss; CXR and labs such as TSH would not be needed prior to abdominal imaging. Conversely a smoker with a cough and weight loss would not start with abdominal imaging, a chest x-ray (CXR) would be the first test to start with. When there is no suspected diagnosis, initial evaluation includes CXR, age-appropriate cancer screening (such as

colonoscopy and mammography) and labs (including CBC, CMP, HbA1C, TSH, stool hemoccult, ESR/CRP, HIV, Hepatitis C). If this initial evaluation fails to identify a cause of weight loss, then the patient is monitored and if progressive weight loss is seen on subsequent visits/weights, then CT Abdomen/Pelvis is reasonable (MRI if there is a contraindication to CT such as contrast allergy or impaired renal function). Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Revised the purpose • Genetics section and Malignancy was reorganized • Organ section was reorganized • Fixed typo in pancreas section for mm to be cm • Renal Bosniak section was adjusted to incorporate background into this section for further clarification • Polycystic Kidney Disease was updated • Known Malignancy section was adjusted to indicate initial staging, restaging, and surveillance to be consistent with new cancer bundles coming out • Background cut • Added in post-embolization imaging • Added CPT code +0722T • Added Contraindications and Preferred Studies statement to Background • Adjusted Combination Studies
May 2023	<ul style="list-style-type: none"> • IBD: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication

	<ul style="list-style-type: none"> ● Adrenal: additional guidance provided for imaging intervals and background given for functional tumors ● Liver: clarified guidance for HCC surveillance imaging, follow up of specific conditions such as hepatic steatosis and focal nodular hyperplasia ● Pancreas: updated pancreatic cystic lesion guidance, specified guidance for increased lifetime risk for pancreatic cancer and pancreatitis ● Renal: specified guidance for increased lifetime risk of renal cancer ● Hernia: Added indications for lower esophageal and deep intraabdominal hernias ● Aneurysm: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication ● Transplant: added section ● Background: deleted some sections, added information to assist with adjudication/application of guideline statement ● Aligned sections across body imaging guidelines ● General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline ● Added statement regarding further evaluation of indeterminate findings on prior imaging
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider



agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Francis I, Mayo-Smith W. Adrenal Imaging: In: Hodler J, Kubik-Huch RA, von Schulthess GK, editors. Diseases of the Abdomen and Pelvis 2018-2021: Diagnostic Imaging. IDKD Book [Internet]. Cham (CH): Springer. 2018; Chapter 9: 10.1007/978-3-319-75019-4_9.
2. Zeiger M, Thompson G, Duh Q, Hamrahian A, Angelos P et al. American Association of Clinical Endocrinologists and American Association of Endocrine Surgeons Medical Guidelines for The Management of Adrenal Incidentalomas. Endocrine Practice. 2009; 15: 1-20. 10.4158/EP.15.S1.1.
3. Chernyak V, Horowitz J M, Kamel I R, Arif-Tiwari H, Bashir M R et al. ACR Appropriateness Criteria® Liver Lesion-Initial Characterization. Journal of the American College of Radiology. 2020; 17: S429 - S446. 10.1016/j.jacr.2020.09.005.
4. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Hepatocellular Carcinoma. National Comprehensive Cancer Network®. 2024; Version 1.2024:
5. Vagvala S H, O'Connor S D. Imaging of abnormal liver function tests. Clinical liver disease. 2018; 11: 128-134. 10.1002/cld.704.
6. Arif-Tiwari H, Porter K K, Kamel I R, Bashir M R, Fung A et al. ACR Appropriateness Criteria® Abnormal Liver Function Tests. Journal of the American College of Radiology. 2023; 20: S302 - S314. 10.1016/j.jacr.2023.08.023.
7. Marrero J, Kulik L, Sirlin C, Zhu A, Finn R et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. Hepatology. Aug 2018; 68: 723-750. 10.1002/hep.29913.
8. Mounajjed T. Hepatocellular Adenoma and Focal Nodular Hyperplasia. Clinical liver disease. 2021; 17: 244-248. 10.1002/cld.1069.
9. Catanzaro E, Gringeri E, Burra P, Gambato M. Primary Sclerosing Cholangitis-Associated Cholangiocarcinoma: From Pathogenesis to Diagnostic and Surveillance Strategies. Cancers. 2023; 15: 10.3390/cancers15204947.
10. Fábrega-Foster K, Kamel I R, Horowitz J M, Arif-Tiwari H, Bashir M R et al. ACR Appropriateness Criteria® Pancreatic Cyst. Journal of the American College of Radiology. 2020; 17: S198 - S206. 10.1016/j.jacr.2020.01.021.
11. Megibow A J, Baker M E, Morgan D E, Kamel I R, Sahani D V et al. Management of Incidental Pancreatic Cysts: A White Paper of the ACR Incidental Findings Committee. Journal of the American College of Radiology. 2017; 14: 911 - 923. 10.1016/j.jacr.2017.03.010.
12. Wang Z J, Nikolaidis P, Khatri G, Dogra V S, Ganeshan D et al. ACR Appropriateness Criteria® Indeterminate Renal Mass. Journal of the American College of Radiology. 2020; 17: S415 - S428. 10.1016/j.jacr.2020.09.010.
13. Herts B R, Silverman S G, Hindman N M, Uzzo R G, Hartman R P et al. Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee. Journal of the American College of Radiology. 2018; 15: 264 - 273. 10.1016/j.jacr.2017.04.028.
14. Richard P, Violette P, Bhindi B, Breau R, Gratton M et al. 2023 UPDATE - Canadian Urological Association guideline: Management of cystic. 2023 UPDATE - Canadian Urological Association guideline: Management of cystic renal lesions Prior to original publication (March 2017). 2023; 17: 162-174. 10.5489/cuaj.8389.

15. Pandey P, Pandey A, Luo Y, Aliyari Ghasabeh M, Khoshpouri P et al. Follow-up of Incidentally Detected Pancreatic Cystic Neoplasms: Do Baseline MRI and CT Features Predict Cyst Growth? *Radiology*. Sep 2019; 292: 647-654. 10.1148/radiol.2019181686.
16. Ryan J, Farrelly C, Geoghegan T. What Are the Indications for Prophylactic Embolization of Renal Angiomyolipoma? A Review of the Current Evidence in the Literature. *Canadian Association of Radiologists Journal*. 2018/08/01/; 69: 236-239. <https://doi.org/10.1016/j.carj.2018.01.002>.
17. Chan K, Chedgy E, Bent C, Turner K. Surveillance imaging for sporadic renal angiomyolipoma less than 40 mm: lessons learnt and recommendations from the experience of a large district general hospital. *Ann R Coll Surg Engl*. Jul 2018; 100: 480-484. 10.1308/rcsann.2018.0040.
18. Northrup H, Koenig M K, Pearson D A, Au K S. Tuberous Sclerosis Complex. 1999 July 13 [Updated 2021 Dec9]. *GeneReviews®* [Internet]. 2021;
19. Bardin F, Chevallier O , Bertaut A , Delorme E, Moulin M et al. Selective arterial embolization of symptomatic and asymptomatic renal angiomyolipomas: a retrospective study of safety, outcomes and tumor size reduction. *Quantitative imaging in medicine and surgery*. 2017; 7: 8-23. 10.21037/qims.2017.01.02.
20. Zeid M, Sayedin H, Nabi N, Abdelrahman M, Jacob P et al. Active Surveillance for Renal Angiomyolipoma Less Than 4 Centimeters: A Systematic Review of Cohort Studies. *Cureus*. 2022; 14: e22678. 10.7759/cureus.22678.
21. Harris P, Torres V. Polycystic Kidney Disease, Autosomal Dominant. 2002 Jan 10 [Updated 2022 Sep 29]. *GeneReviews®* [Internet]. 2022; Accessed May 2024:
22. Gansevoort R T, Arici M, Benzing T, Birn H, Capasso G et al. Recommendations for the use of tolvaptan in autosomal dominant polycystic kidney disease: a position statement on behalf of the ERA-EDTA Working Groups on Inherited Kidney Disorders and European Renal Best Practice. *Nephrol Dial Transplant*. 2016; 31: 337-48. 10.1093/ndt/gfv456.
23. Thut D, Smolinski S, Morrow M, McCarthy S, Alsina J et al. A diagnostic approach to splenic lesions. *Appl Radiol*. 2017; 46: 7-22.
24. McDowell L, Kudaravalli P, Chen R, Sticco K. Iron Overload. [Updated 2024 Jan 11]. *StatPearls Publishing* [Internet]. 2024; Accessed May 2024:
25. İdilman İ S, Akata D, Özmen M N, Karçaaltıncaba M. Different forms of iron accumulation in the liver on MRI. *Diagnostic and interventional radiology (Ankara, Turkey)*. 2016; 22: 22-8. 10.5152/dir.2015.15094.
26. Lichtenstein G, Loftus E, Isaacs K, Regueiro M, Gerson L. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *Am J Gastroenterol*. Apr 2018; 113: 481-517. 10.1038/ajg.2018.27.
27. Rubin D T, Ananthakrishnan A N, Siegel C A, Sauer B G, Long M D. ACG Clinical Guideline: Ulcerative Colitis in Adults. *Official journal of the American College of Gastroenterology | ACG*. 2019; 114: 10.14309/ajg.000000000000152.
28. Cartwright S, Knudson M. Diagnostic imaging of acute abdominal pain in adults. *Am Fam Physician*. Apr 1, 2015; 91: 452-9.
29. Frickenstein A, Jones M, Behkam B, McNally L. Imaging Inflammation and Infection in the Gastrointestinal Tract. *International journal of molecular sciences*. 2019; 21: 10.3390/ijms21010243.
30. Khosa F, Krinsky G, Macari M, Yucel E, Berland L. Managing incidental findings on abdominal and pelvic CT and MRI, Part 2: white paper of the ACR Incidental Findings Committee II on vascular findings. *J Am Coll Radiol*. Oct 2013; 10: 789-94. 10.1016/j.jacr.2013.05.021.

31. Čtvrtilík F, Koranda P, Schovánek J, Škarda J, Hartmann I. Current diagnostic imaging of pheochromocytomas and implications for therapeutic strategy. *Experimental and therapeutic medicine*. 2018; 15: 3151-3160. 10.3892/etm.2018.5871.
32. Brown I, Finnigan N. Fever of Unknown Origin. [Updated 2023 Aug 14]. In: StatPearls Publishing [Internet]. 2023; Accessed May 2024:
33. Gaddey H L, Holder K K. Unintentional Weight Loss in Older Adults. *American family physician*. 2021; 104: 34-40.
34. Gupta R, Evans A. Unintentional Weight Loss in Older Adults [Updated Oct 24, 2023]. UpToDate [Internet]. 2023; Accessed May 2024:
35. Engelskjerd J, LaGrange C. Retroperitoneal Fibrosis. [Updated 2022 Sep 12]. In: StatPearls Publishing [Internet]. 2022;
36. Gasparis A P, Kim P S, Dean S M, Khilnani N M, Labropoulos N. Diagnostic approach to lower limb edema. *Phlebology*. 2020; 35: 650-655. 10.1177/0268355520938283.
37. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164. 10.21037/cdt.2017.10.14.
38. Schlegel P, Sigman M, Collura B, De Jonge C, Eisenberg M et al. Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline Part I. *Journal of Urology*. 2021; 205: 36 - 43. 10.1097/JU.0000000000001521.
39. Gerull S, Medinger M, Heim D, Passweg J, Stern M. Evaluation of the Pretransplantation Workup before Allogeneic Transplantation. *Biology of Blood and Marrow Transplantation*. 2014/11/01/; 20: 1852-1856. <https://doi.org/10.1016/j.bbmt.2014.06.029>.
40. Kaste S, Kaufman R, Sunkara A, Kang G, Morris C et al. Routine pre- and post-hematopoietic stem cell transplant computed tomography of the abdomen for detecting invasive fungal infection has limited value. *Biol Blood Marrow Transplant*. Jun 2015; 21: 1132-5. 10.1016/j.bbmt.2015.02.023.
41. Smereka P, Doshi A, Ream J, Rosenkrantz A. The American College of Radiology Incidental Findings Committee Recommendations for Management of Incidental Lymph Nodes: A Single-Center Evaluation. *Acad Radiol*. May 2017; 24: 603-608. 10.1016/j.acra.2016.12.009.
42. Porter K K, Zaheer A, Kamel I R, Horowitz J M, Arif-Tiwari H et al. ACR Appropriateness Criteria® Acute Pancreatitis. *Journal of the American College of Radiology*. 2019; 16: S316 - S330. 10.1016/j.jacr.2019.05.017.
43. Griffin N, Charles-Edwards G, Grant L A. Magnetic resonance cholangiopancreatography: the ABC of MRCP. *Insights into imaging*. 2012; 3: 11-21. 10.1007/s13244-011-0129-9.
44. ACR-SAR-SPR. ACR–SAR–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF MAGNETIC RESONANCE IMAGING (MRI) OF THE ABDOMEN (Excluding the Liver). The American College of Radiology. 2020; Accessed May 2024:
45. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Breast Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024;
46. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colon Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024;
47. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic V3.2024. National Comprehensive Cancer Network®. 2024; v3.2024:

48. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Melanoma: Uveal Version 1.2023. National Comprehensive Cancer Network®. 2023;
49. Scheirey C D, Fowler K J, Therrien J A, Kim D H, Al-Refaie W B et al. ACR Appropriateness Criteria® Acute Nonlocalized Abdominal Pain. Journal of the American College of Radiology. 2018; 15: S217 - S231. 10.1016/j.jacr.2018.09.010.
50. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer V3.2024. National Comprehensive Cancer Network®. 2024; 1,23.
51. Shuman C, Kalish J, Weksberg R. Beckwith-Wiedemann Syndrome. 2000 Mar 3 [Updated 2023 Sep 21]. GeneReviews® [Internet]. 2023;
52. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colorectal Cancer Screening Version 1.2024. National Comprehensive Cancer Network®. 2024;
53. Hughes D, Pastores G. Gaucher Disease. 2000 Jul 27 [Updated 2023 Dec 7]. GeneReviews® [Internet]. 2023;
54. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors V1.2023. National Comprehensive Cancer Network®. 2023; Version 1.2023: 70-71.
55. Kamilaris C D C, Stratakis C A. Multiple Endocrine Neoplasia Type 1 (MEN1): An Update and the Significance of Early Genetic and Clinical Diagnosis. Frontiers in endocrinology. 2019; 10: 339. 10.3389/fendo.2019.00339.
56. Else T, Greenberg S, Fishbein L. Hereditary Paraganglioma-Pheochromocytoma Syndromes. 2008 May 21 [Updated 2023 Sep 21]. GeneReviews® [Internet]. 2023;
57. van Leeuwen R, Ahmad S, van Nesselrooij B, et al. Von Hippel-Lindau Syndrome. 2000 May 17 [Updated 2024 Feb 29]. GeneReviews® [Internet]. 2024;
58. ARUP Consult. Adrenal Hyperfunction (Cushing Syndrome) Testing Algorithm. ARUP. 2024; Accessed: May 2024. <https://arupconsult.com/algorithm/adrenal-hyperfunction-cushing-syndrome-testing-algorithm>.
59. Nieman L K, Biller B M K, Findling J W, Newell-Price J, Savage M O et al. The diagnosis of Cushing's syndrome: an Endocrine Society Clinical Practice Guideline. The Journal of clinical endocrinology and metabolism. 2008; 93: 1526-40. 10.1210/jc.2008-0125.
60. Cornec-Le Gall E, Audrézet M, Rousseau A, Hourmant M, Renaudineau E et al. The PROPKD Score: A New Algorithm to Predict Renal Survival in Autosomal Dominant Polycystic Kidney Disease. Journal of the American Society of Nephrology. 2016; 27: 10.1681/ASN.2015010016.
61. Katabathina V S, Dasyam A K, Dasyam N, Hosseinzadeh K. Adult bile duct strictures: role of MR imaging and MR cholangiopancreatography in characterization. Radiographics : a review publication of the Radiological Society of North. 2014; 34: 565-86. 10.1148/rg.343125211.

EVOLENT CLINICAL GUIDELINE 034-2 FOR ABDOMEN MRA/MRV (ANGIOGRAPHY)

Guideline or Policy Number: Evolut_CG_034-2	<u>Applicable Codes</u>	
<i>"Evolut" refers to Evolut Health LLC and Evolut Specialty Services, Inc.</i> © 1997 - 2025 Evolut. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS FOR ABDOMEN MR ANGIOGRAPHY/MR VENOGRAPHY (MRA/MRV)	3
ABDOMINAL AORTIC DISEASE.....	3
<i>Abdominal Aortic Aneurysm</i>	<i>3</i>
<i>Aortic Syndromes.....</i>	<i>4</i>
<i>Postoperative Follow-up of Aortic Repair</i>	<i>4</i>
RENAL ARTERY STENOSIS	4
ISCHEMIA OR HEMORRHAGE	5
OTHER VASCULAR ABNORMALITIES	5
VENOUS DISEASE	6
PERIPHERAL VASCULAR DISEASE	6
EVALUATION OF TUMOR	6
PRE-OPERATIVE EVALUATION AND/OR PRE-PROCEDURAL EVALUATION	7
POST-OPERATIVE EVALUATION AND/OR POST-PROCEDURAL EVALUATION	7
GENETIC SYNDROMES AND RARE DISEASES.....	7
COMBINATION STUDIES	8
<i>Abdomen MRA and Abdomen MRI or CT</i>	<i>8</i>
<i>Chest MRA/Abdomen MRA and/or Lower Extremity MRA.....</i>	<i>8</i>
<i>Abdomen MRI (or CT) and Abdomen MRA (or CTA) and PET</i>	<i>9</i>
<i>Abdomen/Pelvis MRA</i>	<i>9</i>
<i>Brain/Neck/Chest/Abdomen/Pelvis MRA</i>	<i>9</i>
<i>Chest/Abdomen/Pelvis MRA</i>	<i>9</i>
<i>Neck/Chest/Abdomen/Pelvis MRA.....</i>	<i>10</i>
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	10
CODING AND STANDARDS	10
CODING	10
<i>CPT Codes</i>	<i>10</i>
APPLICABLE LINES OF BUSINESS	10
BACKGROUND	10

ABDOMINAL ANEURYSMS AND GENERAL GUIDELINES FOR FOLLOW-UP	11
ULTRASOUND SCREENING INTERVALS*	11
MRA AND RENAL VEIN THROMBOSIS	11
MRI/CT AND ACUTE HEMORRHAGE	11
CONTRAINDICATIONS AND PREFERRED STUDIES	12
POLICY HISTORY	12
<i>Summary</i>	12
LEGAL AND COMPLIANCE	13
GUIDELINE APPROVAL	13
<i>Committee</i>	13
DISCLAIMER	13
REFERENCES	14

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance angiography (MRA) and (MRV) generates images of the blood vessels that can be evaluated for evidence of stenosis, occlusion, or aneurysms without use of ionizing radiation. It is used to evaluate the blood vessels of the abdomen.

NOTE: Authorization for MR Angiography covers both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

INDICATIONS FOR ABDOMEN MR ANGIOGRAPHY/MR VENOGRAPHY (MRA/MRV)

Abdominal Aortic Disease

Abdominal Aortic Aneurysm

- **Asymptomatic** known or suspected abdominal aortic aneurysms when prior ultrasound is inconclusive or insufficient **AND** when CT/CTA is **contraindicated or cannot be performed**
- **Symptomatic** known or suspected Abdominal Aortic Aneurysm^(1,2)
 - Symptoms may include:
 - Abrupt onset of severe sharp or stabbing pain in the chest, back or abdomen
 - Acute abdominal or back pain with a pulsatile or epigastric mass
 - Acute abdominal or back pain and at high risk for aortic aneurysm and/or aortic syndrome (risk factors include hypertension, atherosclerosis, prior cardiac or aortic surgery, underlying aneurysm, connective tissue disorder (e.g., Marfan syndrome, vascular form of Ehlers-Danlos syndrome, Loeys-Dietz syndrome), and bicuspid aortic valve)⁽³⁾

Aortic Syndromes

For initial diagnosis of suspected and follow-up of known aortic syndromes, including aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer:

- Frequency for follow up is as clinically indicated

Postoperative Follow-up of Aortic Repair ^(1,2)

Follow-up for post-endovascular repair (EVAR) or open repair of AAA or abdominal extent of iliac artery aneurysms at the following intervals

- Routine, baseline post-EVAR study when CT/CTA is **contraindicated or cannot be performed**:
 - Within one month of procedure
 - Continued follow up imaging at the following intervals:
 - If no endoleak or sac enlargement is seen:
 - Annually monitor with ultrasound
 - ◆ When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR
 - If type II endoleak or sac enlargement is seen at any point in time (US not needed):
 - Monitor every 6 months x 2 years, then annually (does not require US)
- Routine follow up after open repair of AAA when CT/CTA is **contraindicated or cannot be performed**:
 - Within 1 year postoperatively then
 - Annually monitor with ultrasound
 - When US is abnormal or insufficient CT/MR can be used to monitor annually
 - Every 5 years monitor with CT/MR
- If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed as clinically indicated
- Suspected complication such as: new onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair

Renal Artery Stenosis

In a patient with hypertension unrelated to recent medication use **AND** prior abnormal or inconclusive ultrasound **AND** any of the following:^(4,5,6)

- Onset of hypertension prior to the age of 30 without a family history of hypertension and when there is suspicion of fibromuscular dysplasia or a vasculitis
- Failure to obtain adequate blood pressure control on 3 antihypertensive medications, including one diuretic
- Recurrent episodes of sudden onset of congestive heart failure (also known as cardiac disturbance syndrome; may have normal left ventricular function)
- Renal failure of uncertain cause with normal urinary sediment and < 1g of urinary protein per day
- Coexisting diffuse atherosclerotic vascular disease, especially in heavy smokers
- Acute elevation of creatinine after initiation of an angiotensin converting enzyme inhibitor (ACE inhibitor) or angiotensin receptor blocker (ARB)
- Malignant or difficult to control hypertension and unilateral small kidney size (noted on prior imaging)
- New onset of difficult to control or labile hypertension after age 55
- Abdominal bruit lateralizing to one side of the abdomen
- Diagnosis of a syndrome with a higher risk of vascular disease, such as neurofibromatosis⁽⁷⁾ and Williams' syndrome⁽⁸⁾

Ischemia or Hemorrhage

- To determine the vascular source of retroperitoneal hematoma or hemorrhage when CT is insufficient to determine the source and CTA is **contraindicated or cannot be performed** (CT rather than MRA/CTA is the modality of choice for diagnosis) hemorrhage)⁽⁹⁾
- Evaluation of known or suspected mesenteric ischemia/ischemic colitis when CTA is **contraindicated or cannot be performed**⁽¹⁰⁾

Other Vascular Abnormalities

- Initial evaluation of inconclusive vascular findings on prior imaging
- For evaluation or monitoring of non-aortic large vessel or visceral vascular disease when ultrasound is inconclusive^(11,12,13,14)
 - Includes abnormalities such as aneurysm, dissection, arteriovenous malformations (AVM), vascular fistula, intramural hematoma, compression syndromes and vasculitis involving any of the following: inferior vena cava, superior/inferior mesenteric, celiac, hepatic, splenic or renal arteries/veins
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽¹⁵⁾

- Suspected complications of known aneurysm as evidenced by clinical findings such as new onset of abdominal pain

Venous Disease

- Suspected venous thrombosis (including renal vein thrombosis and/or portal venous thrombosis) if previous studies (such as ultrasound) have not resulted in a clear diagnosis⁽¹⁶⁾
- Known/suspected May-Thurner syndrome (iliac vein compression syndrome) when CTV is **contraindicated or cannot be performed**^(17,18)
- Evaluation of suspected pelvic vascular disease or pelvic congestive syndrome when ordered in addition to Pelvis MRA/MRV with prior inconclusive ultrasound⁽¹⁹⁾

Peripheral Vascular Disease ^(20,21,22,23)

For evaluation of known or suspected lower extremity arterial disease when CTA is **contraindicated or cannot be performed** AND Abdomen MRA is ordered in addition to lower extremity MRA(s):

- For known or suspected peripheral arterial disease (such as claudication, or clinical concern for vascular causes of ulcers) when non-invasive studies (pulse volume recording, ankle-brachial index, toe brachial index, segmental pressures, or doppler ultrasound) are abnormal or indeterminate **OR**
- For critical limb ischemia with **ANY** of the below clinical signs of peripheral artery disease (prior ultrasound is NOT needed; if done and negative, MRA should still be approved)^(24,25)
 - Ischemic rest pain
 - Tissue Loss
 - Gangrene
- After stenting or surgery with signs of recurrent symptoms, abnormal ankle/brachial index, abnormal or indeterminate arterial Doppler, **or** abnormal or indeterminate pulse volume recording

NOTE: When the criteria above are met, two separate authorizations are required: Abdomen MRA (CPT 74185) and one Lower Extremity MRA (CPT 73725). This will provide imaging of the abdomen, pelvis and both legs. A separate Pelvis MRA authorization is **NOT** required. Only one Lower Extremity MRA is required (not two).

Evaluation of Tumor

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)⁽²⁶⁾

- Prior to Y90 treatment⁽²⁷⁾
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery

Pre-Operative Evaluation and/or Pre-Procedural Evaluation

- Evaluation of transjugular intrahepatic portosystemic shunt (TIPS) when Doppler ultrasound indicates suspected complication(s)^(28,29,30)
- Evaluation prior to interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) when CTA is **contraindicated or cannot be performed**⁽³¹⁾
- For imaging of the deep inferior epigastric arteries prior to breast reconstructive surgery⁽²²⁾
- Evaluation of vascular anatomy prior to solid organ transplantation
- Evaluation of anatomy (lower pole crossing vessel) prior to UPJ (ureteropelvic junction) obstruction surgery
- Prior to Y90 treatment⁽²⁷⁾

Post-Operative Evaluation and/or Post-Procedural Evaluation

Unless otherwise specified within the guideline:

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in abdomen

Genetic Syndromes and Rare Diseases

- For patients with fibromuscular dysplasia (FMD):^(32,33)

- One-time vascular study from brain to pelvis
- Vascular Ehlers-Danlos syndrome:^(34,35)
 - At diagnosis and then every 18 months
 - More frequently if abnormalities are found
- Marfan syndrome:⁽³⁶⁾
 - At diagnosis and then every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(2,37)
- Loeys-Dietz:⁽³⁸⁾
 - At diagnosis and then every two years
 - More frequently if abnormalities are found
- Williams Syndrome:⁽⁸⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Neurofibromatosis Type 1 (NF-1):⁽⁷⁾
 - Development of hypertension (including concern for renal artery stenosis)
- Takayasu's Arteritis:⁽³⁹⁾
 - For evaluation at diagnosis then as clinically indicated
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combination Studies

Abdomen MRA and Abdomen MRI or CT

- When needed for clarification of vascular invasion from tumor (including suspected renal vein thrombosis)

Chest MRA/Abdomen MRA and/or Lower Extremity MRA

- To evaluate for an embolic source of lower extremity vascular disease. Echocardiography is also often needed, since the heart is the most commonly reported source of lower extremity emboli, accounting for 55 to 87 percent of events.

Abdomen MRI (or CT) and Abdomen MRA (or CTA) and PET

- Prior to Y90 treatment⁽²⁷⁾

Abdomen/Pelvis MRA

- As a dedicated CPT code does not exist for Abdomen and Pelvis MRA, when a disease process is reasonably expected to involve both the abdomen and pelvis AND the guideline criteria have been met, two separate authorizations are required: Abdomen MRA (CPT code 74185) and Pelvis MRA (CPT 72198)

Brain/Neck/Chest/Abdomen/Pelvis MRA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis^(32,33)
- Vascular Ehlers-Danlos syndrome: At diagnosis and then every 18 months; more frequently if abnormalities are found^(34,35)
- Loeys-Dietz: at diagnosis and then every two years, more frequently if abnormalities are found⁽³⁸⁾
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography⁽¹⁵⁾

Chest/Abdomen/Pelvis MRA

- Evaluation prior to endovascular aneurysm repair (EVAR) when thoracic involvement is present
- Evaluation prior to Transcatheter Aortic Valve Replacement (TAVR) when CTA is **contraindicated or cannot be performed**⁽³¹⁾
- Marfan syndrome:⁽³⁶⁾
 - At diagnosis and every 3 years
 - More frequently (annually) if **EITHER**: history of dissection, dilation of aorta beyond aortic root **OR** aortic root/ascending aorta are not adequately visualized on TTE (i.e., advanced imaging is needed to monitor the thoracic aorta)^(2,37)
- Williams Syndrome⁽⁸⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- Acute aortic dissection⁽⁴⁰⁾

- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest, abdomen and pelvis

Neck/Chest/Abdomen/Pelvis MRA

- Takayasu's Arteritis: For evaluation at diagnosis then as clinically indicated⁽³⁹⁾

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

74185

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Abdominal MRA is not used as a screening tool, e.g., evaluation of asymptomatic patients without a previous diagnosis.

Abdominal Aneurysms and General Guidelines for Follow-up

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5 x the normal diameter.⁽⁴¹⁾ Evaluation of AAA can be accurately made by ultrasound which can detect and size AAA with the advantage of being relatively inexpensive, noninvasive, and not requiring iodinated contrast. The limitations are overlying bowel gas which can obscure findings and the technique is operator dependent. Ultrasound is used to screen for and to monitor aneurysms*. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred.

Risk factors for AAA include smoking history, age, male gender, family history of AAA (first degree relative) and personal history of vascular disease. Risk factors for rupture include female gender, large initial aneurysm diameter, low FEV, current smoking history, elevated mean blood pressure and patients on immunosuppression after major organ transplantation. The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk.⁽¹⁾

Ultrasound Screening Intervals*

- Aneurysm size 2.5–3 cm, every 10 years
- Aneurysm size 3.0–3.9 cm, every 3 years
- Aneurysm size 4.0–4.9 cm, annually⁽²⁾
- Aneurysm size 5.0–5.4 cm, every 6 months

MRA and Renal Vein Thrombosis

Renal vein thrombosis is a common complication of nephrotic syndrome and often occurs with membranous glomerulonephritis. Gadolinium-enhanced MRA can demonstrate both the venous and arterial anatomy and find filling defects within renal veins. The test can be used for follow-up purposes as it does not use ionizing radiation.

MRI/CT and Acute Hemorrhage

MRI is not indicated and MRA/MRV (MR Angiography/Venography) is rarely indicated for evaluation of intraperitoneal or retroperitoneal hemorrhage, particularly in the acute setting. CT is usually the study of choice due to its availability, speed of the study, and less susceptibility to artifact from patient motion. Advances in technology have allowed conventional CT to not just detect hematomas but also the source of acute vascular extravasation. In special cases, finer vascular detail to assess the specific source vessel

responsible for hemorrhage may require the use of CTA (e.g., CTA in diagnosis of lower gastrointestinal bleeding).⁽⁴²⁾

MRA/MRV is often utilized in non-acute situations to assess vascular structure involved in atherosclerotic disease and its complications, vasculitis, venous thrombosis, vascular congestion, or tumor invasion. Although some of these conditions may be associated with hemorrhage, it is usually not the primary reason MRI/MRA/MRV is selected for the evaluation. A special condition where MRI may be superior to CT for evaluating hemorrhage is to detect an underlying neoplasm as the cause of bleeding.⁽⁹⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Separated out aortic syndromes to be more clear • EVAR studies clarified order of which studies would be ordered • Renal artery stenosis: updated per new clinical guidance • Added Genetic Syndromes and Tumors Section • Added PVD section • Statement put in all Guidelines for contraindications put in indications and background sections • Combo section adjusted and made uniform • Updated references and background sections
March 2023	<ul style="list-style-type: none"> • Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section

	<ul style="list-style-type: none"> • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Aligned sections across body imaging guidelines
--	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Chaikof E, Dalman R, Eskandari M, Jackson B, Lee W et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg.* 2018; 67: 2-77.e2. 10.1016/j.jvs.2017.10.044.
2. Isselbacher E, Preventza O, III J, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Journal of the American College of Cardiology.* 2022; 80: e223-e393. doi:10.1016/j.jacc.2022.08.004.
3. Murillo H, Molvin L, Chin A, Fleischmann D. Aortic Dissection and Other Acute Aortic Syndromes: Diagnostic Imaging Findings from Acute to Chronic Longitudinal Progression. *RadioGraphics.* 2021; 41: 425 - 446. 10.1148/rg.2021200138.
4. Harvin H, Verma N, Nikolaidis P, Hanley M, Dogra V et al. ACR Appropriateness Criteria® Renovascular Hypertension. *J Am Coll Radiol.* 2017; 14: S540-s549. 10.1016/j.jacr.2017.08.040.
5. Matsumoto A, Brejt S, Caplin D, Ignacio E, Kaufman C et al. ACR–SIR PRACTICE PARAMETER FOR THE PERFORMANCE OF ANGIOGRAPHY, ANGIOPLASTY, AND STENTING FOR THE DIAGNOSIS AND TREATMENT OF RENAL ARTERY STENOSIS IN ADULTS. The American College of Radiology. 2021 [Revised]; <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/RenalArteryStenosis.pdf>.
6. Samadian F, Dalili N, Jamalain A. New Insights into Pathophysiology, Diagnosis, and Treatment of Renovascular Hypertension. *Iranian journal of kidney diseases.* 2017; 11: 79-89.
7. Friedman J, et al. Neurofibromatosis 1 [Updated 2022 Apr 21]. *GeneReviews® [Internet].* 2022; <https://www.ncbi.nlm.nih.gov/books/NBK1109/>.
8. Morris C, et al. Williams Syndrome [Updated 2023 Apr 13]. *GeneReviews® [Internet].* 2023; <https://www.ncbi.nlm.nih.gov/books/NBK1249/>.
9. Verma N, Steigner M, Aghayev A, Azene E, Chong S et al. ACR Appropriateness Criteria® Suspected Retroperitoneal Bleed. *Journal of the American College of Radiology : JACR.* 2021; 18: S482-S487. 10.1016/j.jacr.2021.09.003.
10. Lam A, Kim Y, Fidelman N, Higgins M, Cash B et al. ACR Appropriateness Criteria® Radiologic Management of Mesenteric Ischemia: 2022. *Journal of the American College of Radiology : JACR.* 2022; 19: S433-S444. 10.1016/j.jacr.2022.09.006.
11. Juntermanns B, Bernheim J, Karaindros K, Walensi M, Hoffmann J. Visceral artery aneurysms. *Gefasschirurgie.* 2018; 23: 19-22. 10.1007/s00772-018-0384-x.
12. Knuttinen M, Xie K, Jani A, Palumbo A, Carrillo T. Pelvic Venous Insufficiency: Imaging Diagnosis, Treatment Approaches, and Therapeutic Issues. *American Journal of Roentgenology.* 2015; 204: 448 - 458. 10.2214/AJR.14.12709.
13. Makazu M, Koizumi K, Masuda S, Jinushi R, Shionoya K. Spontaneous retroperitoneal hematoma with duodenal obstruction with diagnostic use of endoscopic ultrasound: A case series and literature review. *Clinical journal of gastroenterology.* 2023; 16: 377-386. 10.1007/s12328-023-01780-3.
14. Wanhainen A, Verzini F, Van Herzele I, Allaire E, Bown M et al. European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. *Eur J Vasc Endovasc Surg.* 2019; 57: 8-93. 10.1016/j.ejvs.2018.09.020.
15. Teruzzi G, Santagostino Baldi G, Gili S, Guarnieri G, Montorsi P. Spontaneous Coronary Artery Dissections: A Systematic Review. *Journal of clinical medicine.* 2021; 10: 10.3390/jcm10245925.
16. Mazhar H R, Aeddula N R. Renal Vein Thrombosis [Updated 2023 Jun 12]. *StatPearls [Internet]. Treasure Island (FL).* 2023; <https://www.ncbi.nlm.nih.gov/books/NBK536971/>.

17. Knuttinen M, Naidu S, Oklu R, Kriegshauser S, Eversman W et al. May-Thurner: diagnosis and endovascular management. *Cardiovascular diagnosis and therapy*. 2017; 7: S159-S164.
18. Shammam N, Jones-Miller S, Kovach T, Radaideh Q, Patel N et al. Predicting Significant Iliac Vein Compression Using a Probability Scoring System Derived from Minimal Luminal Area on Computed Tomography Angiography in Patients 65 Years of Age or Younger. *The Journal of invasive cardiology*. 2021; 33: E16-E18.
19. Bates S, Rajasekhar A, Middeldorp S, McLintock C, Rodger M et al. American Society of Hematology 2018 guidelines for management of venous thromboembolism: venous thromboembolism in the context of pregnancy. *Blood Adv*. 2018; 2: 3317-3359. 10.1182/bloodadvances.2018024802.
20. Azene E, Steigner M, Aghayev A, Ahmad S, Clough R et al. ACR Appropriateness Criteria® Lower Extremity Arterial Claudication-Imaging Assessment for Revascularization: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S364 - S373. 10.1016/j.jacr.2022.09.002.
21. Conte M, Pomposelli F, Clair D, Geraghty P, McKinsey J et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: Management of asymptomatic disease and claudication. *Journal of Vascular Surgery*. 2015; 61: 2S - 41S.e1. 10.1016/j.jvs.2014.12.009.
22. Singh N, Aghayev A, Ahmad S, Azene E, Ferencik M et al. ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery): 2022 Update. *Journal of the American College of Radiology : JACR*. 2022; 19: S357-S363. 10.1016/j.jacr.2022.09.004.
23. Werncke T, Ringe K, von Falck C, Kruschewski M, Wacker F. Diagnostic Confidence of Run-Off CT-Angiography as the Primary Diagnostic Imaging Modality in Patients Presenting with Acute or Chronic Peripheral Arterial Disease. *PLOS ONE*. 2015; 10: true. <https://doi.org/10.1371/journal.pone.0119900>.
24. Browne W, Sung J, Majdalany B, Khaja M, Calligaro K et al. ACR Appropriateness Criteria® Sudden Onset of Cold, Painful Leg: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S565 - S573. 10.1016/j.jacr.2023.08.012.
25. Shishehbor M, White C, Gray B, Menard M, Lookstein R et al. Critical Limb Ischemia: An Expert Statement. *Journal of the American College of Cardiology*. 2016; 68: 2002 - 2015. <https://doi.org/10.1016/j.jacc.2016.04.071>.
26. Čertík B, Třeška V, Moláček J, Šulc R. How to proceed in the case of a tumour thrombus in the inferior vena cava with renal cell carcinoma. *Cor et Vasa*. 2015; 57: e95-e100. <https://doi.org/10.1016/j.crvasa.2015.02.015>.
27. Kim S, Cohalan C, Kopek N, Enger S. A guide to (90)Y radioembolization and its dosimetry. *Phys Med*. 2019; 68: 132-145. 10.1016/j.ejmp.2019.09.236.
28. Darcy M. Evaluation and Management of Transjugular Intrahepatic Portosystemic Shunts. *American Journal of Roentgenology*. 2012; 199: 730 - 736. 10.2214/AJR.12.9060.
29. Dariushnia S, Haskal Z, Midia M, Martin L, Walker T et al. Quality Improvement Guidelines for Transjugular Intrahepatic Portosystemic Shunts. *Journal of vascular and interventional radiology : JVIR*. 2016; 27: 1-7. 10.1016/j.jvir.2015.09.018.
30. Farsad K, Kolbeck K. Clinical and Radiologic Evaluation of Patients Before TIPS Creation. *American Journal of Roentgenology*. 2014; 203: 739 - 745. 10.2214/AJR.14.12999.
31. Hedgire S, Saboo S, Galizia M, Aghayev A, Bolen M et al. ACR Appropriateness Criteria® Preprocedural Planning for Transcatheter Aortic. *Journal of the American College of Radiology : JACR*. 2023; 20: S501-S512. 10.1016/j.jacr.2023.08.009.

32. Gornik H, Persu A, Adlam D, Aparicio L, Azizi M et al. First International Consensus on the diagnosis and management of fibromuscular dysplasia. *Vascular Medicine*. 2019; 24: 164 - 189. 10.1177/1358863X18821816.
33. Kesav P, Manesh Raj D, John S. Cerebrovascular Fibromuscular Dysplasia - A Practical Review. *Vascular health and risk management*. 2023; 19: 543-556. 10.2147/VHRM.S388257.
34. Bowen J, Hernandez M, Johnson D, Green C, Kammin T et al. Diagnosis and management of vascular Ehlers-Danlos syndrome: Experience of the UK national diagnostic service, Sheffield. *European Journal of Human Genetics*. 2023; 31: 749 - 760. 10.1038/s41431-023-01343-7.
35. Byers P. Vascular Ehlers-Danlos Syndrome. [Updated 2019 Feb 21]. *GeneReviews®* [Internet]. 2019;
36. Dietz H. FBN1-Related Marfan Syndrome. [Updated 2022 Feb 17]. *GeneReviews®* [Internet]. 2022;
37. Weinrich J, Lenz A, Schön G, Behzadi C, Molwitz I et al. Magnetic resonance angiography derived predictors of progressive dilatation and surgery of the aortic root in Marfan syndrome. *PloS one*. 2022; 17: e0262826. 10.1371/journal.pone.0262826.
38. Loeys B, Dietz H. Loeys-Dietz Syndrome. [Updated 2018 Mar 1]. *GeneReviews®* [Internet]. 2018;
39. Maz M, Chung S, Abril A, Langford C, Gorelik M et al. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis & rheumatology* (Hoboken, N.J.). 2021; 73: 1349-1365. 10.1002/art.41774.
40. Kicska G, Hurwitz Koweek L, Ghoshhajra B, Beache G, Brown R et al. ACR Appropriateness Criteria® Suspected Acute Aortic Syndrome. *Journal of the American College of Radiology*. 2021; 18: S474 - S481. 10.1016/j.jacr.2021.09.004.
41. Wang L, Prabhakar A, Kwolek C. Current status of the treatment of infrarenal abdominal aortic aneurysms. *Cardiovascular diagnosis and therapy*. 2018; 8: S191-S199.
42. Clerc D, Grass F, Schäfer M, Denys A, Demartines N. Lower gastrointestinal bleeding-Computed Tomographic Angiography, Colonoscopy or both? *World J Emerg Surg*. 2017; 12: 1. 10.1186/s13017-016-0112-3.

EVOLENT CLINICAL GUIDELINE 033-1 FOR CT (VIRTUAL) COLONOSCOPY - DIAGNOSTIC

Guideline or Policy Number: Evolent_CG_033-1	<u>Applicable Codes</u>	
<i>“Evolent” refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2007 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 2007	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS	2
FOR DIAGNOSTIC EVALUATION.....	2
<i>Symptomatic patients when conventional colonoscopy is contraindicated or could not be completed</i>	<i>2</i>
FOLLOW-UP STUDIES	2
CODING AND STANDARDS	3
CODING	3
CPT Codes	3
APPLICABLE LINES OF BUSINESS.....	3
POLICY HISTORY	3
Summary	3
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER.....	3
REFERENCES.....	5

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomographic colonography (CTC), also referred to as virtual colonoscopy, is a minimally invasive structural examination of the colon and rectum to evaluate for colorectal polyps or neoplasms.

INDICATIONS (1,2,3)

For diagnostic evaluation

Symptomatic patients when conventional colonoscopy is contraindicated or could not be completed

- Patient had failed or incomplete colonoscopy
- Patient has an obstructive colorectal cancer
- When colonoscopy is medically contraindicated or not possible (e.g., patient is unable to undergo sedation or has medical conditions such as a recent myocardial infarction, recent colonic surgery, a bleeding disorder, or severe lung and/or heart disease)

Follow-Up Studies

- For a 3-year follow-up when at least one polyp of 6 mm in diameter detected at CTC if patient does not undergo polypectomy (or is unwilling or unable to undergo colonoscopy)

NOTE: CT (Virtual) Colonoscopy is not indicated in routine follow-up of inflammatory bowel disease, hereditary polyposis or non-polyposis cancer syndromes, evaluation of anal disease, or the pregnant or potentially pregnant patient.

CODING AND STANDARDS

Coding

CPT Codes

74261, 74262, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none">Moved follow-up information to Follow-Up Studies section
April 2023	<ul style="list-style-type: none">General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guidelineAdded statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage



may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Colorectal Cancer Screening Version 3.2022. 2022.
2. American College of Radiology. ACR Appropriateness Criteria® Colorectal Cancer Screening. 2018; 2022.
3. Rex D K, Boland C R, Dominitz J A, Giardiello F M, Johnson D A et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients from the U.S. Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol. 2017; 112: 1016-1030. 10.1038/ajg.2017.174.



EVOLENT CLINICAL GUIDELINE 033-2 FOR CT (VIRTUAL) COLONOSCOPY - SCREENING

Guideline or Policy Number: Evolent_CG_033-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2007 - 2025 Evolent. All rights Reserved.		
Original Date: July 2007	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS	2
LEGISLATIVE REQUIREMENTS	3
STATE OF RHODE ISLAND	3
<i>R.I. Gen. Laws § 27-18-58</i>	3
COMMONWEALTH OF VIRGINIA	4
<i>Code of Virginia §38.2-3418.7:1</i>	4
CODING AND STANDARDS	5
CODING	5
<i>CPT Codes</i>	5
APPLICABLE LINES OF BUSINESS	5
BACKGROUND	5
OVERVIEW	5
CONTRAINDICATIONS AND PREFERRED STUDIES	5
POLICY HISTORY	6
<i>Summary</i>	6
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL	6
<i>Committee</i>	6
DISCLAIMER	6
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomographic colonography (CTC), also referred to as virtual colonoscopy, is a minimally invasive structural examination of the colon and rectum and can be used as a screening tool to evaluate for colorectal polyps or neoplasms in the asymptomatic patient.

See Legislative Requirements for specific mandates for the States of Ohio, Rhode Island, and the Commonwealth of Virginia.

INDICATIONS (1,2,3,4,5)

Computer tomographic colonography (CTC) is considered medically appropriate as an alternative to colonoscopy for screening asymptomatic individuals in the following two situations:

1. **Asymptomatic** Individuals at **Average Risk** for colorectal cancer (CRC)

- Every 5 years starting at age 45
 - **Average risk** includes:
 - No personal history of any of the following:
 - Adenoma or serrated sessile polyp/lesion (SSP/SSL)
 - Colorectal cancer
 - Inflammatory bowel disease (IBD)
 - Known hereditary CRC syndrome
 - Cystic Fibrosis
 - Childhood cancer
- **AND**

- No family history of any of the following:
 - Advanced adenoma or serrated sessile polyp/lesion (SSP/SSL) in a first degree relative
 - Colorectal cancer
- NOTE: Any **one** of the above personal or family history risk factors places the patient at increased risk for colorectal cancer and screening is with colonoscopy rather than CTC unless a contraindication
- Generally screening for colorectal cancer stops at age 75, however, it is reasonable to continue screening above age 75 if the patient's life expectancy is ≥ 10 years

2. Patients at **Increased Risk** for colorectal cancer:

- As an alternative to colonoscopy in individuals at **increased risk** for colorectal cancer **AND** a contraindication to colonoscopy has been provided:
 - Contraindications to colonoscopy include known obstructing colonic lesion, anatomic abnormality preventing passage of the scope, technical difficulty, patient is unable to undergo sedation or has medical conditions such as recent myocardial infarction, recent colonic surgery, a bleeding disorder, or severe lung and/or heart disease) **OR**
 - A relative contraindication to colonoscopy such as symptomatic acute colitis, acute diarrhea, recent acute diverticulitis, recent colorectal surgery, symptomatic colon-containing abdominal wall hernia, small bowel obstruction.

NOTE: If a polyp 6mm or larger is detected at screening CTC and polypectomy is not done, then the follow-up CTC is considered diagnostic rather than screening (See Evolent Clinical Guideline 033-1 for CT (Virtual) Colonoscopy - Diagnostic)

LEGISLATIVE REQUIREMENTS

State of Rhode Island

R.I. Gen. Laws § 27-18-58 ⁽⁶⁾

§ 27-18-58. Prostate and colorectal examinations — Coverage mandated — The Maryellen Goodwin Colorectal Cancer Screening Act.

(a) Every accident and sickness insurance policy, medical expense insurance policy or medical services plan contract delivered, issued for delivery, or renewed in this state shall provide coverage for prostate and colorectal preventive screening examinations and laboratory tests for cancer for any nonsymptomatic person covered under that policy or contract. The coverage required by this section shall include preventive colorectal cancer screening coverage for all colorectal cancer examinations and laboratory tests in accordance with **American Cancer Society guidelines**, including for colorectal cancer screening of average risk individuals, including an initial colonoscopy or other medical test or procedure for colorectal cancer screening and a follow-up colonoscopy if the results of the initial medical test or procedure are abnormal. Provided, this section does not apply to insurance

coverage providing benefits for: (1) Hospital confinement indemnity; (2) Disability income; (3) Accident only; (4) Long-term care; (5) Medicare supplement; (6) Limited benefit health; (7) Specific disease indemnity; (8) Sickness or bodily injury or death by accident, or both; and (9) Other limited benefit policies.

(b) An insurer may not impose cost sharing on the coverage required by subsection (a) of this section when the services are delivered within the health insurer's provider network.

History of Section.

P.L. 2000, ch. 125, § 1; P.L. 2000, ch. 345, § 1; P.L. 2002, ch. 292, § 33; P.L. 2021, ch. 7, § 2, effective April 29, 2021; P.L. 2021, ch. 8, § 2, effective April 29, 2021.

Commonwealth of Virginia ⁽⁷⁾

Code of Virginia §38.2-3418.7:1

§ 38.2-3418.7:1. Coverage for colorectal cancer screening.

A. Notwithstanding the provisions of § **38.2-3419**, each insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis; each corporation providing individual or group accident and sickness subscription contracts; and each health maintenance organization providing a health care plan for health care services shall provide coverage for colorectal cancer screening under any such policy, contract, or plan delivered, issued for delivery, or renewed in this Commonwealth.

B. Coverage for colorectal cancer screening, examinations, and laboratory tests shall be provided in accordance with the most recently published recommendations established by the **U.S. Preventive Services Task Force for colorectal cancer screening** for which a rating of A or B is in effect with respect to the individual involved. A follow-up colonoscopy after a positive noninvasive stool-based screening test or direct visualization screening test shall be covered.

C. The coverage provided under this section shall not be subject to any deductible, coinsurance, or any other cost-sharing requirements for services received from participating providers under the policy, contract, or plan.

D. The provisions of this section shall not apply to (i) short-term travel, accident only, limited or specified disease policies, other than cancer policies, (ii) short-term nonrenewable policies of not more than six months duration, or (iii) policies or contracts designed for issuance to persons eligible for coverage under Title XVIII of the Social Security Act, known as Medicare, or any other similar coverage under state or federal governmental plans.

Approved March 28, 2024

CODING AND STANDARDS

Coding

CPT Codes

74263, 0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Overview

The American Cancer Society 2018 guideline for colorectal cancer screening recommends that average-risk adults aged 45 years and older undergo regular screening with either a high-sensitivity stool-based test (such as mt-sDNA, HSgFOBT or FIT tests) or a structural exam (colonoscopy or CTC), based on personal preferences and test availability. As a part of the screening process, all positive results on non-colonoscopy screening tests should be followed up with timely colonoscopy ⁽⁸⁾.

For all high-risk individuals, colonoscopy is preferred.

CTC is not indicated for routine follow up of inflammatory bowel disease, hereditary polyposis or non-polyposis cancer syndromes, evaluation of anal disease, or the pregnant or potentially pregnant patient.

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, and pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Updated references • Age range adjusted • Added legislative language for Rhode Island, Virginia
April 2023	<ul style="list-style-type: none"> • Updated references • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology (ACR), Society of Abdominal Radiology (SAR), Society of Computed Body Tomography & Magnetic Resonance (SCBT-MR). ACR-SAR-SCBT-MR practice parameter for the performance of computed tomography (CT) colonography in adults. 2019; 2022:
2. US Preventative Services Task Force. Screening for Colorectal Cancer: US Preventive Services Task Force Recommendation Statement. JAMA. 2021; 325: 1965-1977. 10.1001/jama.2021.6238.
3. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Colorectal Cancer Screening Version 2.2024. 2024.
4. Rex D K, Boland C R, Dominitz J A, Giardiello F M, Johnson D A et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients from the U.S. Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol. 2017; 112: 1016-1030. 10.1038/ajg.2017.174.
5. Wolf A M D, Fontham E T H, Church T R, Flowers C R, Guerra C E et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. CA Cancer J Clin. 2018; 68: 250-281. 10.3322/caac.21457.
6. State of Rhode Island General Assembly. The Maryellen Goodwin Colorectal Cancer Screening Act. 2021; <http://webserver.rilin.state.ri.us/Statutes/TITLE27/27-18/27-18-58.htm>.
7. General Assembly of Virginia. Chapter 181: An Act to amend and reenact §38.2-3418. 7: 1 of the Code of Virginia. <https://law.lis.virginia.gov/vacode/title38.2/chapter34/section38.2-3418.7:1/>.
8. American Cancer Society Guideline for Colorectal Cancer Screening. November 17, 2020; 2022:

EVOLENT CLINICAL GUIDELINE 110 FOR FETAL MRI

Guideline or Policy Number: Evolent_CG_110	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2016 - 2025 Evolent. All rights Reserved.		
Original Date: January 2016	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
<i>Fetal MRI</i>	2
SPECIAL NOTE	2
INDICATIONS FETAL MRI	2
COMBINATION STUDIES	3
<i>Pelvis and Fetal MRI</i>	3
CODING AND STANDARDS	3
CODING	3
<i>CPT Codes</i>	3
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	3
CONTRAINDICATIONS AND PREFERRED STUDIES	3
POLICY HISTORY	4
SUMMARY	4
LEGAL AND COMPLIANCE	4
GUIDELINE APPROVAL	4
<i>Committee</i>	4
DISCLAIMER	4
REFERENCES	5

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Fetal MRI ⁽¹⁾

Fetal MRI should be performed only for a valid medical reason and only after careful consideration of sonographic findings or family history of an abnormality for which screening with MRI might be beneficial. Before 18 weeks gestational age, a fetal MRI may not provide additional diagnostic information due to the small size of the fetus and fetal movement when compared with sonography. The need for early diagnosis should be balanced against the advantages of improved resolution later in pregnancy, with the choice dependent on the anomalies to be assessed.

Special Note

For evaluating the placenta or imaging the maternal pelvis without need for fetal assessment, use the Pelvic MRI (Evolent_CG_037) Guideline

INDICATIONS FETAL MRI

To better define or confirm any of the following:

- Known or suspected abnormality of the fetus after ultrasound has been performed ⁽¹⁾
- Fetal surgery is planned
- Make a decision about therapy, delivery, or to advise the family about prognosis ⁽¹⁾

Combination Studies

Pelvis and Fetal MRI

- When medical necessity has been met for Pelvis MRI (such as for suspected placenta accreta or percreta when ultrasound is indeterminate⁽²⁾) **AND** medical necessity has been met for Fetal MRI (such as suspected fetal abnormality after ultrasound has been performed), two separate authorizations are required: Pelvis MRI Pelvis MRI (CPT 72195, 72196, 72197) and Fetal MRI (CPT 74712, +74713).

CODING AND STANDARDS

Coding

CPT Codes

74712, +74713

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none">• Combination Studies section added• Reduced background
March 2023	<ul style="list-style-type: none">• Modified background• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Updated references• Removed Additional Resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Prayer D, Malinge G, De Catte L, De Keersmaecker B, Gonçalves L et al. ISUOG Practice Guidelines (updated): performance of fetal magnetic resonance imaging. *Ultrasound in obstetrics gynecology: the official journal of the International*. 2023; 61: 278-287. 10.1002/uog.26129.
2. Kilcoyne A, Shenoy-Bhangle A, Roberts D, Sisodia R, Gervais D. MRI of Placenta Accreta, Placenta Increta, and Placenta Percreta: Pearls and Pitfalls. *American Journal of Roentgenology*. 2016; 208: 214 - 221. 10.2214/AJR.16.16281.



EVOLENT CLINICAL GUIDELINE 028 FOR HEART MRI

Guideline or Policy Number: Evolent_CG_028	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2008 - 2025 Evolent. All rights Reserved.		
Original Date: March 2008	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
CLINICAL REASONING.....	3
INDICATIONS FOR CARDIAC MAGNETIC RESONANCE	4
CARDIOMYOPATHY & HEART FAILURE	4
VALVULAR HEART DISEASE	5
EVALUATION OF INTRA- AND EXTRA-CARDIAC STRUCTURES.....	5
PRE-PROCEDURE EVALUATION FOR CLOSURE OF ASD OR PFO.....	5
ASSESSMENT FOLLOWING LAA OCCLUSION	6
PRE-ABLATION PLANNING.....	6
AORTIC PATHOLOGY	6
CONGENITAL HEART DISEASE.....	7
CORONARY ARTERY DISEASE EVALUATION	8
COMBINATION STUDIES	9
<i>Chest MRA and Heart MRI.....</i>	<i>9</i>
LEGISLATIVE REQUIREMENTS	9
STATE OF WASHINGTON	9
<i>Health Technology Clinical Committee 20211119A.....</i>	<i>9</i>
CODING AND STANDARDS	10
CODING	10
<i>CPT Codes.....</i>	<i>10</i>
APPLICABLE LINES OF BUSINESS.....	10
BACKGROUND	10
GENERAL OVERVIEW	10
AUC SCORE	11
DEFINITIONS	11
ACRONYMS/ABBREVIATIONS	12
POLICY HISTORY	13
<i>Summary</i>	<i>13</i>
LEGAL AND COMPLIANCE	13



GUIDELINE APPROVAL	13
<i>Committee</i>	13
DISCLAIMER.....	13
REFERENCES.....	15

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

CMR is an imaging modality used to assess cardiac or vascular anatomy, function, perfusion, and tissue characteristics in a single examination. In lesions affecting the right heart, CMR provides excellent visualization and volume determination regardless of RV shape. This is particularly useful in patients with congenital heart disease.

Special Note

Since many cardiac patients have cardiac implanted electrical devices, the risk of CMR to the patient and the device must be weighed against the benefit to the patient in terms of clinical value in optimal management ^(1,2,3,4).

See **Legislative Requirements** for specific mandates in Washington State

CLINICAL REASONING

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

In instances where an AUC has not been established through prior publication, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(5,6,7,8,9)

INDICATIONS FOR CARDIAC MAGNETIC RESONANCE

Cardiomyopathy & Heart Failure ^(10,11,12)

- To assess systolic and diastolic function in the evaluation of a newly diagnosed cardiomyopathy (AUC 7) (10)
- Suspected infiltrative disease such as amyloidosis, sarcoidosis (13), hemochromatosis, or endomyocardial fibrosis if PET has not been performed (AUC 8) (10)
- Suspected inherited or acquired cardiomyopathy (AUC 7) (10)
- Diagnosis of acute myocarditis, with suspicion based upon new, unexplained findings such as:
 - Rise in troponin not clearly due to acute myocardial infarction
 - Change in ECG suggesting acute myocardial injury or pericarditis, without evident myocardial infarction
- Assessment of hypertrophic cardiomyopathy ⁽¹⁴⁾ (**AUC 8**) ⁽¹⁰⁾
 - When TTE is inadequate for diagnosis, management, or operative planning, or when tissue characterization (degree of fibrosis) will impact indications for ICD
 - For patients with LVH when there is a suspicion of alternative diagnoses, including infiltrative or storage disease as well as athlete's heart
 - For patients with obstructive HCM in whom the autonomic mechanism of obstruction is inconclusive on echocardiography, CMR is indicated for selection and planning of SRT (septal reduction therapy)
 - For patients with HCM, repeat imaging on a periodic basis (every 3-5 years) for the purpose of SCD risk stratification to evaluate changes in LGE, EF, development of apical aneurysm or LV wall thickness
- Arrhythmogenic right ventricular cardiomyopathy to aid in identification and diagnosis (assessment of myocardial fat, fibrosis, and RV tissue characteristics), based upon reason for suspicion, such as:
 - Nonsustained ventricular tachycardia (VT)
 - Unexplained syncope
 - ECG abnormalities
 - First-degree relatives with positive genotype for ARVD
- Noncompaction cardiomyopathy to aid in the diagnosis (measurement of compacted to noncompacted myocardium) when TTE is suggestive
- Viability assessment when SPECT, PET or Dobutamine Echo has provided "equivocal or indeterminate" results

- Clinical symptoms and signs consistent with a cardiac diagnosis known to cause presyncope/syncope (including, but not limited to, hypertrophic cardiomyopathy) **(AUC 7)** ⁽¹⁰⁾
- Pulmonary hypertension in the absence of severe valvular disease **(AUC 7)** ⁽¹⁰⁾
- Cardiomyopathy
 - Hemosiderosis
 - Restrictive cardiomyopathy **(AUC 7)** ⁽¹⁰⁾
 - Cardio toxic chemotherapy

Valvular Heart Disease

- Evaluation of valvular stenosis, regurgitation, or valvular masses when transthoracic echocardiography (TTE) is inadequate **(AUC 7)** ⁽¹⁵⁾
- Pre-TAVR assessment if the patient has not undergone cardiac CT ⁽¹⁶⁾
- Prior to transcatheter mitral valve intervention, when TTE and TEE result in uncertain assessment of the severity of mitral regurgitation ^(17,18)
- Suspected clinically significant bioprosthetic valvular dysfunction and inadequate images from TTE and TEE **(AUC 7)** ⁽¹⁵⁾

Evaluation of Intra- and Extra-Cardiac Structures

- Initial evaluation of cardiac mass, suspected tumor or thrombus, or potential cardiac source of emboli **(AUC 7)** ⁽¹⁰⁾
- Re-evaluation of intracardiac mass when findings would change therapy; no prior imaging in the last three months **(AUC 7)** ⁽¹⁰⁾
- Evaluation of pericardial disease to provide structural and functional assessment and differentiate constrictive vs restrictive physiology **(AUC 8)** ⁽¹⁰⁾
- Assessment of left ventricular pseudoaneurysm, when TTE was inadequate
- Identification and characteristics of coronary aneurysms or anomalous coronary arteries **(AUC 7)** ⁽¹⁰⁾

Pre-procedure Evaluation for Closure of ASD or PFO **(AUC 7)** ⁽¹⁰⁾

- For assessment of atrial septal anatomy and atrial septal aneurysm
- For assessment of suitability for percutaneous device closure

Assessment Following LAA Occlusion

- For surveillance at 45 days or FDA guidance, if TEE or Heart CT was not done, to assess:
 - Device stability
 - Device leaks
 - To exclude device migration

Pre-Ablation Planning

- Evaluation of left atrium and pulmonary veins prior to radiofrequency ablation for atrial fibrillation, if cardiac CT has not been done

Aortic Pathology

- CT, MR, or echocardiogram can be used for screening and follow-up, with CT and MR preferred for imaging beyond the proximal ascending thoracic aorta (**AUC 8**) ⁽¹⁰⁾
- Screening of first-degree relatives with a history of thoracic aortic aneurysm or dissection (**AUC 7**) ⁽¹⁰⁾
- Six-month follow-up after initial diagnosis of thoracic aortic aneurysm to measure rate of change
- Annual follow-up for an enlarged thoracic aortic aneurysm (usually defined as > 4.4.cm)
- Biannual (2x/year) follow-up of enlarged aortic root or showing growth rate ≥ 0.5 cm/year
- Screening of first-degree relative with a bicuspid aortic valve
- Re-evaluation (<1 y) of the size and morphology of the aortic sinuses and ascending aorta in patients with a bicuspid AV and an ascending aortic diameter > 4 cm with 1 of the following:
 - Aortic diameter > 4.5 cm
 - Rapid rate of change in aortic diameter
 - Family history (first-degree relative) of aortic dissection
- Patients with Turner's syndrome annually if an abnormality exists; if initial study normal, can have imaging every 5 - 10 years ⁽¹⁹⁾
- Evaluation in patients with known or suspected connective tissue disease or genetic condition that predispose to aortic aneurysm or dissection, such as Marfan syndrome, Ehlers-Danlos or Loeys-Dietz syndrome (at the time of diagnosis and 6 months thereafter), followed by annual imaging (can be done more frequently if > 4.5 cm or rate of growth > 0.5 cm/year- up to twice per year) (**AUC 8**) ⁽¹⁰⁾

Congenital Heart Disease

For all indications below, either CT or CMR can be done

- All lesions: evaluation prior to planned repair and evaluation for change in clinical status and/or new concerning signs or symptoms
- Patent Ductus Arteriosus: routine surveillance (1-2 years) in a patient with postprocedural aortic obstruction (**AUC 7**)⁽²⁰⁾
- In the absence of prior imaging documenting congenital heart disease, a cardiac MRI is appropriate for anomalous pulmonary venous drainage and pulmonary outflow tract obstruction
- Eisenmenger Syndrome and Pulmonary Hypertension associated with congenital heart disease (CHD) (**AUC 7**)⁽²⁰⁾
 - Evaluation due to change in pulmonary arterial hypertension-targeted therapy
 - Initial evaluation with suspicion of pulmonary hypertension following CHD surgery
- Aortic Stenosis or Regurgitation:
 - Routine surveillance (6-12 months) in a child with aortic sinus and/or ascending aortic dilation with increasing size (**AUC 8**)⁽²⁰⁾
 - Routine surveillance (2–3 years) in a child with aortic sinus and/or ascending aortic dilation with stable size (CMR only) (**AUC 7**)⁽²⁰⁾
- Aortic Coarctation and Interrupted Aortic Arch: (**AUC 8**)⁽²⁰⁾
 - In the absence of prior imaging documenting congenital heart disease, a cardiac MRI is appropriate for suspected Coarctation (**AUC 8**)⁽²⁰⁾
 - Routine surveillance (3–5 years) in a child or adult with mild aortic coarctation
 - Post procedure (surgical or catheter-based) routine surveillance (3–5 years) in an asymptomatic patient to evaluate for aortic arch aneurysms, in-stent stenosis, stent fracture, or endoleak
- Coronary anomalies
- Tetralogy of Fallot:
 - Postoperative routine surveillance (2–3 years) in a patient with pulmonary regurgitation and preserved ventricular function (CMR only) (**AUC 7**)⁽²⁰⁾
 - Routine surveillance (2–3 years) in an asymptomatic patient with no or mild sequelae (CMR only) (**AUC 7**)⁽²⁰⁾
 - Routine surveillance (2–3 years) in a patient with valvular or ventricular dysfunction, right ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-PA conduit (**AUC 8**)⁽²⁰⁾
- Double Outlet Right Ventricle: Routine surveillance (3–5 years) in an asymptomatic patient with no or mild sequelae (CMR only)
- D-Loop Transposition of the Great Arteries (postoperative):

- Routine surveillance (3–5 years) in an asymptomatic patient (**AUC 7**)
- Routine surveillance (1–2 years) in a patient with dilated aortic root with increasing size, or aortic regurgitation (**AUC 8**)
- Routine surveillance (3–12 months) in a patient with \geq moderate systemic AV valve regurgitation, systemic RV dysfunction, LVOT obstruction, or arrhythmias
- Congenitally Corrected Transposition of the Great Arteries: (**AUC 7**) ⁽²⁰⁾
 - Unrepaired: routine surveillance (3–5 years) in an asymptomatic patient
 - Postoperative: routine surveillance (3–5 years) in an asymptomatic patient
 - Postoperative anatomic repair: routine surveillance (6–12 months) in a patient with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of an RV-to-PA conduit
 - Postoperative physiological repair with VSD closure and/or LV-to-PA conduit: routine surveillance (3–12 months) in a patient with \geq moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction
- Truncus Arteriosus: routine surveillance (1–2 years) in an asymptomatic child or adult with \geq moderate truncal stenosis and/or regurgitation (**AUC 7**) ⁽²⁰⁾
- Single-Ventricle Heart Disease:
 - Postoperative routine surveillance (1–2 years) in an asymptomatic patient
 - Routine surveillance (1–2 years) in an asymptomatic adult postoperative Stage 2 palliation (CMR only) (**AUC 7**) ⁽²⁰⁾
- Ebstein's anomaly and Tricuspid Valve dysplasia (only CMR indicated):
 - Evaluation prior to planned repair and evaluation for change in clinical status and/or new concerning signs or symptoms (**AUC 7**) ⁽²⁰⁾
- Pulmonary Stenosis (only CMR indicated) (**AUC 7**) ⁽²⁰⁾
 - Unrepaired: routine surveillance (3–5 years) in an asymptomatic adult with PS and pulmonary artery dilation
 - Postprocedural (surgical or catheter-based): routine surveillance (1–3 years) in an asymptomatic adult with moderate or severe sequelae
- Pulmonary Atresia (postprocedural complete repair): routine surveillance (1–3 years) in an asymptomatic adult with \geq moderate sequelae (**AUC 7**) ⁽²⁰⁾

Coronary Artery Disease Evaluation

CMR, which is done pharmacologically, is used for the assessment of coronary artery disease, and can be performed if the patient would otherwise be a candidate for a pharmacologic MPI.

- If the patient can walk and is having an MPI for another reason (LBBB, CABG, etc.), MPI is chosen over CMR
- Assessment of LV wall motion to identify patients with akinetic segments that would benefit from coronary revascularization
- To identify the extent and location of myocardial necrosis in patients with chronic or acute ischemic heart disease
- Follow-up of known CAD
 - Coronary stenosis of unclear significance on previous coronary angiography^(12,21)
- To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA) as documented in provider notes (no MPI diversion required).⁽²²⁾

Combination Studies

Chest MRA and Heart MRI

- When medical necessity criteria indications are met for each Chest MRA (see Evolent Clinical Guideline 022-2 for Chest MRA) and Heart MRI or CT (see Evolent Clinical Guideline 025 for Heart CT) (such as for certain congenital malformations when evaluation of extra cardiac and cardiac structures are needed)

LEGISLATIVE REQUIREMENTS

State of Washington⁽²³⁾

Health Technology Clinical Committee 20211119A

Number and coverage topic:

20211119A – Use of Cardiac Magnetic Resonance Angiography (CMRA) in Adults and Children

HTCC coverage determination:

CMRA is a **covered benefit** for adults or children with known or suspected coronary vessel anomalies or congenital heart disease

CMRA is a **covered benefit with conditions** for stable symptomatic adults with known or suspected coronary artery disease (CAD)

HTCC reimbursement determination:

Limitations of coverage: CMRA should not be a first line diagnostic tool in patients with stable symptoms consistent with CAD. CMRA is covered with conditions for stable symptomatic adults with known or suspected CAD when the following conditions are met:

- In consultation with a cardiologist, and

- The patient is unable to tolerate or safely participate in other noninvasive anatomic or functional testing.

CMRA is not a covered service in coronary artery bypass graft (CABG) patients without CAD symptoms, or in those requiring cardiac lead placement unless cardiac vascular anomalies are suspected.

Non-covered indicators:

N/A

Notes:

Out of scope/data not reviewed for this decision:

- Cardiac stress MRI

CODING AND STANDARDS

Coding

CPT Codes

75557, 75559, 75561, 75563 +75565, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview ⁽²⁴⁾

- CMR in CAD ^(21,25,26) is often required when transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) provide inadequate imaging data.
- Stress CMR for assessment of coronary artery disease (CAD) is performed pharmacologically either as a vasodilator perfusion imaging with gadolinium contrast or dobutamine inotropic wall motion (ventriculography).
- With respect to CAD evaluation, since CMR is only pharmacologic (non-exercise stress), and stress echocardiography (SE) or myocardial perfusion imaging (MPI) provide similar information about CAD:

- Requests for stress CMR require diversion to exercise SE first, and to exercise MPI second.
- Exemptions for the diversion to SE or exercise MPI:
 - If body habitus or marked obesity (e.g., BMI ≥ 40) would interfere significantly with imaging with SE and MPI ⁽²⁷⁾
 - Evaluation of young (< 55 years old) patients with documented complex CAD, who are likely to need frequent non-invasive coronary ischemia evaluation and/or frequent radiation exposure from other testing ⁽²⁸⁾
- Heart magnetic resonance imaging (MRI) is an imaging method that uses powerful magnets and radio waves to create pictures of the heart. It does not use radiation (x-rays).

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner ⁽⁵⁾.

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories: ^(21,25,26)
 - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online
 - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant ($\geq 50\%$) CAD (below):
- The THREE Types of Chest Pain or Discomfort
 - **Typical Angina (Definite)** is defined as including all **3** characteristics:
 - Substernal chest pain or discomfort with characteristic quality and duration
 - Provoked by exertion or emotional stress
 - Relieved by rest and/or nitroglycerine
 - **Atypical Angina (Probable)** has only **2** of the above characteristics
 - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics

- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of obstructive CAD is estimated from the **Diamond Forrester Table** below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability: ⁽²¹⁾

Diamond Forrester Table ^(29,30)

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50 – 59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CA

- For additional information on stress imaging, please refer to Evolent Clinical Guideline 024 for Myocardial Perfusion Imaging.

Acronyms/Abbreviations

ARVD/C: Arrhythmogenic right ventricular dysplasia/cardiomyopathy

ASD: Atrial septal defect

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CMR: Cardiac magnetic resonance (imaging)

CT: Computed tomography

ECG: Electrocardiogram

EF: Ejection fraction

HCM: Hypertrophic cardiomyopathy

ICD: Implantable cardioverter-defibrillator

LAA: Left atrial appendage

LBBB: Left bundle-branch block

LGE: Late gadolinium enhancement

LV: Left ventricle

LVH: Left ventricular hypertrophy

LVOT: Left ventricular outflow

MPI: Myocardial perfusion imaging

MR: Mitral regurgitation

MR(I): Magnetic resonance (imaging)

PA: Pulmonary artery

PET: Positron emission tomography

PFO: Patent foramen ovale
 PS: Pulmonary stenosis
 RV: Right ventricle
 SCD: Sudden cardiac death
 SE: Stress echocardiography
 SRT: Septal reduction therapy
 TAVR: Transcatheter Aortic Valve Replacement
 TTE: Transthoracic Echo
 TEE: Transesophageal Echo
 VT: Ventricular tachycardia

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Formatting change • Addition of clinical reasoning statement with AUC scoring described • AUC scores added to bullet points • References updated • Combination Studies section added
April 2023	<ul style="list-style-type: none"> • Added statement on clinical indications not addressed in this guideline • Added Washington State Legislative Language

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its



sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Brignole M, Auricchio A, Baron-Esquivias G, Bordachar P, Boriani G et al. 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy: the Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). Eur Heart J. Aug 2013; 34: 2281-329. 10.1093/eurheartj/eh150.
2. Indik J, Gimbel J, Abe H, Alkimi-Teixeira R, Birgersdotter-Green U et al. 2017 HRS expert consensus statement on magnetic resonance imaging and radiation exposure in patients with cardiovascular implantable electronic devices. Heart Rhythm. Jul 2017; 14: e97-e153. 10.1016/j.hrthm.2017.04.025.
3. Nazarian S, Hansford R, Rahsepar A, Weltin V, McVeigh D et al. Safety of Magnetic Resonance Imaging in Patients with Cardiac Devices. N Engl J Med. Dec 28, 2017; 377: 2555-2564. 10.1056/NEJMoA1604267.
4. Russo R, Costa H, Silva P, Anderson J, Arshad A et al. Assessing the Risks Associated with MRI in Patients with a Pacemaker or Defibrillator. N Engl J Med. Feb 23, 2017; 376: 755-764. 10.1056/NEJMoA1603265.
5. Hendel R, Lindsay B, Allen J, Brindis R, Patel M et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. J Am Coll Cardiol. 2018; 71: 935-948. 10.1016/j.jacc.2018.01.007.
6. Hendel R, Patel M, Allen J, Min J, Shaw L et al. Appropriate Use of Cardiovascular Technology: 2013 ACCF Appropriate Use Criteria Methodology Update: A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force. J Am Coll Cardiol. 2013; 61: 1305 - 1317. 10.1016/j.jacc.2013.01.025.
7. Bonow R, Douglas P, Buxton A, Cohen D, Curtis J et al. ACCF/AHA methodology for the development of quality measures for cardiovascular technology: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Performance Measures. J Am Coll Cardiol. 2011; 58: 1517-38. 10.1016/j.jacc.2011.07.007.
8. Fitch K, Bernstein S, Aguilar M, Burnand B, LaCalle J et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
9. Patel M, Spertus J, Brindis R, Hendel R, Douglas P et al. ACCF proposed method for evaluating the appropriateness of cardiovascular. J Am Coll Cardiol. 2005; 46: 1606-13. 10.1016/j.jacc.2005.08.030.
10. Doherty J, Kort S, Mehran R, Schoenhagen P, Soman P et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. J Am Coll Cardiol. Feb 5, 2019; 73: 488-516. 10.1016/j.jacc.2018.10.038.
11. Patel M, White R, Abbara S, Bluemke D, Herfkens R et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. J Am Coll Cardiol. May 28, 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.

12. Heidenreich P, Bozkurt B, Aguilar D, Allen L, Byun J et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 145: e876-e894. 10.1161/CIR.0000000000001062.
13. Birnie D, Nery P, Ha A, Beanlands R. Cardiac Sarcoidosis. *J Am Coll Cardiol*. 2016; 68: 411-21. 10.1016/j.jacc.2016.03.605.
14. Ommen S, Mital S, Burke M, Day S, Deswal A et al. 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. Dec 22, 2020; 76: e159-e240. 10.1016/j.jacc.2020.08.045.
15. Doherty J, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Sep 26, 2017; 70: 1647-1672. 10.1016/j.jacc.2017.07.732.
16. Otto C, Kumbhani D, Alexander K, Calhoon J, Desai M et al. 2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults With Aortic Stenosis: A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents. *J Am Coll Cardiol*. Mar 14, 2017; 69: 1313-1346. 10.1016/j.jacc.2016.12.006.
17. Bonow R, O'Gara P, Adams D, Badhwar V, Bavaria J et al. 2020 Focused Update of the 2017 ACC Expert Consensus Decision Pathway on the Management of Mitral Regurgitation: A Report of the American College of Cardiology Solution Set Oversight Committee. *J Am Coll Cardiol*. May 5, 2020; 75: 2236-2270. 10.1016/j.jacc.2020.02.005.
18. Agricola E, Ingallina G, Ancona F, Biondi F, Margonato D et al. Evolution of interventional imaging in structural heart disease. *Eur Heart J Suppl*. 2023; 25: C189 - C199. 10.1093/eurheartjsupp/suad044.
19. Isselbacher E M, Preventza O, Black J H, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 146: e334-e482. doi:10.1161/CIR.0000000000001106.
20. Sachdeva R, Valente A, Armstrong A, Cook S, Han B et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Coll Cardiol*. Feb 18, 2020; 75: 657-703. 10.1016/j.jacc.2019.10.002.
21. Winchester D, Maron D, Blankstein R, Chang I, Kirtane A et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *J Cardiovasc Magn Reson*. 2023; 25: 58. 10.1186/s12968-023-00958-5.
22. Gulati M, Levy P, Mukherjee D, Amsterdam E, Bhatt D et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest

Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. Nov 30, 2021; 78: e187-e285. 10.1016/j.jacc.2021.07.053.

23. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211119A – Use of Cardiac Magnetic Resonance Angiography (CMRA) in Adults and Children. [Final Adoption: March 18, 2022]. 2022; <https://www.hca.wa.gov/assets/program/cmra-final-findings-and-decision-2022-03-18.pdf>.

24. Pennell D. Cardiovascular magnetic resonance. *Circulation*. Feb 9, 2010; 121: 692-705. 10.1161/circulationaha.108.811547.

25. Fihn S, Gardin J, Abrams J, Berra K, Blankenship J et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. Dec 18, 2012; 126: e354-471. 10.1161/CIR.0b013e318277d6a0.

26. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. Oct 2013; 34: 2949-3003. 10.1093/eurheartj/ehs296.

27. Cortez R, Okoshi M, K O. A Review of the Roles and Limitations of Noninvasive Imaging Methods for Investigating Cardiovascular Disease in Individuals with Obesity. *Med Sci Monit*. 2022; 28: e937362. 10.12659/MSM.937362.

28. Hirshfeld J J, Ferrari V, Bengel F, Bergersen L, Chambers C et al. 2018 ACC/HRS/NASCI/SCAI/SCCT Expert Consensus Document on Optimal Use of Ionizing Radiation in Cardiovascular Imaging-Best Practices for Safety and Effectiveness, Part 1: Radiation Physics and Radiation Biology: A Report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways Developed in Collaboration With Mended Hearts. *Catheter Cardiovasc Interv*. Aug 1, 2018; 92: 203-221. 10.1002/ccd.27660.

29. Diamond G, Forrester J. Analysis of probability as an aid in the clinical diagnosis of coronary-artery disease. *N Engl J Med*. 1979; 300: 1350-8. 10.1056/NEJM197906143002402.

30. Wolk M, Bailey S, Doherty J, Douglas P, Hendel R et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Feb 4, 2014; 63: 380-406. 10.1016/j.jacc.2013.11.009.



EVOLENT CLINICAL GUIDELINE 029 FOR ELECTRON-BEAM TOMOGRAPHY OR NON-CONTRAST CORONARY COMPUTED TOMOGRAPHY

Guideline or Policy Number: Evolent_CG_029	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2008 - 2025 Evolent. All rights Reserved.		
Original Date: January 2008	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
SPECIAL NOTE	2
CLINICAL REASONING	2
INDICATIONS FOR CORONARY ARTERY CALCIUM (CAC) TESTING	2
LEGISLATIVE REQUIREMENTS	3
STATE OF NEW MEXICO	3
STATE OF TEXAS	4
STATE OF WASHINGTON	5
20091120A	5
CODING AND STANDARDS	5
CODING	5
CPT Codes	5
APPLICABLE LINES OF BUSINESS	5
BACKGROUND	6
GENERAL OVERVIEW	6
ACRONYMS / ABBREVIATIONS	7
POLICY HISTORY	7
Summary	7
LEGAL AND COMPLIANCE	7
GUIDELINE APPROVAL	7
Committee	7
DISCLAIMER	7
REFERENCES	9

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

This guideline includes clinical criteria for coronary artery calcium scoring, by either EBCT or non-contrast CCT. CAC testing provides a quantitative assessment of coronary artery calcium content in Agatston units, as an adjunct to the estimation of global risk¹ for coronary or cardiovascular events over the next 10 years. A CAC Score > 0 is a highly specific feature of coronary atherosclerosis. ^(1,2)

Special Note

See **Legislative Requirements** for specific mandates in: State of New Mexico, State of Texas and State of Washington

Clinical Reasoning

All criteria are either supported by Appropriate Use Scores or clinical reasoning that represents a standard of care that considers variables to deliver patient-centered care, supported by current guidelines endorsed by the American College of Cardiology and the American Heart Association. Care should always be determined on a case-by-case basis and reflect the best needs of the patient.

INDICATIONS FOR CORONARY ARTERY CALCIUM (CAC) TESTING

Patients, regardless of age, can be considered for CAC testing when there is well-documented evidence of one of the following ^(3,4,5,6):

- For asymptomatic patients, without known coronary disease, at intermediate global risk (7.5%-19.9%) **(AUC 8)**
- For asymptomatic patients, without known coronary disease, that are at either borderline global risk (5%-7.4%) **(AUC 7)** or estimated 10-year risk of less than 5%, but are suspected to be at elevated ASCVD risk because of one or more major risk factor (listed below) not accounted for in global risk equations ^(1,3,5,7,8,9,10):
 - Family history of premature ASCVD
 - Persistently elevated LDL-C > 160 mg/dl or non-HDL-C > 190 mg/dl
 - Chronic kidney disease
 - Metabolic syndrome
 - Conditions specific to women (e.g., pre-eclampsia, premature menopause) ⁽¹⁰⁾
 - Inflammatory diseases (HIV, psoriasis, RA)
 - Ethnicity (e.g., South Asian ancestry)
 - Persistently elevated triglycerides (> 175 mg/dl)
 - hsCRP > 2 mg/L
 - Lp(a) levels > 50 mg/dl
 - apoB > 130 mg/dl
 - ABI < 0.9, 15
- For asymptomatic patients, without known coronary disease, where there is a need for alternative lipid-lowering strategies when statin therapy is contraindicated, due to adverse effects or patient reluctance ^(8,9)
- CAC testing may be repeated indefinitely for re-assessment of the asymptomatic patient without known coronary disease after a minimum of 5 years until the calcium score breaches 400 or up to twice if the calcium score remains zero.

LEGISLATIVE REQUIREMENTS

State of New Mexico ⁽¹¹⁾

- A group health plan, other than a small group health plan or a blanket health insurance policy or contract that is delivered, issued for delivery or renewed in this state shall provide coverage for eligible insureds to receive a heart artery calcium scan.
- Coverage provided pursuant to this section shall:
 - be limited to the provision of a heart artery calcium scan to an eligible insured to be used as a clinical management tool;

- be provided every five years if an eligible insured has previously received a heart artery calcium score of zero; and
- not be required for future heart artery calcium scans if an eligible insured receives a heart artery calcium score greater than zero.
- At its discretion or as required by law, an insurer may offer or refuse coverage for further cardiac testing or procedures for eligible insureds based upon the results of a heart artery calcium scan.
- The provisions of this section do not apply to short-term travel, accident-only or limited or specified-disease policies, plans or certificates of health insurance.
- As used in this section:
 - "eligible insured" means an insured who:
 - is a person between the ages of forty-five and sixty-five; and
 - has an intermediate risk of developing coronary heart disease as determined by a health care provider based upon a score calculated from an evidence-based algorithm widely used in the medical community to assess a person's ten-year cardiovascular disease risk, including a score calculated using a pooled cohort equation;
 - "health care provider" means a physician, physician assistant, nurse practitioner or other health care professional authorized to furnish health care services within the scope of the professional's license; and
 - "heart artery calcium scan" means a computed tomography scan measuring coronary artery calcium for atherosclerosis and abnormal artery structure and function.

State of Texas ⁽¹²⁾

- A health benefit plan that provides coverage for screening medical procedures must provide the minimum coverage required by this section to each covered individual:
 - who is:
 - a male older than 45 years of age and younger than 76 years of age; or
 - a female older than 55 years of age and younger than 76 years of age; and
 - who:
 - is diabetic; or
 - has a risk of developing coronary heart disease, based on a score derived using the Framingham Heart Study coronary prediction algorithm, that is intermediate or higher.
- The minimum coverage required to be provided under this section is coverage of up to \$200 for one of the following noninvasive screening tests for atherosclerosis and



abnormal artery structure and function every five years, performed by a laboratory that is certified by a national organization recognized by the commissioner by rule for the purposes of this section:

- computed tomography (CT) scanning measuring coronary artery calcification; or
- ultrasonography measuring carotid intima-media thickness and plaque.

State of Washington ⁽¹³⁾

20091120A

Number and Coverage Topic

20091120A – Coronary Artery Calcium Scoring

HTCC Coverage Determination

Cardiac Artery Calcium Scoring is a **non-covered benefit**.

HTCC Reimbursement Determination

- Limitations of Coverage
 - Not Applicable
- Non-Covered Indicators
 - Coronary Artery Calcium Scoring

CODING AND STANDARDS

Coding

CPT Codes

75571, S8092, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview

CAC testing is for cardiovascular risk assessment in individuals aged 40-75 years who have an intermediate (5-19.9%) 10-year ASCVD risk based upon the ACC/AHA pooled cohort risk calculator. Documentation is required that the results of the study will affect decision making for preventative actions (i.e., statin therapy). CAC testing is a cardiovascular risk assessment tool, applicable only to the patient without known cardiovascular disease, for the purpose of primary prevention. It is not for the patient with suspected or known cardiovascular disease, coronary or otherwise, who already requires aggressive risk factor modification. This test is not to be utilized for symptomatic patients in active ischemic evaluation.

CAC score > 100 can also provide support for aspirin therapy and statin therapy ^(1,14). Calcium scores are used to help determine the use and dosage of statin therapy in patients with various risks of developing clinically symptomatic atherosclerotic disease. Once symptomatic coronary disease has been established or once the patient is considered high risk, the usefulness of calcium scoring falls away as patients should be on high dose therapy and the results of a calcium score would add no further benefit. If a patient is symptomatic, non-invasive or invasive testing should remain first line.

† Global risk of CAD is defined as the probability of an asymptomatic patient without known CAD developing CAD, including myocardial infarction or CAD death, over a given period of time. Risk categories include:

- Low risk (<5%)
- Borderline risk (5% - 7.4%)
- Intermediate risk (7.5% to 19.9%)
- High risk (≥ 20%)

Links to Global Cardiovascular Risk Calculators

Risk Calculator	Website for Online Calculator
Framingham Cardiovascular Risk	https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk
Reynolds Risk Score (can use if no diabetes, unique for use of family history)	http://www.reynoldsriskscore.org/
Pooled Cohort Equation	http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example
ACC/AHA Risk Calculator	http://tools.acc.org/ASCVD-Risk-Estimator/

Acronyms / Abbreviations

ASCAD: Atherosclerotic coronary artery disease
 ASCVD: Atherosclerotic cardiovascular disease
 CAC: Coronary artery calcium
 CAD: Coronary artery disease
 CCT: Cardiac computed tomography
 EBCT: Electron beam computed tomography

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Formatting change • Addition of clinical reasoning statement with AUC scoring described • AUC scores added to bullet points • Clarifying statement that this test is not to be utilized for symptomatic patients • References updated • Added Legislative Language for Washington
April 2023	<ul style="list-style-type: none"> • Removed age limitations for CAC testing • Added new references • Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs



may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Greenland P, Blaha M J, Budoff M J, Erbel R, Watson K E. Coronary Calcium Score and Cardiovascular Risk. *J Am Coll Cardiol*. 2018; 72: 434-447. 10.1016/j.jacc.2018.05.027.
2. McClelland R L, Jorgensen N W, Budoff M, Blaha M J, Post W S et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol*. 2015; 66: 1643-53. 10.1016/j.jacc.2015.08.035.
3. Goff D, Lloyd-Jones D M, Bennett G, Coady S, D'Agostino R et al. 2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014; 63: 2935 - 2959. 10.1016/j.jacc.2013.11.005.
4. Arnett D K, Blumenthal R S, Albert M A, Buroker A B, Goldberger Z D et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019; 74: e177-e232. 10.1016/j.jacc.2019.03.010.
5. Pender A, Lloyd-Jones D M, Stone N J, Greenland P. Refining Statin Prescribing in Lower-Risk Individuals: Informing Risk/Benefit Decisions. *J Am Coll Cardiol*. 2016; 68: 1690-1697. 10.1016/j.jacc.2016.07.753.
6. Piepoli M F, Hoes A W, Agewall S, Albus C, Brotons C et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur Heart J*. 2016; 37: 2315-2381. 10.1093/eurheartj/ehw106.
7. Hecht H, Blaha M J, Berman D S, Nasir K, Budoff M et al. Clinical indications for coronary artery calcium scoring in asymptomatic patients: Expert consensus statement from the Society of Cardiovascular Computed Tomography. *J Cardiovasc Comput Tomogr*. 2017; 11: 157-168. 10.1016/j.jcct.2017.02.010.
8. Michos E D, Blaha M J, Blumenthal R S. Use of the Coronary Artery Calcium Score in Discussion of Initiation of Statin Therapy in Primary Prevention. *Mayo Clin Proc*. 2017; 92: 1831-1841. 10.1016/j.mayocp.2017.10.001.
9. Blankstein R, Gupta A, Rana J S, Nasir K. The Implication of Coronary Artery Calcium Testing for Cardiovascular Disease Prevention and Diabetes. *Endocrinol Metab (Seoul)*. 2017; 32: 47-57. 10.3803/EnM.2017.32.1.47.
10. Winchester D, Maron D, Blankstein R, Chang I, Kirtane A et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *Journal of cardiovascular magnetic resonance: official journal of the Society*. 2023; 25: 58. 10.1186/s12968-023-00958-5.
11. New Mexico Legislature. Coverage for health artery calcium scan. 2020.
12. Texas Constitution and Statutes. Texas Statutes Insurance Code Title 8 - Health Insurance and Other Health Coverages Subtitle E - Benefits Payable Under Health Coverages Chapter 1376 - Certain Tests for Early Detection of Cardiovascular Disease. 2023.

13. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee Coverage Decision 20091120A Coronary Artery Calcium Scoring. 2010; <https://www.hca.wa.gov/about-hca/programs-and-initiatives/health-technology-assessment/computed-tomographic-angiography-cta>.
14. Mortensen M B, Falk E, Li D, Nasir K, Blaha M J et al. Statin Trials, Cardiovascular Events, and Coronary Artery Calcification: Implications for a Trial-Based Approach to Statin Therapy in MESA. JACC Cardiovasc Imaging. 2018; 11: 221-230. 10.1016/j.jcmg.2017.01.029.



EVOLENT CLINICAL GUIDELINE 025 FOR HEART CT

Guideline or Policy Number: Evolent_CG_025	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS FOR HEART CT	3
CONGENITAL HEART DISEASE.....	3
PATENT DUCTUS ARTERIOSUS.....	3
AORTIC DILATION	3
AORTIC COARCTATION AND INTERRUPTED AORTIC ARCH	3
TETRALOGY OF FALLOT	4
D-LOOP TRANSPOSITION OF THE GREAT ARTERIES	4
CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES	4
TRUNCUS ARTERIOSUS	4
CARDIOMYOPATHY	5
VALVULAR HEART DISEASE	5
EVALUATION OF INTRA- AND EXTRA-CARDIAC STRUCTURES	5
ELECTROPHYSIOLOGIC PROCEDURE PLANNING	6
TRANSCATHETER STRUCTURAL INTERVENTION PLANNING.....	6
AORTIC PATHOLOGY	6
COMBINATION STUDIES	7
<i>Chest MRA and Heart CT</i>	<i>7</i>
CODING AND STANDARDS	7
CODING	7
<i>CPT Codes</i>	<i>7</i>
APPLICABLE LINES OF BUSINESS.....	7
BACKGROUND	8
<i>General Overview.....</i>	<i>8</i>
<i>Acronyms / Abbreviations.....</i>	<i>8</i>
POLICY HISTORY	9
<i>Summary</i>	<i>9</i>
LEGAL AND COMPLIANCE	9
GUIDELINE APPROVAL	9



<i>Committee</i>	9
DISCLAIMER	9
REFERENCES	10

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for determining medical necessity for non-contrast cardiac computed tomography.

INDICATIONS FOR HEART CT

Congenital Heart Disease ^(1,2)

For all indications below, either CT or CMR can be performed:

- All congenital lesions: prior to planned repair and for change in clinical status and/or new concerning signs or symptoms

Patent Ductus Arteriosus

- Routine surveillance (1-2 years) in a patient with postprocedural aortic obstruction (AUC 7)

Aortic Dilation

- Routine surveillance (6-12 months) in a child with aortic sinus and/or ascending aortic dilation with increasing size (AUC 7)

Aortic Coarctation and Interrupted Aortic Arch

- Routine surveillance (3–5 years) in a child or adult with mild aortic coarctation (AUC 7)

- Post procedure (surgical or catheter-based) routine surveillance (3–5 years) in an asymptomatic patient to evaluate for aortic arch aneurysms, in-stent stenosis, stent fracture, or endoleak (**AUC 8**)

Tetralogy of Fallot

- Post procedure routine surveillance (2–3 years) in a patient with valvular or ventricular dysfunction, right ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-PA conduit (**AUC 7**)

D-Loop Transposition of the Great Arteries

- Post procedure routine surveillance (3–5 years) in an asymptomatic patient (**AUC 7**)
- Post procedure routine surveillance (1–2 years) in a patient with dilated aortic root with increasing size, or aortic regurgitation (**AUC 7**)
- Post procedure routine surveillance (3–12 months) in a patient with \geq moderate systemic AV valve regurgitation, systemic RV dysfunction, LVOT obstruction, or arrhythmias (**AUC 7**)

Congenitally Corrected Transposition of the Great Arteries

- Unrepaired: routine surveillance (3–5 years) in an asymptomatic patient (**AUC 7**)
- Postoperative: routine surveillance (3–5 years) in an asymptomatic patient (**AUC 7**)
- Postoperative anatomic repair: routine surveillance (6–12 months) in a patient with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of an RV-to-PA conduit (**AUC 7**)
- Postoperative physiological repair with VSD closure and/or LV-to-PA conduit: routine surveillance (3–12 months) in a patient with \geq moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction (**AUC 7**)

Truncus Arteriosus

- Routine surveillance (1–2 years) in an asymptomatic child or adult with \geq moderate truncal stenosis and/or regurgitation (**AUC 7**)
- Single-Ventricle Heart Disease (includes hypoplastic left heart syndrome, double-inlet LV, double-inlet RV, mitral atresia, tricuspid atresia, unbalanced A-V septal defect): postoperative routine surveillance (3–5 years) in an asymptomatic patient (**AUC 7**)

Cardiomyopathy ⁽³⁾

- Quantification of myocardial (muscle) mass (CMR or CT) ^(4,5,6)
- Assessment of left ventricular systolic dysfunction when prior noninvasive imaging has been inadequate (**AUC 7**)
- Assessment of right ventricular morphology in suspected arrhythmogenic right ventricular cardiomyopathy (**AUC 7**) ⁽⁷⁾, based upon other findings such as ⁽⁴⁾:
 - Nonsustained VT
 - Unexplained syncope
 - ECG abnormalities ⁽⁶⁾
 - First-degree relative with positive genotype of ARVC (either, but CMR is superior to CT) ^(4,6)

Valvular Heart Disease ^(8,9)

- Characterization of native or prosthetic valves with clinical signs or symptoms suggesting valve dysfunction, when TTE, TEE, and/or fluoroscopy have been inadequate (**AUC 7**)
- Evaluation of RV systolic function in severe TR, including systolic and diastolic volumes, when TTE images are inadequate and CMR is not readily available
- Pulmonary hypertension in the absence of severe valvular disease ⁽¹⁰⁾
- Evaluation of suspected infective endocarditis with moderate to high pretest probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when TTE and TEE have been inadequate
- Evaluation of suspected paravalvular infections when the anatomy cannot be clearly delineated by TTE and TEE

Evaluation of Intra- and Extra-cardiac Structures ⁽³⁾

- Evaluation of cardiac mass, suspected tumor or thrombus, or cardiac source of emboli, when imaging with TTE and TEE have been inadequate (**AUC 7**)
- Re-evaluation of prior findings for interval change (i.e., reduction or resolution of atrial thrombus after anticoagulation (**AUC 8**), when a change in therapy is anticipated (**AUC 7**) ^(3,11)
- Evaluation of pericardial anatomy (**AUC 8**), when TTE and/or TEE are inadequate or for better tissue characterization of a mass and detection of metastasis [CMR superior for physiologic assessment (constrictive versus restrictive) and tissue characterization, CT superior for calcium assessment] ^(4,12,13)

Electrophysiologic Procedure Planning (4,7)

- Evaluation of pulmonary venous anatomy prior to radiofrequency ablation of atrial fibrillation and for follow-up when needed for evaluation of pulmonary vein stenosis (**AUC 8**)
- Non-invasive coronary vein mapping prior to placement of biventricular pacing leads (**AUC 8**)

Transcatheter Structural Intervention Planning

- Evaluation for transcatheter aortic valve replacement (TAVR) (**AUC 9**) ^(8,14)
- When TTE and TEE cannot provide adequate imaging, CT imaging can be used for planning: robotic mitral valve repair, atrial septal defect closure, left atrial appendage closure, ventricular septal defect closure, endovascular grafts, and percutaneous pulmonic valve implantation ⁽¹⁵⁾
- Evaluation for suitability of transcatheter mitral valve procedures, alone or in addition to TEE ⁽¹⁶⁾

Aortic Pathology (3,8,11,17,18)

- CT, MR, or echo can be used for screening and follow-up, with CT and MR preferred for imaging beyond the proximal ascending thoracic aorta in the following scenarios:
 - Evaluation of dilated aortic sinuses or ascending aorta identified by TTE (**AUC 8**)
 - Suspected acute aortic pathology, such as dissection (**AUC 9**)
 - Re-evaluation of known aortic dilation or aortic dissection with a change in clinical status or cardiac examination or when findings would alter management (**AUC 8**)
 - Screening first-degree relatives of individuals with a history of thoracic aortic aneurysm or dissection, or an associated high-risk mutation for thoracic aneurysm in common (**AUC 7**)
 - Screening second-degree relative of a patient with thoracic aortic aneurysm, when the first-degree relative has aortic dilation, aneurysm, or dissection
 - Six-month follow-up after initial finding of a dilated thoracic aorta, for assessment of rate of change (**AUC 8**)
 - Annual follow-up of enlarged thoracic aorta with size up to 4.4 cm
 - Biannual (twice/year) follow-up of enlarged aortic root ≥ 4.5 cm or showing growth rate ≥ 0.5 cm/year

- Patients with Marfan syndrome may undergo annual imaging with CT, MRI or TTE, with increase to biannual (twice-yearly) when diameter ≥ 4.5 cm or when expansions is > 0.5 cm/year (**AUC 8**)
- Patient with Turner syndrome should undergo initial imaging with CT, MRI, or TTE for evidence of dilatation of the ascending thoracic aorta. If imaging is normal and there are no risk factors for aortic dissection, repeat imaging should be performed every 5 - 10 years, or if otherwise indicated. If the aorta is enlarged, appropriate follow-up imaging should be done according to size, as above
- Evaluation of the aorta in the setting of a known or suspected connective tissue disease or genetic condition that predisposes to aortic aneurysm or dissection (i.e., Loeys-Dietz, Ehlers-Danlos), with re-evaluation at 6 months for rate of expansion. Complete evaluation with CMR from the cerebrovascular circulation to the pelvis is recommended with Loeys-Dietz syndrome.

Combination Studies

Chest MRA and Heart CT

- When medical necessity criteria indications are met for each Chest MRA (see Evolent Clinical Guideline 022-2 for Chest MRA and Heart MRI (see Evolent Clinical Guideline 028 for Heart MRI) or CT (such as for certain congenital malformations when evaluation of extra cardiac and cardiac structures are needed)

CODING AND STANDARDS

Coding

CPT Codes

75572, 75573, +0722T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview

- Cardiac computed tomography (Heart CT) images the cardiac chambers, great vessels, valves, myocardium, and pericardium to assess cardiac structure and function, particularly when echocardiography (transthoracic echocardiography and transesophageal echocardiography) cannot provide adequate information
- CT imaging can be used for assessment of:
 - Structures of the heart (e.g., chambers, valves, great vessels, masses), as in this guideline
 - Quantitative level of calcium in the walls of the coronary arteries, in the separate coronary artery calcium (CAC) scoring guideline

Acronyms / Abbreviations

ARVD/C: Arrhythmogenic right ventricular dysplasia/cardiomyopathy

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CCS: Coronary calcium score

CCT: Cardiac (heart) CT

CHD: Coronary heart disease

CMR: Cardiac magnetic resonance (imaging)

CT: Computed tomography

CTA: Computed tomography angiography

ECG: Electrocardiogram

EF: Ejection fraction

HF: Heart failure

LVOT: Left ventricular outflow tract

MI: Myocardial infarction

MPI: Myocardial perfusion Imaging or cardiac nuclear imaging

MR(I): Magnetic resonance (imaging)

PA: Pulmonary artery

PCI: Percutaneous coronary intervention

PVML: Paravalvular mitral leak

RV: Right ventricle

SE: Stress echocardiogram

TAVR: Transcatheter aortic valve replacement

TMVR: Transcatheter mitral valve replacement

TR: Tricuspid regurgitation

TEE: Transesophageal echocardiography

TTE: Transthoracic echocardiography

VT: Ventricular tachycardia

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> • Formatting change • Addition of clinical reasoning statement with AUC scoring described • AUC scores added to bullet points • References updated • Combination Studies section added
April 2023	<ul style="list-style-type: none"> • Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Sachdeva R, Valente A M, Armstrong A K, Cook S C, Han B K et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Coll Cardiol*. 2020; 75: 657-703. 10.1016/j.jacc.2019.10.002.
2. Stout K, Daniels C, Aboulhosn J, Bozkurt B, Broberg C et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019; 73: e81-e192. 10.1016/j.jacc.2018.08.1029.
3. Doherty J U, Kort S, Mehran R, Schoenhagen P, Soman P et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2019; 73: 488-516. 10.1016/j.jacc.2018.10.038.
4. Conte E, Mushtaq S, Muscogiuri G, Formenti A, Annoni A et al. The Potential Role of Cardiac CT in the Evaluation of Patients With Known or Suspected Cardiomyopathy: From Traditional Indications to Novel Clinical Applications. *Front Cardiovasc Med*. 2021; 8: 709124. 10.3389/fcvm.2021.709124.
5. Ommen S, Mital S, Burke M, Day S, Deswal A et al. 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients with Hypertrophic Cardiomyopathy: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2020; 76: e159-e240. 10.1016/j.jacc.2020.08.045.
6. Te Riele A, Tandri H, Sanborn D M, Bluemke D A. Noninvasive Multimodality Imaging in ARVD/C. *JACC Cardiovasc Imaging*. 2015; 8: 597-611. 10.1016/j.jcmg.2015.02.007.
7. Taylor A J, Cerqueira M, Hodgson J M, Mark D, Min J et al. ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 appropriate use criteria for cardiac computed tomography. A report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the Society of Cardiovascular Computed Tomography, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the American Society of Nuclear Cardiology, the North American Society for Cardiovascular Imaging, the Society for Cardiovascular Angiography and Interventions, and the Society for Cardiovascular Magnetic Resonance. *J Am Coll Cardiol*. 2010; 56: 1864-94. 10.1016/j.jacc.2010.07.005.
8. Doherty J U, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2017; 70: 1647-1672. 10.1016/j.jacc.2017.07.732.

9. Otto C, Nishimura R, Bonow R, Carabello B, Erwin 3rd J et al. 2020 ACC/AHA Guideline for the Management of Patients with Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2021; 77: e25-e197. 10.1016/j.jacc.2020.11.018.
10. Ascha M, Renapurkar R, Tonelli A. A review of imaging modalities in pulmonary hypertension. *Ann Thorac Med*. 2017; 12: 61-73. 10.4103/1817-1737.203742.
11. Baumgartner H, Falk V, Bax J J, De Bonis M, Hamm C et al. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. *Eur Heart J*. 2017; 38: 2739-2791. 10.1093/eurheartj/ehx391.
12. Cosyns B, Plein S, Nihoyanopoulos P, Smiseth O, Achenbach S et al. European Association of Cardiovascular Imaging (EACVI) position paper: Multimodality imaging in pericardial disease. *Eur Heart J Cardiovasc Imaging*. 2015; 16: 12-31. 10.1093/ehjci/jeu128.
13. Klein A L, Abbara S, Agler D A, Appleton C P, Asher C R et al. American Society of Echocardiography clinical recommendations for multimodality cardiovascular imaging of patients with pericardial disease: endorsed by the Society for Cardiovascular Magnetic Resonance and Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr*. 2013; 26: 965-1012.e15. 10.1016/j.echo.2013.06.023.
14. Otto C M, Kumbhani D J, Alexander K P, Calhoun J H, Desai M Y et al. 2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults with Aortic Stenosis: A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents. *J Am Coll Cardiol*. 2017; 69: 1313-1346. 10.1016/j.jacc.2016.12.006.
15. Pison L, Potpara T S, Chen J, Larsen T B, Bongiorni M G. Left atrial appendage closure- indications, techniques, and outcomes: results of the European Heart Rhythm Association Survey. *Europace*. 2015; 17: 642-6. 10.1093/europace/euv069.
16. Wunderlich N C, Beigel R, Ho S Y, Nietlispach F, Cheng R et al. Imaging for Mitral Interventions: Methods and Efficacy. *JACC Cardiovasc Imaging*. 2018; 11: 872-901. 10.1016/j.jcmg.2018.02.024.
17. Erbel R, Aboyans V, Boileau C, Bossone E, Bartolomeo R D et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014; 35: 2873-926. 10.1093/eurheartj/ehu281.
18. Isselbacher E M, Preventza O, Black 3rd J, Augoustides J G, Beck A W et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 146: e334-e482. 10.1161/cir.0000000000001106.

EVOLENT CLINICAL GUIDELINE 062 FOR CORONARY CT ANGIOGRAPHY

Guideline or Policy Number: Evolent_CG_062	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 2009 - 2025 Evolent. All rights Reserved.</i>		
Original Date: October 2009	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
SPECIAL NOTE	3
CLINICAL REASONING.....	3
INDICATIONS FOR CORONARY COMPUTED TOMOGRAPHIC ANGIOGRAPHY (CCTA)	4
EVALUATION IN SUSPECTED CORONARY ARTERY DISEASE (CAD).....	4
<i>Probability</i>	4
<i>Asymptomatic Patients</i>	4
<i>Symptomatic Patients</i>	4
<i>Heart Failure</i>	5
<i>Heart Valve</i>	5
<i>Heart Anomaly or Aneurysm</i>	5
<i>PCI or CABG</i>	5
<i>Limited Prior or Replacement Imaging</i>	6
<i>Electrophysiologic Procedure Planning</i>	6
LEGISLATIVE REQUIREMENTS	6
STATE OF WASHINGTON.....	6
<i>Health Technology Clinical Committee 20211105A</i>	6
CODING AND STANDARDS	7
CODING	7
<i>CPT Codes</i>	7
APPLICABLE LINES OF BUSINESS.....	7
BACKGROUND.....	7
AUC SCORE.....	8
REDUCTION IN CCTA TEST QUALITY.....	8
PATIENT SELECTION CRITERIA.....	8
DEFINITIONS	8
ACRONYMS/ABBREVIATIONS	13
POLICY HISTORY	14



<i>Summary</i>	14
LEGAL AND COMPLIANCE	14
GUIDELINE APPROVAL	14
<i>Committee</i>	14
DISCLAIMER	15
REFERENCES	16

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Indications for determining medical necessity for Coronary and/or Cardiac Computed Tomographic Angiography (CCTA). Patients should be on maximally tolerated guideline directed medical therapy (GDMT), when applicable.

Special Note

See [Legislative Requirements](#) for specific mandates in Washington State.

CLINICAL REASONING

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(1,2,3,4,5)

INDICATIONS FOR CORONARY COMPUTED TOMOGRAPHIC ANGIOGRAPHY (CCTA) ^(6,7,8,9)

Evaluation in Suspected Coronary Artery Disease (CAD) ^(10,11,12,13,14)

Probability

- Low pretest probability patients should be considered for exercise treadmill test (ETT) unless other criteria for CCTA are met ⁽⁶⁾
- Intermediate and high pretest probability patients ⁽¹⁵⁾
- Exercise ECG stress test with intermediate Duke Treadmill (- 10 to + 4)

Asymptomatic Patients

- Asymptomatic patients without known CAD:
 - Previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see Uninterpretable baseline ECG section)
 - Previously unevaluated pathologic Q waves (see Uninterpretable baseline ECG section)
 - Previously unevaluated left bundle branch block

Symptomatic Patients

- CCTA is being performed to avoid performing cardiac catheterization in patients with chest pain syndrome with intermediate pretest probability of CAD, uninterpretable ECG and are not able to exercise with no prior CCTA done within the last 12 months who have: ^(15,16)
 - Equivocal, borderline, or discordant stress evaluation with continued symptoms concerning for CAD **(AUC 8)** ⁽⁸⁾
 - Repeat testing in patient with new or worsening symptoms since prior normal stress imaging **(AUC 7)** ⁽⁸⁾
 - Chest pain of uncertain etiology, when non-invasive tests are negative, but symptoms are typical and management requires that significant coronary artery disease be excluded **(AUC 7)** ⁽⁸⁾

Heart Failure

- Newly diagnosed clinical systolic heart failure or diastolic heart failure, with reasonable suspicion of cardiac ischemia unless invasive coronary angiography is planned (SE diversion not required) ^(17,18) **(AUC 7)** ⁽⁸⁾

Heart Valve

- Before valve surgery or transcatheter intervention as an alternative to coronary angiography ^(16,19,20)
- To establish the etiology of mitral regurgitation ⁽²⁰⁾
- Pre-TAVR evaluation as an alternative to coronary angiography ^(21,22)

Heart Anomaly or Aneurysm

- Evaluation of coronary anomaly or aneurysm ^(23,24,25,26,27)
 - Evaluation prior to planned repair
 - Evaluation due to change in clinical status and/or new concerning signs or symptoms
 - Kawasaki disease and MIS-C follow up – for medium sized or greater aneurysms ⁽²⁸⁾ periodic surveillance can be considered every 2-5 years. Once aneurysmal size has reduced to small aneurysms, surveillance can be performed every 3-5 years. No further surveillance once normalized.
- Evaluation of suspected pulmonary embolism

NOTE: CMR is favored in younger patients for coronary anomaly evaluation ^(23,29)

PCI or CABG

- Prior PCI or CABG history
 - Symptomatic patient with prior PCI or CABG history, with angina interfering in performing daily activities, despite being on guideline directed medical therapy, and with an equivocal stress test results. No prior CCTA done within the last 12 months **(AUC 7)** ⁽⁸⁾
- Evaluation of coronary artery bypass grafts, to assess: ^(8,30)
 - Patency and location when invasive coronary arteriography was either nondiagnostic or not performed/planned **(AUC 7)** ⁽⁸⁾
 - Location of grafts prior to cardiac or another chest surgery **(AUC 7)** ⁽⁸⁾

Limited Prior or Replacement Imaging

- CCTA may be performed in patients who cannot tolerate moderate sedation that is required during TEE, for pre procedural evaluation for Left Atrial Appendage Occlusion to look for LA/LAA thrombus, spontaneous contrast, LAA morphology and dimensions. *TEE however remains the preferred choice of modality for this procedure.*

Electrophysiologic Procedure Planning

- Evaluation of anatomy (pulmonary vein isolation planning) prior to radiofrequency ablation

LEGISLATIVE REQUIREMENTS

State of Washington ⁽³¹⁾

Health Technology Clinical Committee 20211105A

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
 - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
 - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
 - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or

- Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
 - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
 - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation
 - Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
 - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
 - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Coding

CPT Codes

75574

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

A coronary computerized tomography angiogram (CCTA) is a noninvasive imaging study that uses intravenously administered contrast material and high-resolution, rapid imaging computed tomography (CT) ^(32,33)

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. ⁽¹⁾

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score – 4-6
- Rarely Appropriate Care - Median Score 1-3

Reduction in CCTA test quality

- The following can reduce the quality of the test in patients with: ⁽⁸⁾
 - Morbid Obesity
 - High or irregular heart rates
 - Severe coronary calcification

Patient Selection Criteria

- Patient selection for CCTA must be considered and may be inappropriate for the following:
 - Known history of severe and/or anaphylactic contrast reaction
 - Inability to cooperate with scan acquisition and/or breath-hold instructions
 - Pregnancy
 - Clinical instability (e.g., acute myocardial infarction, decompensated heart failure, severe hypotension)
 - Renal Impairment as defined by local protocols
 - Image quality depends on keeping HR optimally < 60 bpm (after beta blockers), a regular rhythm, stents > 3.0 mm in diameter, and vessels requiring imaging ≥ 1.5 mm diameter ⁽³⁴⁾

Definitions

- Stable patients without known CAD fall into 2 categories: ^(6,7,8)
 - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section)
 - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD

- Three Types of Chest Pain or Discomfort:
 - **Typical Angina (Definite)** is defined as including ALL **3** characteristics:
 - Substernal chest pain or discomfort with characteristic quality and duration
 - Provoked by exertion or emotional stress
 - Relieved by rest and/or nitroglycerin
 - **Atypical Angina (Probable)** has only **2** of the above characteristics
 - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics
- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of significant CAD is estimated from the Diamond Forrester Table below, recognizing that additional coronary risk factors could increase pretest probability: ⁽⁸⁾

Diamond Forrester Table ^(35,36)

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50 – 59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very Low: < 5% pretest probability of CAD

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes: ⁽⁶⁾
 - ST segment depression is considered significant when there is 1 mm or more, not for non-specific ST - T wave changes
 - Ischemic-looking T waves are considered significant when there are at least 2.5 mm inversions (excluding V1 and V2)
 - LVH with repolarization abnormalities, WPW, a ventricular paced rhythm, or left bundle branch block
 - Digitalis use with associated ST - T abnormalities
 - Resting HR under 50 bpm on a beta blocker and an anticipated suboptimal workload
 - Note: RBBB with less than 1 mm ST depression at rest may be suitable for ECG treadmill testing

- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
 - > 40 ms (1 mm) wide
 - > 2 mm deep
 - > 25% of depth of QRS complex
- ECG Stress Test Alone versus Stress Testing with Imaging
 - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise: ⁽⁸⁾
 - The (symptomatic) low pretest probability patient who can exercise and has an interpretable ECG ⁽⁸⁾
 - The patient who is under evaluation for exercise-induced arrhythmia
 - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
 - For the evaluation of syncope or presyncope during exertion ⁽³⁷⁾
- Duke Exercise ECG Treadmill Score ⁽³⁸⁾
 - Calculates risk from ECG treadmill alone:
 - Duke treadmill score (DTS) equation is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
 - The score ranges from - 25 to + 15 with values corresponding to low-risk (score of $\geq + 5$), intermediate risk (scores ranging from - 10 to + 4), and high-risk (score of $\leq - 11$) categories
- Scenarios that can additionally support a CCTA over a regular exercise treadmill test in the low probability scenario ⁽³⁹⁾
 - Inability to Exercise
 - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
 - The patient has limited functional capacity (< 4 METS) such as ONE of the following:
 - Unable to take care of their activities of daily living (ADLs) or ambulate
 - Unable to walk 2 blocks on level ground
 - Unable to climb 1 flight of stairs
 - Unable to vacuum, dust, do dishes, sweep, or carry a small grocery bag

- Other Comorbidities
 - Prior cardiac surgery (coronary artery bypass graft or valvular)
 - Left ventricular ejection fraction $\leq 50\%$
 - Severe chronic obstructive pulmonary disease (COPD) with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
 - Poorly controlled hypertension, with systolic blood pressure (BP) > 180 or Diastolic BP > 120
- ECG and Echo-Related Baseline Findings
 - Pacemaker or implantable cardioverter defibrillator (ICD)
 - Resting wall motion abnormalities on echocardiography
 - Complete LBBB
- Risk-Related scenarios
 - Intermediate or high global risk in patients requiring type IC antiarrhythmic drugs
 - Arrhythmia risk with exercise
- Global Risk of Cardiovascular Disease
 - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years.
 - **CAD Risk—Low**
 - 10-year absolute coronary or cardiovascular risk less than 10%
 - **CAD Risk—Moderate**
 - 10-year absolute coronary or cardiovascular risk between 10% and 20%
 - **CAD Risk—High**
 - 10-year absolute coronary or cardiovascular risk of greater than 20%

Websites for Global Cardiovascular Risk Calculators* (40,41,42,43,44)

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk
Reynolds Risk Score Can use if no diabetes	http://www.reynoldsriskscore.org/

Risk Calculator	Websites for Online Calculator
Unique for use of family history	
Pooled Cohort Equation	http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example
ACC/AHA Risk Calculator	http://tools.acc.org/ASCVD-Risk-Estimator/
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease ^(6,7,45,46,47)
 - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
 - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. It is not a diagnostic tool so much as it is a **risk stratification** tool. Its incorporation into global risk can be achieved by using the MESA risk calculator.
 - Stenoses $\geq 70\%$ are considered obstructive coronary artery disease (also referred to as clinically significant), while stenoses $\leq 70\%$ are considered non-obstructive coronary artery disease ⁽⁴⁵⁾
 - Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
 - Suggested by percentage diameter stenosis $\geq 70\%$ by angiography; intermediate lesions are 50 – 69% ⁽⁸⁾
 - For a left main artery, suggested by a percentage stenosis $\geq 50\%$ or minimum luminal cross-sectional area on IVUS ≤ 6 square mm ^(6,46,47)
 - FFR (fractional flow reserve) ≤ 0.80 for a major vessel ^(46,47)
 - iFR (instantaneous wave-free ratio) ≤ 0.89 for a major vessel ^(47,48,49,50)
 - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree

- A major vessel would be a coronary vessel that would be amenable to revascularization, if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
 - FFR is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
 - Newer technology that estimates FFR from CCTA images is covered under the Evolent Clinical Guideline 062-1 for Fractional Flow Reserve CT.
- Anginal Equivalent ^(6,37,51)
 - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data such as respiratory rate, oximetry, lung exam, etc. (as well as D-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Syncope, per se, is not an anginal equivalent.

Acronyms/Abbreviations

ACS: Acute coronary syndrome
 ADLs: Activities of daily living
 CABG: Coronary artery bypass grafting surgery
 CAD: Coronary artery disease
 CCS: Coronary calcium score
 CCTA: Coronary computed tomography angiography
 CT(A): Computed tomography (angiography)
 COPD: Chronic obstructive pulmonary disease
 DTS: Duke Treadmill Score
 ECG: Electrocardiogram
 EF: Ejection fraction
 FFR: Fractional flow reserve
 ICD: Implantable cardioverter-defibrillator
 iFR: Instantaneous wave-free ratio or instant flow reserve
 IVUS: Intravascular ultrasound
 LBBB: Left bundle branch block
 LVH: Left ventricular hypertrophy
 MESA: Multi-Ethnic Study of Atherosclerosis
 METS: Metabolic equivalents
 MI: Myocardial infarction
 MPI: Myocardial perfusion imaging

PCI: Percutaneous coronary intervention
PFT: Pulmonary function test
RBBB: Right bundle branch block
SE: Stress echocardiography
TTE: Transthoracic echocardiography
WPW: Wolff-Parkinson-White syndrome

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Formatting change • Addition of clinical reasoning statement with AUC scoring described • AUC scores added to bullet points • Addition of SE symbol to those points for which a stress echocardiogram should be considered • Changed “Equivocal, borderline, or discordant stress imaging evaluation...” to “Equivocal, borderline, or discordant stress evaluation...”, having taken the word ‘imaging’ out of the newer policy • References updated • WA legislative requirements added
April 2023	<ul style="list-style-type: none"> • Added Electrophysiology testing prior to ablation • Added Kawasaki/MIS-C section on follow up • Added statement about low pretest probability • Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Hendel R, Lindsay B, Allen J, Brindis R, Patel M et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2018; 71: 935-948. 10.1016/j.jacc.2018.01.007.
2. Hendel R, Patel M, Allen J, Min J, Shaw L et al. Appropriate use of cardiovascular technology: 2013 ACCF appropriate use criteria methodology update: a report of the American College of Cardiology Foundation appropriate use criteria task force. *J Am Coll Cardiol*. 2013; 61: 1305-17. 10.1016/j.jacc.2013.01.025.
3. Bonow R, Douglas P, Buxton A, Cohen D, Curtis J et al. ACCF/AHA methodology for the development of quality measures for cardiovascular technology: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Performance Measures. *Circulation*. 2011; 124: 1483-502. 10.1161/CIR.0b013e31822935fc.
4. Fitch K, Bernstein S, Aguilar M, Burnand B, LaCalle J et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
5. Patel M, Spertus J, Brindis R, Hendel R, Douglas P et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *J Am Coll Cardiol*. 2005; 46: 1606-13. 10.1016/j.jacc.2005.08.030.
6. Fihn S D, Gardin J M, Abrams J, Berra K, Blankenship J C et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. 2012; 126: e354-471. 10.1161/CIR.0b013e318277d6a0.
7. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. 2013; 34: 2949-3003. 10.1093/eurheartj/eh296.
8. Winchester D, Maron D, Blankstein R, Chang I, Kirtane A et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *J Cardiovasc Magn Reson*. 2023; 25: 58. 10.1186/s12968-023-00958-5.
9. Bandettini W P, Kwong R Y, Patel A R, Plein S, Resonance Society for Cardiovascular Magnetic. Society for Cardiovascular Magnetic Resonance perspective on the ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 multi-modality appropriate use criteria for the detection and risk assessment of chronic coronary disease. *J Cardiovasc Magn Reson*. 2023; 25: 59. 10.1186/s12968-023-00959-4.
10. Cheng V, Berman D, Rozanski A, Dunning A, Achenbach S et al. Performance of the traditional age, sex, and angina typicality-based approach for estimating pretest probability of angiographically significant coronary artery disease in patients undergoing coronary computed tomographic angiography. *Circulation*. 2011; 124: 2423-32, 1-8. 10.1161/CIRCULATIONAHA.111.039255.
11. Foy A, Dhruva S, Peterson B, Mandrola J, Morgan D. Coronary Computed Tomography Angiography vs Functional Stress Testing for Patients With Suspected Coronary Artery Disease: A Systematic Review and Meta-analysis. *JAMA Intern Med*. 2017; 177: 1623-1631. 10.1001/jamainternmed.2017.4772.

12. Newby D, Williams M, Hunter A, Pawade T, Shah A et al. CT coronary angiography in patients with suspected angina due to coronary heart disease (SCOT-HEART): an open-label, parallel-group, multicentre trial. *Lancet*. 2015; 385: 2383-91. 10.1016/S0140-6736(15)60291-4.
13. Tzolos E, Newby D. Coronary Computed Tomography Angiography Improving Outcomes in Patients with Chest Pain. *Curr Cardiovasc Imaging Rep*. 2019; 12: 15. 10.1007/s12410-019-9492-6.
14. Adamson P D, Newby D E, Hill C L, Coles A, Douglas P S. Comparison of International Guidelines for Assessment of Suspected Stable Angina: Insights From the PROMISE and SCOT-HEART. *JACC Cardiovasc Imaging*. 2018; 11: 1301-1310. 10.1016/j.jcmg.2018.06.021.
15. Gulati M, Levy P D, Mukherjee D, Amsterdam E, Bhatt D L et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021; 144: e368-e454. 10.1161/CIR.0000000000001029.
16. Gatti M, Gallone G, Poggi V, Bruno F, Serafini A et al. Diagnostic accuracy of coronary computed tomography angiography for the evaluation of obstructive coronary artery disease in patients referred for transcatheter aortic valve implantation: a systematic review and meta-analysis. *Eur Radiol*. 2022; 32: 5189-5200. 10.1007/s00330-022-08603-y.
17. Doherty J U, Kort S, Mehran R, Schoenhagen P, Soman P et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2019; 73: 488-516. 10.1016/j.jacc.2018.10.038.
18. Patel M R, White R D, Abbata S, Bluemke D A, Herfkens R J et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.
19. Vahanian A, Beyersdorf F, Praz F, Milojevic M, Baldus S et al. 2021 ESC/EACTS Guidelines for the management of valvular heart disease. *Eur Heart J*. 2022; 43: 561-632. 10.1093/eurheartj/ehab395.
20. Otto C, Nishimura R, Bonow R, Carabello B, Erwin 3rd J et al. 2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021; 143: e72-e227. 10.1161/CIR.0000000000000923.
21. Achenbach S, Delgado V, Hausleiter J, Schoenhagen P, Min J. SCCT expert consensus document on computed tomography imaging before transcatheter aortic valve implantation (TAVI)/transcatheter aortic valve replacement (TAVR). *J Cardiovasc Comput Tomogr*. 2012; 6: 366-80. 10.1016/j.jcct.2012.11.002.
22. Blanke P, Weir-McCall J, Achenbach S, Delgado V, Hausleiter J et al. Computed Tomography Imaging in the Context of Transcatheter Aortic Valve Implantation (TAVI)/Transcatheter Aortic Valve Replacement (TAVR): An Expert Consensus Document of the Society of Cardiovascular Computed Tomography. *JACC Cardiovasc Imaging*. 2019; 12: 1-24. 10.1016/j.jcmg.2018.12.003.
23. Bluemke D, Achenbach S, Budoff M, Gerber T, Gersh B et al. Noninvasive coronary artery imaging: magnetic resonance angiography and multidetector computed tomography angiography: a scientific statement from the american heart association committee on cardiovascular imaging and

intervention of the council on cardiovascular radiology and intervention, and the councils on clinical cardiology and cardiovascular disease in the young. *Circulation*. 2008; 118: 586-606. 10.1161/CIRCULATIONAHA.108.189695.

24. Gräni C, Bigler M, Kwong R. Noninvasive Multimodality Imaging for the Assessment of Anomalous Coronary Artery. *Curr Cardiol Rep*. 2023; 25: 1233 - 1246. 10.1007/s11886-023-01948-w.

25. Newburger J W, Takahashi M, Burns J C. Kawasaki Disease. *J Am Coll Cardiol*. 2016; 67: 1738-49. 10.1016/j.jacc.2015.12.073.

26. Sachdeva R, Valente A M, Armstrong A K, Cook S C, Han B K et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Soc Echocardiogr*. 2020; 33: e1-e48. 10.1016/j.echo.2020.04.026.

27. Singhal M, Pilania R, Gupta P, Johnson N, Singh S. Emerging role of computed tomography coronary angiography in evaluation of children with Kawasaki disease. *World J Clin Pediatr*. 2023; 12: 97-106. 10.5409/wjcp.v12.i3.97.

28. McCrindle B W, Rowley A H, Newburger J W, Burns J C, Bolger A F et al. Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease: A Scientific Statement for Health Professionals From the American Heart Association. *Circulation*. 2017; 135: e927-e999. 10.1161/cir.0000000000000484.

29. Weberling L, Lossnitzer D, Frey N, André F. Coronary Computed Tomography vs. Cardiac Magnetic Resonance Imaging in the Evaluation of Coronary Artery Disease. *Diagnostics (Basel)*. 2022; 13: 125. 10.3390/diagnostics13010125.

30. Seraphim A, Knott K, Augusto J, Menacho K, Tyebally S et al. Non-invasive Ischaemia Testing in Patients With Prior Coronary Artery Bypass Graft Surgery: Technical Challenges, Limitations, and Future Directions. *Front Cardiovasc Med*. 2021; 8: 795195. 10.3389/fcvm.2021.795195.

31. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease. [Final Adoption: March 18, 2022]. 2022; <https://www.hca.wa.gov/assets/program/noninvasive-cardiac-imaging-final-findings-and-decision-2022-03-18.pdf>.

32. Sliwicka O, Sechopoulos I, Baggiano A, Pontone G, Nijveldt R. Dynamic myocardial CT perfusion imaging-state of the art. *Eur Radiol*. 2023; 33: 5509-5525. 10.1007/s00330-023-09550-y.

33. Pugliese L, Ricci F, Sica G, Scaglione M, Masala S. Non-Contrast and Contrast-Enhanced Cardiac Computed Tomography Imaging in the Diagnostic and Prognostic Evaluation of Coronary Artery Disease. *Diagnostics (Basel)*. 2023; 13: 2074. 10.3390/diagnostics13122074.

34. Abbara S, Blanke P, Maroules C D, Cheezum M, Choi A D et al. SCCT guidelines for the performance and acquisition of coronary computed tomographic angiography: A report of the society of Cardiovascular Computed Tomography Guidelines Committee: Endorsed by the North American Society for Cardiovascular Imaging (NASCI). *J Cardiovasc Comput Tomogr*. 2016; 10: 435-449. 10.1016/j.jcct.2016.10.002.

35. Diamond G, Forrester J. Analysis of probability as an aid in the clinical diagnosis of coronary-artery. *N Engl J Med*. 1979; 300: 1350-8. 10.1056/NEJM197906143002402.

36. Wolk M J, Bailey S R, Doherty J U, Douglas P S, Hendel R C et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use

criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2014; 63: 380-406. 10.1016/j.jacc.2013.11.009.

37. Shen W K, Sheldon R S, Benditt D G, Cohen M I, Forman D E et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2017; 70: 620–663. 10.1016/j.jacc.2017.03.002.

38. Shaw I, Peterson E, Shaw L, Kesler K, DeLong E et al. Use of a prognostic treadmill score in identifying diagnostic coronary disease subgroups. *Circulation*. 1998; 98: 1622-30. 10.1161/01.cir.98.16.1622.

39. Henzlova M J, Duvall W L, Einstein A J, Travin M I, Verberne H J. ASNC imaging guidelines for SPECT nuclear cardiology procedures: Stress, protocols, and tracers. *J Nucl Cardiol*. 2016; 23: 606-39. 10.1007/s12350-015-0387-x.

40. D'Agostino Sr R B, Vasan R S, Pencina M J, Wolf P A, Cobain M et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation*. 2008; 117: 743-53. 10.1161/CIRCULATIONAHA.107.699579.

41. Arnett D K, Blumenthal R S, Albert M A, Buroker A B, Goldberger Z D et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019; 74: e177-e232. 10.1016/j.jacc.2019.03.010.

42. Goff D C J, Lloyd-Jones D M, Bennett G, Coady S, D'Agostino R B et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014; 129: S49-73. 10.1161/01.cir.0000437741.48606.98.

43. McClelland R L, Jorgensen N W, Budoff M, Blaha M J, Post W S et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol*. 2015; 66: 1643-53. 10.1016/j.jacc.2015.08.035.

44. Ridker P M, Buring J E, Rifai N, Cook N R. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. *JAMA*. 2007; 297: 611-9. 10.1001/jama.297.6.611.

45. Patel M R, Calhoun J H, Dehmer G J, Grantham J A, Maddox T M et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2017 Appropriate Use Criteria for Coronary Revascularization in Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2017; 69: 2212-2241. 10.1016/j.jacc.2017.02.001.

46. Shlofmitz E, Ali Z, Maehara A, Mintz G, Shlofmitz R. Intravascular Imaging-Guided Percutaneous Coronary Intervention: A Universal Approach for Optimization of Stent Implantation. *Circ Cardiovasc Interv*. 2020; 13: e008686. 10.1161/CIRCINTERVENTIONS.120.008686.

47. Lotfi A, Davies J E, Fearon W F, Grines C L, Kern M J. Focused update of expert consensus statement: Use of invasive assessments of coronary physiology and structure: A position statement of the society of cardiac angiography and interventions. *Catheter Cardiovasc Interv*. 2018; 92: 336-347. 10.1002/ccd.27672.
48. Davies J E, Sen S, Dehbi H M, Al-Lamee R, Petraco R et al. Use of the Instantaneous Wave-free Ratio or Fractional Flow Reserve in PCI. *N Engl J Med*. 2017; 376: 1824-1834. 10.1056/NEJMoa1700445.
49. Götzberg M, Christiansen E H, Gudmundsdottir I J, Sandhall L, Danielewicz M et al. Instantaneous Wave-free Ratio versus Fractional Flow Reserve to Guide PCI. *N Engl J Med*. 2017; 376: 1813-1823. 10.1056/NEJMoa1616540.
50. Verdoia M, Rognoni A. Coronary Physiology: Modern Concepts for the Guidance of Percutaneous Coronary Interventions and Medical Therapy. *J Clin Med*. 2023; 12: 2274. 10.3390/jcm12062274.
51. Brignole M, Moya A, de Lange F, Deharo J, Elliott P et al. 2018 ESC Guidelines for the diagnosis and management of syncope. *Eur Heart J*. 2018; 39: 1883-1948. 10.1093/eurheartj/ehy037.

EVOLENT CLINICAL GUIDELINE 035 FOR ABDOMINAL AORTA CT ANGIOGRAPHY WITH LOWER EXTREMITY RUNOFF

Guideline or Policy Number: Evolent_CG_035		<u>Applicable Codes</u>
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2008 - 2025 All rights Reserved		
Original Date: July 2008	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS	2
PERIPHERAL VASCULAR DISEASE	2
PRE-OPERATIVE/PROCEDURE EVALUATION	3
POST-OPERATIVE/POST-PROCEDURAL EVALUATION	3
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	3
GENETIC SYNDROMES AND RARE DISEASES.....	3
COMBINATIONS STUDIES	4
<i>Abdominal Aorta CT Angiography with Lower Extremity Runoff and Chest CTA.....</i>	<i>4</i>
CODING AND STANDARDS	4
CODING.....	4
<i>CPT Codes</i>	<i>4</i>
APPLICABLE LINES OF BUSINESS	4
BACKGROUND	4
<i>Contraindications and Preferred Studies.....</i>	<i>4</i>
<i>Suspected Peripheral Arteral Disease</i>	<i>5</i>
POLICY HISTORY	5
<i>Summary</i>	<i>5</i>
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL.....	6
<i>Committee</i>	<i>6</i>
DISCLAIMER.....	6
REFERENCES.....	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Computed tomography angiography (CTA) generates images of the blood vessels in the abdomen and lower extremities that can be evaluated for evidence of stenosis or occlusion with the use of ionizing radiation, which is a potential hazard in patients with impaired renal function.

INDICATIONS

Peripheral Vascular Disease ^(1,2,3,4)

- For evaluation of known or suspected lower extremity arterial disease):
 - For known or suspected peripheral arterial disease (such as claudication, or clinical concern for vascular causes of ulcers) when non-invasive studies (pulse volume recording, ankle-brachial index, toe brachial index, segmental pressures, or doppler ultrasound) are abnormal or equivocal **OR**
 - For critical limb ischemia with **ANY** of the below clinical signs of peripheral artery disease (prior ultrasound is not needed; if done and negative, CTA should still be approved) ^(5,6)
 - Ischemic rest pain
 - Tissue Loss
 - Gangrene
 - After stenting or surgery with signs of recurrent symptoms, abnormal ankle/brachial index, abnormal or indeterminate arterial Doppler, **OR** abnormal or indeterminate pulse volume recording

NOTE: When vascular imaging of the aorta and both legs, i.e., CTA aortogram and runoff is desired (sometimes incorrectly requested as Abd/Pelvis CTA & Lower Extremity CTA Runoff), only one authorization request is required, using CPT Code 75635 CTA Aortogram.

This study provides for imaging of the abdomen, pelvis, and both legs. A separate authorization for Lower Extremity CTA is **NOT** needed.

Pre-operative/Procedure Evaluation

- Evaluation of interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia

Post-Operative/Post-Procedural Evaluation

- Evaluation of post-operative complications, e.g., pseudoaneurysms related to surgical bypass grafts, vascular stents, and stent-grafts
- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery.
 - Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow-up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

Genetic Syndromes and Rare Diseases

- Williams Syndrome:⁽⁷⁾
 - When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)
- For other syndromes and rare diseases not otherwise addressed in the guideline, coverage is based on a case-by-case basis using societal guidance

Combinations Studies

Abdominal Aorta CT Angiography with Lower Extremity Runoff and Chest CTA

- To evaluate for an embolic source of lower extremity vascular disease when other imaging such as echocardiography suggests a cardiac source of the embolism
- Williams Syndrome: When there is concern for vascular disease (including renal artery stenosis) based on abnormal exam or imaging findings (such as diminished pulses, bruits or signs of diffuse thoracic aortic stenosis)⁽⁷⁾

CODING AND STANDARDS

Coding

CPT Codes

75635

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Suspected Peripheral Arterial Disease

CTA (or MRA) is an excellent tool to diagnose lower extremity peripheral arterial disease (PAD). Benefits include the fast-scanning time and accurate detection of occlusions and stenosis. According to the Society for Vascular Surgery guidelines, “Measurement of the ankle-brachial index (ABI) is the primary method for establishing the diagnosis of PAD. An ABI of ≤ 0.90 has been demonstrated to have high sensitivity and specificity for the identification of PAD compared with the gold standard of invasive arteriography.”⁽²⁾ The presence of a normal ABI at rest and following exercise almost excludes atherosclerotic disease as a cause for leg claudication.^(1,7)

When an ABI is >1.40 (suggesting noncompressible calcified vessels) and clinical suspicion is high, other tests such as toe-brachial index <8 , a resting toe pressure <40 mm Hg, a systolic peak posterior tibial artery flow velocity <10 cm/s may be used. “In symptomatic patients in whom revascularization treatment is being considered, we recommend anatomic imaging studies, such as arterial duplex ultrasound, CTA, MRA, and contrast arteriography.”⁽²⁾ This later statement is accompanied by a “B” (moderate) rating for the accompanying evidence (“A” = high, “C” = low) “In patients with limited renal function or planned surgical intervention, noninvasive imaging tests (particularly MRA and CTA) may obviate the need for diagnostic catheter angiography to visualize the location and severity of peripheral vascular disease.”⁽²⁾

Follow-up imaging post vascular surgery procedures have not been well researched without clear surveillance protocols in place. Clinical exam, ABI and EUS within the first month of endovascular therapy are generally recommended to assess for residual stenosis, and again at 6 and 12 months, then annually. More sophisticated imaging with CTA, MRA, or invasive catheter angiography is reserved for complex cases.⁽⁸⁾

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> Updated references Added Combo studies, Genetic Syndromes and Rare Diseases, Contraindications and Preferred Studies sections Updated guideline name
May 2023	<ul style="list-style-type: none"> General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline Added statement regarding further evaluation of indeterminate findings on prior imaging



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Azene E M, Steigner M L, Aghayev A, Ahmad S, Clough R E et al. AACR Appropriateness Criteria® Lower Extremity Arterial Claudication-Imaging Assessment for Revascularization: 2022 Update. *Journal of the American College of Radiology*. 2022; 19: S364 - S373. 10.1016/j.jacr.2022.09.002.
2. Conte M S, Pomposelli F B, Clair D G, Geraghty P J, McKinsey J F et al. Society for Vascular Surgery practice guidelines for atherosclerotic occlusive disease of the lower extremities: management of asymptomatic disease and claudication. *J Vasc Surg*. 2015; 61: 2s-41s. 10.1016/j.jvs.2014.12.009.
3. Singh-Bhinder N, Kim D H, Holly B P, Johnson P T, Hanley M et al. ACR Appropriateness Criteria® Nonvariceal Upper Gastrointestinal Bleeding. *Journal of the American College of Radiology*. 2017; 14: S177 - S188. 10.1016/j.jacr.2017.02.038.
4. Werncke T, Ringe K I, von Falck C, Kruschewski M, Wacker F. Diagnostic confidence of run-off CT-angiography as the primary diagnostic imaging modality in patients presenting with acute or chronic peripheral arterial disease. *PLoS One*. 2015; 10: e0119900. 10.1371/journal.pone.0119900.
5. Shishehbor M H, White C J, Gray B H, Menard M T, Lookstein R et al. Critical Limb Ischemia: An Expert Statement. *J Am Coll Cardiol*. 2016; 68: 2002-2015. 10.1016/j.jacc.2016.04.071.
6. Browne W F, Sung J, Majdalany B S, Khaja M S, Calligaro K et al. ACR Appropriateness Criteria® Sudden Onset of Cold, Painful Leg: 2023 Update. *Journal of the American College of Radiology*. 2023; 20: S565 - S573. 10.1016/j.jacr.2023.08.012.
7. Morris C. Williams Syndrome. [Updated 2023 Apr 13]. *GeneReviews®* [Internet]. 2023.

EVOLENT CLINICAL GUIDELINE 104 FOR CT MULTIPLANAR RECONSTRUCTION (3D RENDERING)

Guideline or Policy Number: Evolent_CG_104	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 2009 - 2025 Evolent. All rights Reserved.</i>		
Original Date: March 2009	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS.....	2
POLICY HISTORY	2
Summary	2
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER.....	3

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

These procedures should always be approved.

This organization does not review these services for medical necessity.

CODING AND STANDARDS

Coding

CPT Codes

76376, 76377

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none"> No changes

Date	Summary
March 2023	<ul style="list-style-type: none">• No changes

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.



EVOLENT CLINICAL GUIDELINE 003 FOR BRAIN MAGNETIC RESONANCE SPECTROSCOPY (MRS)

Guideline or Policy Number: Evolent_CG_003	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2007 - 2025 Evolent. All rights Reserved.</i>		
Original Date: April 2007	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
<i>Magnetic Resonance Spectroscopy</i>	2
INDICATIONS FOR BRAIN MRS ⁽²⁾	2
CODING AND STANDARDS	2
CODING	2
<i>CPT Codes</i>	2
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	3
TUMOR RECURRENCE VS. RADIATION NECROSIS	3
GLIOMA	3
INHERITED METABOLIC CONDITIONS	3
MRS IN OTHER DISEASES	4
CONTRAINDICATION AND PREFERRED STUDIES	4
POLICY HISTORY	4
SUMMARY	4
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL	5
<i>Committee</i>	5
DISCLAIMER	5
REFERENCES	6

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic Resonance Spectroscopy ⁽¹⁾

Magnetic resonance spectroscopy (MRS) is a noninvasive imaging technique which can be useful when conventional imaging (CT or MR) provides limited information regarding a specific clinical question. MRS is sensitive but not specific and results should be closely correlated with clinical history, physical examination, laboratory results, and diagnostic imaging studies. ⁽²⁾

INDICATIONS FOR BRAIN MRS ⁽²⁾

- For the evaluation of a recurrent or residual brain tumor from post-treatment changes, e.g., radiation necrosis ^(2,3,4)
- For further evaluation of a brain lesion to distinguish a brain tumor from other non-tumor diagnoses (e.g., abscess or other infectious or inflammatory process) ^(1,5)
- Suspected inherited metabolic disorders such as Canavan disease and primary mitochondrial disorders. ⁽⁶⁾ Can be done in combination with Brain MRI when not previously performed. ^(7,8)

CODING AND STANDARDS

Coding

CPT Codes

76390, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Magnetic resonance spectroscopy (MRS) determines the concentration of brain metabolites, such as N-acetylaspartate, choline, creatine, and lactate, within the body tissue examined. Radiofrequency waves are translated into biochemical composition of the scanned tissue; the resulting metabolic profile is useful in identifying brain tumors, e.g., differentiating neoplastic and non-neoplastic brain lesions. This modality should be considered as an adjunct to conventional imaging rather than replacement for histopathological evaluation.⁽⁹⁾ In terms of brain tumor evaluation and classification, carefully designed multi-center trials complying with criteria of evidence-based medicine have not yet been completed.⁽¹⁰⁾

Tumor Recurrence vs. Radiation Necrosis ⁽⁴⁾

Differentiation between recurrent brain tumors and treatment related injury, e.g., radiation necrosis, is difficult using conventional MRI. MRS is a quantitative approach, measuring various brain metabolic markers, to help in the differentiation of recurrent tumors vs. radiation necrosis.⁽³⁾ However, no consensus exists regarding the value of this in clinical decision making, and no approach has yet been validated to be sufficiently accurate.^(2,4)

Glioma ^(4,11)

MRS has been proposed for pre-operative grading of gliomas and differentiating high-grade gliomas (HGGs) from low-grade gliomas. It has been found to have moderate diagnostic value and should be combined with other advanced imaging techniques to improve accuracy. Currently, the data is limited; more research is needed for a definite conclusion for the utility of MRS for this indication. Therefore, it remains experimental/investigational.^(12,13)

Inherited Metabolic Conditions ⁽⁶⁾

Although Brain MRS may show abnormalities in many inherited metabolic conditions, primary mitochondrial disease, storage diseases and other neurometabolic disorders (including leukodystrophies), it's role in the diagnosis, prognosis, and management of most of these conditions is not well established by research and condition-specific guidelines. In a select few conditions MRS does have a more specific role in diagnosis and/or management

(primary mitochondrial disorders and Canavan disease). For most of these conditions, Brain MRS is considered Experimental/Investigational. In all cases, basic work-up should first be completed including appropriate family history for inheritance and specific labs related to the suspected condition.

MRS in other Diseases

A role for MRS has been suggested in the management of neurodegenerative disease, epilepsy, and stroke. MRS can also be applied in conjunction with MRI in the evaluation of traumatic brain injury and neonatal hypoxia-ischemia.^(14,15) However, to better define these roles, it will be necessary to standardize the MRS methodology, as well as the collection, analysis, and interpretation of data so it can be consistently translated to the applicable clinical settings. Currently, these potential applications remain experimental/investigational.⁽¹⁵⁾

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Update references and background. • Added Contraindications and preferred studies section. • Added pediatric metabolic disorders section.
May 2023	<ul style="list-style-type: none"> • Updated references • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Reddy V, Kummari S, Burra K, Das S. Accuracy of Proton Magnetic Resonance Spectroscopy in Distinguishing Neoplastic From Non-neoplastic Brain Lesions. *Cureus*. 2023; 15: e49824. 10.7759/cureus.49824.
2. American College of Radiology, American Society of Neuroradiology, Society for Pediatric Radiology. ACR–ASNR–SPR practice parameter for the performance and interpretation of magnetic resonance spectroscopy of the central nervous system. American College of Radiology. 2019; <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Spectroscopy.pdf>.
3. Chuang M T, Liu Y S, Tsai Y S, Chen Y C, Wang C. Differentiating Radiation-Induced Necrosis from Recurrent Brain Tumor Using MR Perfusion and Spectroscopy: A Meta-Analysis. *PLoS One*. 2016; 11: e0141438. 10.1371/journal.pone.0141438.
4. Weinberg B, Kuruva M, Shim H, Mullins M. Clinical Applications of Magnetic Resonance Spectroscopy in Brain Tumors: From Diagnosis to Treatment. *Radiologic clinics of North America*. 2021; 59: 349-362. 10.1016/j.rcl.2021.01.004.
5. Alshammari Q, Salih M, Gameraddin M, Yousef M, Abdelmalik B. Accuracy of Magnetic Resonance Spectroscopy in Discrimination of Neoplastic and Non-Neoplastic Brain Lesions. *Current medical imaging*. 2021; 17: 904-910. 10.2174/1573405617666210224112808.
6. Chinnery P. Primary Mitochondrial Disorders Overview. 2000 Jun 8 [Updated 2021 Jul 29]. *GeneReviews®* [Internet]. 2021; Accessed May 2024:
7. Liserre R, Pinelli L, Gasparotti R. MR spectroscopy in pediatric neuroradiology. *Translational pediatrics*. 2021; 10: 1169-1200. 10.21037/tp-20-445.
8. Lunsing R, Strating K, de Koning T, Sijens P. Diagnostic value of MRS-quantified brain tissue lactate level in identifying children with mitochondrial disorders. *European radiology*. 2017; 27: 976-984. 10.1007/s00330-016-4454-8.
9. Hellström J, Romanos Zapata R, Libard S, Wikström J, Ortiz-Nieto F et al. The value of magnetic resonance spectroscopy as a supplement to MRI of the brain in a clinical setting. *PLoS One*. 2018; 13: e0207336. 10.1371/journal.pone.0207336.
10. Horská A, Barker P. Imaging of brain tumors: MR spectroscopy and metabolic imaging. *Neuroimaging Clin N Am*. Aug 2010; 20: 293-310. 10.1016/j.nic.2010.04.003.
11. Galijasevic M, Steiger R, Mangesius S, Mangesius J, Kerschbaumer J et al. Magnetic Resonance Spectroscopy in Diagnosis and Follow-Up of Gliomas: State-of-the-Art. *Cancers*. 2022; 14: 3197. 10.3390/cancers14133197.
12. Abrigo J M, Fountain D M, Provenzale J M, Law E K, Kwong J S et al. Magnetic resonance perfusion for differentiating low-grade from high-grade gliomas at first presentation. *Cochrane Database Syst Rev*. 2018; 1: Cd011551. 10.1002/14651858.CD011551.pub2.
13. Wang Q, Zhang H, Zhang J, Wu C, Zhu W et al. The diagnostic performance of magnetic resonance spectroscopy in differentiating high-from low-grade gliomas: A systematic review and meta-analysis. *Eur Radiol*. 2016; 26: 2670-84. 10.1007/s00330-015-4046-z.
14. Blüml S, Saunders A, Tamrazi B. Proton MR Spectroscopy of Pediatric Brain Disorders. *Diagnostics (Basel, Switzerland)*. 2022; 12: 10.3390/diagnostics12061462.
15. Oz G, Alger J R, Barker P B, Bartha R, Bizzi A et al. Clinical proton MR spectroscopy in central nervous system disorders. *Radiology*. 2014; 270: 658-79. 10.1148/radiol.13130531.

EVOLENT CLINICAL GUIDELINE 063 FOR UNLISTED STUDY

Guideline or Policy Number: Evolut_CG_063	<u>Applicable Codes</u>	
<i>"Evolut" refers to Evolut Health LLC and Evolut Specialty Services, Inc.</i> <i>© 2013 - 2025 Evolut. All rights Reserved.</i>		
Original Date: September 2013	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
SPECIAL NOTE	2
INDICATIONS FOR UNLISTED MRI	2
Unlisted MRI (CPT Code 76498)	2
INDICATIONS FOR UNLISTED CT	3
Unlisted CT (CPT Code 76497)	3
CODING AND STANDARDS	4
CODING	4
CPT Codes	4
APPLICABLE LINES OF BUSINESS	4
BACKGROUND	4
CONTRAINDICATED AND PREFERRED STUDIES	4
POLICY HISTORY	5
Summary	5
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL	5
Committee	5
DISCLAIMER	5
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Whole Body Magnetic Resonance Imaging (MRI) generates images of the whole body (skull base to mid-thigh) without the use of ionizing radiation. It is used to evaluate for conditions where imaging of the whole body is needed such as certain genetic syndromes and rare diseases. MRI can also be used for radiation planning. CPT 76498 is used for either Whole Body MRI or radiation planning MRI.

Whole Body Low Dose Computed Tomography (CT) generates images of the whole skeleton and can be used when images of the entire skeletal system is needed such as for certain hematologic malignancies. CPT 76497 is used when Whole Body Low Dose CT is needed.

Special Note

When used for CT or MRI, another CPT code should be selected that describes the specific service being requested. This code is only to be used when there is not an existing CPT code to describe the requested imaging study. As there is no dedicated CPT code for whole body MRI or CT, the unlisted code is used when whole body imaging is needed rather than individual body part studies.

INDICATIONS FOR UNLISTED MRI

Unlisted MRI (CPT Code 76498)

CPT Code 76498, Unlisted MRI, can be used in the context of:

- Radiation treatment planning
- Whole Body MRI requests related to Rare Genetic Disease Screening as determined by professional society recommendations (not an all-inclusive list):

- Li-Fraumeni Syndrome (LFS), Annually, all ages^(1,2)
- Constitutional Mismatch Repair Deficiency (CMMRD) syndrome as clinically indicated
- Hereditary Retinoblastoma as clinically indicated
- Neurofibromatosis Type 1 as clinically indicated⁽³⁾
- Hereditary Paraganglioma-Pheochromocytoma (PGL/PCC) Syndrome (SDHx mutations) every 2 years⁽⁴⁾
- Rhabdoid Tumor Predisposition Syndrome (RTPS) at diagnosis and then at the following intervals:
 - Age 0-6 months: monthly
 - Age 7 months - 18 months: every 2 months when Brain and Spine MRI are not ordered
 - Age 19 months - 5 years: every 3 months when Brain and Spine MRI are not ordered
 - Age > 5 years: every 6 months
 - **NOTE:** between ages 7 months and 5 years, WB MRI may not be as reliable for the imaging the neuraxis and Brain and Spine MRI can be approved in lieu of WB MRI if requested. After age 5, the preferred surveillance imaging study is WB MRI.

Rhabdoid Tumor Predisposition Syndrome is rare and aggressive, thus frequent imaging is warranted.

Whole Body MRI using CPT 76498 is used for evaluation of the soft tissue and bone. For conditions where imaging of the bone marrow is needed (such as chronic recurrent multifocal osteomyelitis and smoldering/multiple myeloma), please see indications for Bone Marrow MRI (Evolent_CG_059).

INDICATIONS FOR UNLISTED CT

Unlisted CT (CPT Code 76497)

CPT Code 76497, Unlisted CT, can be used when imaging of the whole body is needed for certain hematologic malignancies:

- Low Dose Whole Body CT is indicated for the evaluation of the following conditions:
 - Multiple Myeloma - monoclonal proliferation of plasma cells with myeloma-defining CRAB (Calcium level elevation, Renal failure, Anemia, or Bone lesions) findings
 - Monoclonal Gammopathy of Undetermined Significance (MGUS) - monoclonal proliferation of plasma cells without myeloma-defining CRAB
 - Solitary Plasmacytoma - monoclonal plasma cells manifesting as a single tumor

- Smoldering Multiple Myeloma - monoclonal proliferation of plasma cells in bone marrow and/or serum/urine with abnormal levels of monoclonal protein (asymptomatic precursor state of MM)⁽⁵⁾
- Low Dose Whole Body CT for the **above conditions** is indicated at the following intervals:
 - Suspected Disease
 - Initial Staging of Known Disease
 - Restaging on Active Treatment
 - Surveillance
 - Annually if in asymptomatic
 - More frequent imaging as clinically indicated by signs/symptoms, laboratory, or radiographic concern for disease relapse or progression

CODING AND STANDARDS

Coding

CPT Codes

Unlisted CT - 76497, +0722T

Unlisted MRI - 76498, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindicated and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-

compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Clarified purpose of the guideline • Clarified the frequency and detail on why you would get an unlisted study • Whole Body MRI discussed and refer the user to Bone Marrow MRI guideline • Defined the points in time on when you would get the study • Reduced the background section • Added CPT Codes +0722T and +0698T per Clinical Informatics • Added Contraindications and Preferred Studies section in background
March 2023	<ul style="list-style-type: none"> • Updated background and references • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider



agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic Version 3.2024. National Comprehensive Cancer Network®. 2024; Accessed April 2024:
2. Schneider K, Zelle K, Nichols K, et al. Li-Fraumeni Syndrome. 1999 Jan 19 [Updated 2019 Nov 21]. GeneReviews® [Internet]. 2019; Accessed Feb 2024:
3. Friedman J. Neurofibromatosis 1. [Updated 2022 Apr 21]. GeneReviews® [Internet]. 2022; Accessed Feb 28, 2024:
4. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023; Accessed April 17, 2024:
5. Mateos M, Kumar S, Dimopoulos M, González-Calle V, Kastritis E S O R et al. International Myeloma Working Group risk stratification model for smoldering multiple myeloma (SMM). Blood cancer journal. 2020; 10: 102. 10.1038/s41408-020-00366-3.



EVOLENT CLINICAL GUIDELINE 105 FOR CT OR MRI GUIDANCE FOR NEEDLE PLACEMENT

Guideline or Policy Number: Evolent_CG_105	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2009 - 2025 Evolent. All rights Reserved.</i>		
Original Date: March 2009	Last Revised Date: June 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS.....	2
POLICY HISTORY	3
Summary	3
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER.....	3



STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

The CPT codes describe the CT or MRI “guidance” component of a diagnostic procedure. Requests for these services should always be approved. This organization does not review these for medical necessity.

CODING AND STANDARDS

Coding

CPT Codes

CT: 77011, 77012, 77013, 77014

MRI: 77021, 77022

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children’s Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
June 2024	<ul style="list-style-type: none">• No changes
April 2023	<ul style="list-style-type: none">• No changes

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.



EVOLENT CLINICAL GUIDELINE 023 FOR BREAST MRI

Guideline or Policy Number: Evolent_CG_023	Applicable Codes	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
<i>Breast MRI</i>	3
SPECIAL NOTE	3
<i>Legislative Requirements</i>	3
INDICATIONS	3
NO HISTORY OF KNOWN BREAST CANCER	4
<i>Dense Breast Tissue on Mammography</i>	4
<i>High-Risk Breast Cancer Screening</i>	4
<i>For Evaluation of Identified Lesion, Mass or Abnormality</i>	5
HISTORY OF KNOWN BREAST CANCER	6
<i>Staging, Treatment, and Surveillance</i>	6
SILICONE IMPLANTS.....	7
PRE AND POST PROCEDURAL EVALUATIONS.....	7
<i>Pre-Operative/Procedural Evaluation</i>	7
<i>Post-Operative/Procedural Evaluation</i>	7
PRIOR IMAGING.....	7
<i>Further Evaluation of Indeterminate Findings on Prior Imaging</i>	7
LEGISLATIVE REQUIREMENTS	8
STATE OF CONNECTICUT	8
<i>General Assembly 38a-530</i>	8
STATE OF ILLINOIS ⁽¹⁸⁾	8
<i>SB 0162</i>	8
STATE OF NORTH CAROLINA.....	8
<i>CCP 1K-1; 3.2.1(c)</i>	8
STATE OF OHIO.....	9
<i>HB 371</i>	9
COMMONWEALTH OF PENNSYLVANIA.....	9
<i>SB 8</i>	9

STATE OF WASHINGTON	11
<i>Health Technology Assessment 20100820A</i>	11
CODING AND STANDARDS	11
CODING	11
<i>CPT Codes</i>	11
APPLICABLE LINES OF BUSINESS.....	12
BACKGROUND	12
CONTRAINDICATION AND PREFERRED STUDIES.....	12
POLICY HISTORY	12
<i>Summary</i>	12
LEGAL AND COMPLIANCE	13
GUIDELINE APPROVAL	13
<i>Committee</i>	13
DISCLAIMER.....	13
REFERENCES	14

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Breast MRI

Magnetic resonance imaging (MRI) of the breast is a useful tool for the detection and characterization of breast disease, assessment of local extent of disease, evaluation of treatment response, and guidance for biopsy and localization. Breast MRI is typically bilateral to allow for assessment of symmetry between the breasts. MRI findings should be correlated with clinical history, physical examination, and the results of mammography and any other prior breast imaging.

NOTE: The age of a family member's diagnosis is **only** relevant for patients under the age of 40. Anyone 40 or over should be getting annual mammograms and breast MRIs if their lifetime risk is 20% or greater.

Special Note

Legislative Requirements

See Legislative Requirements for specific mandates in: [State of Connecticut](#); [State of Illinois](#); [State of North Carolina](#), [State of Ohio](#), [Commonwealth of Pennsylvania](#), [State of Washington](#).

INDICATIONS

For screening examination to detect breast cancer in any of the following situations. It is appropriate to perform screening breast MRI at routine intervals in patients at increased risk who are lactating.

Contrast-enhanced MRI is not recommended during pregnancy due to the trans-placental passage of gadolinium and potential concern for the exposure of the fetus to gadolinium.

No History of Known Breast Cancer

Dense Breast Tissue on Mammography

- Inconclusive screening mammogram when category 0 has been specifically assigned due to breast characteristics limiting the sensitivity of mammography (e.g., extremely or heterogeneously dense breast, implants obscure breast tissue)

High-Risk Breast Cancer Screening

- A Breast Cancer Risk Assessment (including the Breast Cancer Consortium Risk Model (BCSC) which incorporates breast density, the International Breast Cancer Intervention Study (IBIS)/ Tyrer-Cuzick model, the Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm model (BOADICEA), the modified Gail (also known as the Breast Cancer Risk assessment tool (BCRAT)) or other validated risk assessment models) that identifies the patient as having a lifetime risk of 20% or greater of developing breast cancer ⁽¹⁾
 - Approve annually beginning 10 years prior to youngest family member's age at diagnosis or at age 40, whichever comes first, but not before age 25 ^(2,3,4,5)
- Patients with lifetime risk of 20% or greater of developing breast cancer based on history of lobular neoplasia (LCIS/ALH (Lobular Carcinoma in Situ /Atypical Lobular Hyperplasia)) or ADH (atypical ductal hyperplasia)
 - Approve annually beginning at age of diagnosis of LCIS/ALH or ADH but not prior to age 25 ⁽²⁾
- Patients with intermediate lifetime risk (15%-20%) of developing breast cancer based on a history lobular neoplasia (LCIS/ALH (Lobular Carcinoma in Situ/Atypical Lobular Hyperplasia)) or ADH (atypical ductal hyperplasia)) AND have dense breast tissue on mammography
 - Approve annually beginning at age of diagnosis of LCIS/ALH or ADH but not prior to age 25 ^(2,6)
- Patients with history of extensive chest irradiation (usually as treatment for Hodgkin's or other lymphoma between ages ten and thirty)
 - Begin eight years after radiation, but not prior to age 25 ⁽²⁾
- Patients with known *BRCA* 1/2 mutation
 - Approve annually starting at age 25 ^(2,4)
- Patients not yet tested for *BRCA* gene, but with known *BRCA* mutation in first-degree relative
 - Approve annually starting at age 25 ^(2,4)
- Personal history of germline mutations known to predispose to a high risk of breast cancer: ⁽¹⁾
 - Li-Fraumeni syndrome (*TP53* mutation)

- Begin age 20-29 or age at earliest diagnosed breast cancer in family, if younger than age 20
- Cowden syndrome (*PTEN*) or Bannayan-Riley-Ruvalcaba syndrome (BRRS)
 - Begin age 35 or 10 years before earliest breast cancer diagnosis in family, whichever comes first (NCCN 2022)
- *ATM*
 - Begin age 30-35 years
- *BARD1*
 - Begin age 40
- *CDH1*
 - Begin age 30
- *CHEK2*
 - Begin age 30-35 years
- *NF1*
 - Begin age 30, end age 50 ⁽²⁾
- *PALB2*
 - Begin age 30
- Peutz-Jeghers Syndrome (*STK11*)
 - Begin age 30
- RAD51C
 - Begin age 40
- RAD51D
 - Begin age 40

For Evaluation of Identified Lesion, Mass or Abnormality

- Evaluation of suspected breast cancer when other imaging examinations, such as ultrasound and mammography, and physical examination are inconclusive for the presence of breast cancer, and biopsy could not be performed (e.g., seen only in single view mammogram without ultrasound correlation)
 - Includes skin changes of suspected inflammatory breast cancer if conventional imaging and skin biopsies are first performed and negative ⁽⁴⁾
- For evaluation of suspicious mass, lesion, distortion, or abnormality of the breast in patient with history of breast cancer when other imaging is inconclusive
- For cases of new nipple inversion when mammographic and sonographic findings are inconclusive, and a biopsy cannot be performed ⁽⁷⁾

- Patients diagnosed with biopsy-proven lobular neoplasia, i.e., LCIS/ALH (Lobular Carcinoma in Situ/Atypical Lobular Hyperplasia) or ADH (atypical ductal hyperplasia) ^(2,4,8)
- Spontaneous unilateral serous or bloody nipple discharge when conventional imaging is interpreted as BI-RADS 1-3 and there is no palpable mass thought to be related to the discharge ^(2,4)
- Paget's disease of the nipple: to detect underlying ductal carcinoma when conventional imaging is interpreted as BI-RADS 1-3 and there is no palpable mass ⁽⁴⁾
- For a phyllodes tumor diagnosed by biopsy, breast MRI may help determine extent of disease and resectability in selected cases. However routine use for surgical planning is controversial ^(9,10)
- Follow-up of a probably benign (BI-RADS 3) lesion seen only on prior MRI (when prior mammogram and ultrasound did not show the abnormality) ⁽¹¹⁾

History of Known Breast Cancer

Staging, Treatment, and Surveillance

- Yearly Surveillance for ^(3,4,12,13):
 - History of breast cancer and dense breast tissue on mammography
 - Individuals with personal history of breast cancer diagnosed before age 50
 - Patients with genetic or other risk factors placing them at high risk for a new cancer or recurrence
 - Individuals with a mammographically occult primary breast cancer
- For initial staging when conventional imaging is indeterminate in defining the extent of cancer, or presence of multifocal, multicentric, or contralateral cancer, or if there is a discrepancy in estimated tumor size between physical exam and imaging ^(2,4,8,14)
- For invasive lobular carcinoma that is poorly or inadequately defined by mammography, ultrasound, or physical exam ^(2,8,14)
- To identify primary cancer in a patient with axillary nodal adenocarcinoma and unidentified primary tumor ⁽²⁾
- Prior to treatment: To serve as a baseline for comparison prior to a patient starting planned neoadjuvant chemotherapy ⁽¹⁵⁾
- During or after treatment: To identify candidates for breast conserving therapy or evaluate response to treatment, including preoperative neoadjuvant therapy [within three (3) months] ⁽⁴⁾

Silicone Implants

- MRI is **not indicated** for evaluation of saline implant complications ⁽¹⁶⁾
- Confirmation of suspected silicone gel-filled breast implant ruptures in *asymptomatic* patients, after an abnormal or indeterminate finding on mammography or breast ultrasound
- MRI is considered the gold standard for evaluation of symptomatic silicone implant rupture. Prior imaging is not required in patients with silicone implants and symptoms of possible rupture ^(3,4,16).
- For postoperative evaluation of silicone breast implant complications when other imaging is inconclusive
- For evaluation of asymptomatic silicone implants, initial imaging 5-6 years after placement, with follow-up every 2-3 years after initial negative imaging ⁽¹⁶⁾
- As initial imaging to evaluate suspected silicone implant complications ⁽¹⁶⁾

Pre and Post Procedural Evaluations

Pre-Operative/Procedural Evaluation

- For preoperative evaluation for known breast cancer when surgery planned within thirty (30) days to be determined on a case-by-case basis ^(4,8)

Post-Operative/Procedural Evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested ^(3,13)

Prior Imaging

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

LEGISLATIVE REQUIREMENTS

State of Connecticut ⁽¹⁷⁾

General Assembly 38a-530

CT ST § 38a-530. Effective: October 1, 2020

- Coverage for breast MRI is mandated within the State of Connecticut without coinsurance, copay of more than \$20 deductible, or other out of pocket expenses for women with dense breast tissue if the woman is believed to be at increased risk of breast cancer because of family or personal history of breast cancer, positive genetic testing. Coverage is also mandated for other indications determined by a woman's physician, or when screening is recommended by a physician and the woman is over age 40, has a family or prior history of breast cancer or has breast disease diagnosed through biopsy as benign. This applies to high deductible plans unless plans are used to establish an HRA or HSA to the extent permitted by federal law. Though not designated in the original intent of the bill, language includes the above provisions and criteria for breast MRI.

State of Illinois ⁽¹⁸⁾

SB 0162

Commercial, Exchange, and Medicaid

- MRI of the entire breast or breasts is approvable for individuals 35 years or older
 - if a mammogram demonstrates heterogenous or dense breast tissue **OR**
 - when determined medically necessary by a physician licensed to practice medicine in all of its branches
- Screening breast MRI approvable when determined medically necessary by a physician licensed to practice medicine in all of its branches

State of North Carolina ⁽¹⁹⁾

CCP 1K-1; 3.2.1(c)

Medicaid and NCHC cover magnetic resonance imaging (MRI) for the detection of:

- Breast cancer in beneficiaries who are at a high genetic risk for breast cancer:
 - known BRCA 1 or 2 mutation in beneficiary;
 - known BRCA 1 or 2 mutation in relatives; or
 - pattern of breast cancer history in multiple first-degree relatives, often at a young age and bilaterally.

- Breast cancer in beneficiaries who have breast characteristics limiting the sensitivity of mammography (such as dense breasts, implants, scarring after treatment for breast cancer).
- A suspected occult breast primary tumor in beneficiaries with axillary nodal adenocarcinoma with negative mammography and clinical breast exam.
- Breast cancer in beneficiaries with a new diagnosis of breast cancer. It can be used to determine the extent of the known cancer and/or to detect disease in the contralateral breast.
- To evaluate implant integrity in beneficiaries with breast implants.

State of Ohio ⁽²⁰⁾

HB 371

Medicaid

- Section 1 (A)(3): "Supplemental breast cancer screening" means any additional screening method deemed medically necessary by a treating health care provider for proper breast cancer screening in accordance with applicable American college of radiology guidelines, including magnetic resonance imaging, ultrasound, or molecular breast imaging.
- Section 1 (C)(2) The benefits provided under division (B)(2) of this section shall cover expenses for supplemental breast cancer screening for an adult woman who meets either of the following conditions:
 - (a) The woman's screening mammography demonstrates, based on the breast imaging reporting and data system established by the American college of radiology, that the woman has dense breast tissue;
 - (b) The woman is at an increased risk of breast cancer due to family history, prior personal history of breast cancer, ancestry, genetic predisposition, or other reasons as determined by the woman's health care provider.

Commonwealth of Pennsylvania ⁽²¹⁾

SB 8

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:
Section 632 - Coverage for Mammographic Examinations and [Diagnostic] Breast Imaging and of the act of May 17, 1921 (P.L.682, No.284), known as The Insurance Company Law of 1921.

- A group or individual health or sickness or accident insurance policy providing hospital or medical/surgical coverage and a group or individual subscriber contract or certificate issued by any entity subject to 40 Pa.C.S. Ch. 61 or 63, this act, the "Health Maintenance Organization Act," the "Fraternal Benefit Society Code" or an

employee welfare benefit plan as defined in section 3 of the Employee Retirement Income Security Act of 1974 providing hospital or medical/surgical coverage shall also provide coverage for breast imaging.

- The minimum coverage required shall include
 - supplemental magnetic resonance imaging or, if such imaging is not possible, ultrasound if recommended by the treating physician
 - all costs associated with one supplemental breast screening every year because the woman is believed to be at an increased risk of breast cancer due to:
 - personal history of atypical breast histologies
 - personal history or family history of breast cancer
 - genetic predisposition for breast cancer
 - prior therapeutic thoracic radiation therapy
 - heterogeneously dense breast tissue based on breast composition categories of the Breast Imaging and Reporting Data System established by the American College of Radiology with any one of the following risk factors
 - ◆ lifetime risk of breast cancer of greater than 20%, according to risk assessment tools based on family history;
 - ◆ personal history of BRCA1 or BRCA2 gene mutations;
 - ◆ first-degree relative with a BRCA1 or BRCA2 gene mutation but not having had genetic testing herself;
 - ◆ prior therapeutic thoracic radiation therapy between 10 and 30 years of age; or
 - ◆ personal history of Li-Fraumeni syndrome, Cowden syndrome or Bannayan-Riley-Ruvalcaba syndrome or a first-degree relative with one of these syndromes; or
 - ◆ extremely dense breast tissue based on breast composition (categories of the Breast Imaging and Reporting Data System established by the American College of Radiology)
- Nothing in this subsection shall be construed to require an insurer to cover the surgical procedure known as mastectomy or to prevent the application of deductible, copayment or coinsurance provisions contained in the policy or plan.
- Nothing in this subsection shall be construed as to preclude utilization review as provided under Article XXI of this act or to prevent the application of deductible, copayment or coinsurance provisions contained in the policy or plan for breast imaging in excess of the minimum coverage required.
- As used in this section: "Supplemental breast screening" means a medically necessary and clinically appropriate examination of the breast using either standard or abbreviated magnetic resonance imaging or, if such imaging is not possible,

ultrasound if recommended by the treating physician to screen for breast cancer when there is no abnormality seen or suspected in the breast.

State of Washington ⁽²²⁾

Health Technology Assessment 20100820A

Number and Coverage Topic

20100820A – Breast MRI

HTCC Coverage Determination

Breast MRI is a **covered benefit with conditions** consistent with the criteria identified in the reimbursement determination.

HTCC Reimbursement Determination

- Limitations of Coverage
- Breast MRI is a covered benefit for screening for breast cancer, with a minimum of 11 months between screenings in women at high risk of breast cancer. Women at high risk are defined as:
 - A personal history or strong family history of breast cancer;
 - A genetic mutation of BRCA 1, BRCA2, TP53 or PTEN genes (Li-Fraumeni syndrome and Cowden and Bannayan-Riley-Ruvalcaba syndromes);
 - GAIL model lifetime cancer risk of 20% or higher; or
 - History of radiation treatment to the chest between ages 10 and 30, such as for Hodgkin's disease.
- Non-Covered Indicators
 - N/A

CODING AND STANDARDS

Coding

CPT Codes

77046, 77047, 77048, 77049, +0698T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Updated references • Added new guidance on silicone implant monitoring • Legislative language updated/adjusted • Moved background section to purpose • Added in Contraindications and Preferred Studies section to Background • Added Legislative Language for Washington
May 2023	<ul style="list-style-type: none"> • Updated background • Updated references • Added dense breast to indications for breast MRI • Change screening ages based on society recommendations for high-risk conditions • Added language regarding lactating and pregnant patients • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic Version 3.2024. 2024.
2. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Breast Cancer Screening and Diagnosis Version 2.2024. 2024.
3. American College of Radiology. ACR practice parameter for the performance of contrast-enhanced magnetic resonance imaging (MRI) of the breast. 2023.
4. American Society of Breast Surgeons. Consensus Guideline on Diagnostic and Screening Magnetic Resonance Imaging of the Breast. 2018.
5. American College of Radiology. ACR Appropriateness Criteria: Transgender Breast Cancer Screening. Journal of the American College of Radiology. 2021; 18: S502 - S515. 10.1016/j.jacr.2021.09.005.
6. American College of Radiology. ACR Appropriateness Criteria: Supplemental Breast Cancer Screening Based on Breast Density. Journal of the American College of Radiology. 2021; 18: S456 - S473. 10.1016/j.jacr.2021.09.002.
7. Del Riego J, Pitarch M, Codina C, Nebot L, Andreu F et al. Multimodality approach to the nipple-areolar complex: a pictorial review and diagnostic algorithm. Insights Imaging. Aug 5, 2020; 11: 89. 10.1186/s13244-020-00896-1.
8. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Breast Cancer Version 2.2024. 2024.
9. Li X, Guo H, Cong C, Liu H, Zhang C et al. The Potential Value of Texture Analysis Based on Dynamic Contrast-Enhanced MR Images in the Grading of Breast Phyllode Tumors. Front Oncol. 2021; 11: 745242. 10.3389/fonc.2021.745242.
10. Ma W, Guo X, Liu L, Qi L, Liu P et al. Magnetic resonance imaging semantic and quantitative features analyses: an additional diagnostic tool for breast phyllodes tumors. Am J Transl Res. 2020; 12: 2083-2092.
11. Spick C, Bickel H, Polanec S, Baltzer P. Breast lesions classified as probably benign (BI-RADS 3) on magnetic resonance imaging: a systematic review and meta-analysis. Eur Radiol. May 2018; 28: 1919-1928. 10.1007/s00330-017-5127-y.
12. Park V, Kim E, Kim M, Moon H, Yoon J. Breast magnetic resonance imaging for surveillance of women with a personal history of breast cancer: outcomes stratified by interval between definitive surgery and surveillance MR imaging. BMC Cancer. Jan 22, 2018; 18: 91. 10.1186/s12885-018-3998-1.
13. American College of Radiology. ACR Appropriateness Criteria® Imaging after Breast Surgery. 2022.
14. American College of Radiology. ACR Appropriateness Criteria: Imaging of Invasive Breast Cancer. 2023.
15. American College of Radiology. ACR Appropriateness Criteria: Monitoring Response to Neoadjuvant Systemic Therapy for Breast Cancer: 2022 Update. Journal of the American College of Radiology. 2023; 20: S125 - S145. 10.1016/j.jacr.2023.02.016.
16. American College of Radiology. ACR Appropriateness Criteria: Breast Implant Evaluation: 2023 Update. Journal of the American College of Radiology. 2023; 20: S329 - S350. 10.1016/j.jacr.2023.08.019.

17. Connecticut General Assembly. Connecticut General Assembly: § 38a-530. Mandatory coverage for mammography, breast ultrasound and magnetic resonance imaging. 2022:

18. Illinois General Assembly. Illinois General Assembly. Senate Bill 0162: 215 ILCS 5/356g (a)(4); 215 ILCS 125/4-6.1 (a)(4); and 305 ILCS 5/5-5 (D)(E). Effective date January 1, 2020. 2022:

19. NC Medicaid Division of Health Benefits. NC Medicaid Division of Health Benefits. Breast Imaging Procedures. Clinical Coverage Policy No: 1K-1; 3.2.1(c). Breast Magnetic Resonance Imaging. Accessed November 20, 2022.

20. Ohio General Assembly. House Bill Number 371 (Amendment). Section 1: (a)3;(C)(2)(a);(C)(2)(b). Effective September 23, 2022.

21. Pennsylvania G A o. The General Assembly of Pennsylvania Senate Bill No. 8 Session of 2023. May 1, 2023; 2023:

22. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: Health Technology Assessment 20100820A - Breast MRI. [Final Adoption: October 22nd, 2010]. 2010; https://www.hca.wa.gov/assets/program/adopted_findings_decision_bmri_102510 [1].pdf.

*Evolut	
Clinical guidelines BREAST MRI	Original Date: September 1997
CPT Codes: Unilateral without contrast 77046 Bilateral without contrast 77047 Unilateral without and with contrast 77048 Bilateral without and with contrast 77049 +0698T	Last Revised Date: May 2023
Guideline Number: Evolut_CG_023	Implementation Date: January 2024

GENERAL INFORMATION

- It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR BREAST MRI

See [Legislative Requirements](#) for specific mandates in: Commonwealth of Pennsylvania; State of Connecticut; State of Illinois; State of North Carolina, State of Ohio

NO HISTORY OF KNOWN BREAST CANCER⁺

Dense breast tissue on mammography

- Inconclusive screening mammogram when category 0 has been specifically assigned due to breast characteristics limiting the sensitivity of mammography (e.g., extremely or heterogeneously dense breast, implants obscure breast tissue)

High risk screening breast MRI

- A Breast Cancer Risk Assessment (including the Breast Cancer Consortium Risk Model (BCSC) which incorporates breast density, the International Breast Cancer Intervention Study (IBIS)/

Tyrer-Cuzick model, the Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm model (BOADICEA), the modified Gail (also known as the Breast Cancer Risk assessment tool (BCRAT)) or other validated risk assessment models) that identifies the patient as having a lifetime risk of 20% or greater of developing breast cancer¹

- Approve annually beginning 10 years prior to youngest family member's age at diagnosis or at age 40, whichever comes first, but not before age 25²⁻⁶
- Patients with lifetime risk of 20% or greater of developing breast cancer based on history of lobular neoplasia (LCIS/ALH (Lobular Carcinoma in Situ /Atypical Lobular Hyperplasia)) or ADH (atypical ductal hyperplasia)
 - Approve annually beginning at age of diagnosis of LCIS/ALH or ADH but not prior to age 25²
- Patients with intermediate lifetime risk (15%-20%) of developing breast cancer based on a history lobular neoplasia (LCIS/ALH (Lobular Carcinoma in Situ /Atypical Lobular Hyperplasia)) or ADH (atypical ductal hyperplasia)) AND have dense breast tissue on mammography
 - Approve annually beginning at age of diagnosis of LCIS/ALH or ADH but not prior to age 25^{2, 7, 8}
- Patients with history of extensive chest irradiation (usually as treatment for Hodgkin's or other lymphoma between ages ten and thirty)
 - Begin eight years after radiation, but not prior to age 25²
- Patients with known *BRCA 1/2* mutation
 - Approve annually starting at age 25^{2, 3}
- Patients not yet tested for *BRCA* gene, but with known *BRCA* mutation in first-degree relative
 - Approve annually starting at age 25^{2, 3}
- Personal history of germline mutations known to predispose to a high risk of breast cancer:¹
 - Li-Fraumeni syndrome (*TP53* mutation)
 - Begin age 20-29 or age at earliest diagnosed breast cancer in family, if younger than age 20
 - Cowden syndrome (*PTEN*) or Bannayan-Riley-Ruvalcaba syndrome (BRRS)
 - Begin age 35 or 10 years before earliest breast cancer diagnosis in family, whichever comes first (NCCN 2022)
 - *ATM*
 - Begin age 30-35 years
 - *BARD1*
 - Begin age 40
 - *CDH1*
 - Begin age 30
 - *CHEK2*
 - Begin age 30-35 years
 - *NF1*
 - Begin age 30, end age 50²
 - *PALB2*
 - Begin age 30

- Peutz-Jeghers Syndrome (*STK11*)
 - Begin age 30
- RAD51C
 - Begin age 40
- RAD51D
 - Begin age 40

⁺For screening examination to detect breast cancer in any of the following situations. It is appropriate to perform screening breast MRI at routine intervals in patients at increased risk who are lactating.

Contrast-enhanced MRI is not recommended during pregnancy due to the trans-placental passage of gadolinium and potential concern for the exposure of the fetus to gadolinium.

For evaluation of identified lesion, mass, or abnormality in breast in any of the following situations

- Evaluation of suspected breast cancer when other imaging examinations, such as ultrasound and mammography, and physical examination are inconclusive for the presence of breast cancer, and biopsy could not be performed (e.g., seen only in single view mammogram without ultrasound correlation)
 - Includes skin changes of suspected inflammatory breast cancer if conventional imaging and skin biopsies are first performed and negative^{3, 9, 10}
- For evaluation of suspicious mass, lesion, distortion, or abnormality of the breast in patient with history of breast cancer when other imaging is inconclusive
- For cases of new nipple inversion when mammographic and sonographic findings are inconclusive, and a biopsy cannot be performed¹¹⁻¹³
- Patients diagnosed with biopsy-proven lobular neoplasia, i.e., LCIS/ALH (Lobular Carcinoma in Situ /Atypical Lobular Hyperplasia) or ADH (atypical ductal hyperplasia)^{2, 3, 14, 15}
- Spontaneous unilateral serous or bloody nipple discharge when conventional imaging is interpreted as BI-RADS 1-3 and there is no palpable mass thought to be related to the discharge^{2, 3, 16}
- Paget's disease of the nipple: to detect underlying ductal carcinoma when conventional imaging is interpreted as BI-RADS 1-3 and there is no palpable mass³
- For a phyllodes tumor diagnosed by biopsy, breast MRI may help determine extent of disease and resectability in selected cases. However routine use for surgical planning is controversial¹⁷⁻¹⁹
- Follow-up of a probably benign (BI-RADS 3) lesion seen only on prior MRI (when prior mammogram and ultrasound did not show the abnormality)²⁰⁻²²

HISTORY OF KNOWN BREAST CANCER

- Yearly surveillance for history of breast cancer and dense breast tissue on mammography⁴
- Yearly surveillance for individuals with personal history of breast cancer diagnosed before age 50⁴

- Yearly surveillance in patients with genetic or other risk factors placing them at high risk for a new cancer or recurrence^{3, 23}
- Yearly surveillance for individuals with a mammographically occult primary breast cancer²⁴.

Staging, treatment, and surveillance of patients with a known history of Breast Cancer

- Approve for initial staging when conventional imaging is indeterminate in defining the extent of cancer, or presence of multifocal, multicentric, or contralateral cancer, or if there is a discrepancy in estimated tumor size between physical exam and imaging^{2, 3, 14}
- For invasive lobular carcinoma that is poorly or inadequately defined by mammography, ultrasound, or physical exam^{2, 14}
- To identify primary cancer in a patient with axillary nodal adenocarcinoma and unidentified primary tumor²
- Prior to treatment: To serve as a baseline for comparison prior to a patient starting planned neoadjuvant chemotherapy²⁵
During or after treatment: To identify candidates for breast conserving therapy or evaluate response to treatment, including preoperative neoadjuvant therapy [within three (3) months]³

Silicone Implants

MRI is not indicated for evaluation of saline implant complications or for asymptomatic silicone implants.^{4, 26}

- Confirmation of suspected silicone gel-filled breast implant ruptures in *asymptomatic* patients, after an abnormal or indeterminate finding on mammography or breast ultrasound
- MRI is considered the gold standard for evaluation of symptomatic silicone implant rupture.^{3, 4} Prior imaging is not required in patients with silicone implants and symptoms of possible rupture.
- For postoperative evaluation of silicone breast implant complications when other imaging is inconclusive

Pre-operative

- For preoperative evaluation for known breast cancer when surgery planned within thirty (30) days to be determined on a case-by-case basis^{3, 14, 27, 28}

Post-operative/procedural evaluation

A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested⁴

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

LEGISLATIVE REQUIREMENTS

- **Commonwealth of Pennsylvania**
 - The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows: Section 632 - Coverage for Mammographic Examinations and [Diagnostic] Breast Imaging and of the act of May 17, 1921 (P.L.682, No.284), known as The Insurance Company Law of 1921.
 - A group or individual health or sickness or accident insurance policy providing hospital or medical/surgical coverage and a group or individual subscriber contract or certificate issued by any entity subject to 40 Pa.C.S. Ch. 61 or 63, this act, the "Health Maintenance Organization Act," the "Fraternal Benefit Society Code" or an employee welfare benefit plan as defined in section 3 of the Employee Retirement Income Security Act of 1974 providing hospital or medical/surgical coverage shall also provide coverage for breast imaging.
 - The minimum coverage required shall include
 - supplemental magnetic resonance imaging or, if such imaging is not possible, ultrasound if recommended by the treating physician
 - all costs associated with one supplemental breast screening every year because the woman is believed to be at an increased risk of breast cancer due to:
 - personal history of atypical breast histologies
 - personal history or family history of breast cancer
 - genetic predisposition for breast cancer
 - prior therapeutic thoracic radiation therapy
 - heterogeneously dense breast tissue based on breast composition categories of the Breast Imaging and Reporting Data System established by the American College of Radiology with any one of the following risk factors
 - lifetime risk of breast cancer of greater than 20%, according to risk assessment tools based on family history;
 - personal history of BRCA1 or BRCA2 gene mutations;

- first-degree relative with a BRCA1 or BRCA2 gene mutation but not having had genetic testing herself;
 - prior therapeutic thoracic radiation therapy between 10 and 30 years of age; or
 - personal history of Li-Fraumeni syndrome, Cowden syndrome or Bannayan-Riley-Ruvalcaba syndrome or a first-degree relative with one of these syndromes; or
 - extremely dense breast tissue based on breast composition (categories of the Breast Imaging and Reporting Data System established by the American College of Radiology)
- Nothing in this subsection shall be construed to require an insurer to cover the surgical procedure known as mastectomy or to prevent the application of deductible, copayment or coinsurance provisions contained in the policy or plan.
- Nothing in this subsection shall be construed as to preclude utilization review as provided under Article XXI of this act or to prevent the application of deductible, copayment or coinsurance provisions contained in the policy or plan for breast imaging in excess of the minimum coverage required.
- As used in this section: "Supplemental breast screening" means a medically necessary and clinically appropriate examination of the breast using either standard or abbreviated magnetic resonance imaging or, if such imaging is not possible, ultrasound if recommended by the treating physician to screen for breast cancer when there is no abnormality seen or suspected in the breast.

Source: Pennsylvania General Assembly, Senate Bill 8, Amended May 01, 2023²⁹

- **State of Connecticut**

- CT ST § 38a-530. Effective: October 1, 2020
 - Coverage for breast MRI is mandated within the State of Connecticut without coinsurance, copay of more than \$20 deductible, or other out of pocket expenses for women with dense breast tissue if the woman is believed to be at increased risk of breast cancer because of family or personal history of breast cancer, positive genetic testing. Coverage is also mandated for other indications determined by a woman's physician, or when screening is recommended by a physician and the woman is over age 40, has a family or prior history of breast cancer or has breast disease diagnosed through biopsy as benign. This applies to high deductible plans unless plans are used to establish an HRA or HSA to the extent permitted by federal law. Though not designated in the original intent of the bill, language includes the above provisions and criteria for breast MRI.
- Source: Connecticut General Assembly³⁰

- **State of North Carolina**

- Medicaid and NCHC cover magnetic resonance imaging (MRI) for the detection of:
 - Breast cancer in beneficiaries who are at a high genetic risk for breast cancer:
 - known BRCA 1 or 2 mutation in beneficiary;
 - known BRCA 1 or 2 mutation in relatives; or
 - pattern of breast cancer history in multiple first-degree relatives, often at a young age and bilaterally.
 - Breast cancer in beneficiaries who have breast characteristics limiting the sensitivity of mammography (such as dense breasts, implants, scarring after treatment for breast cancer).
 - A suspected occult breast primary tumor in beneficiaries with axillary nodal adenocarcinoma with negative mammography and clinical breast exam.
 - Breast cancer in beneficiaries with a new diagnosis of breast cancer. It can be used to determine the extent of the known cancer and/or to detect disease in the contralateral breast.
 - To evaluate implant integrity in beneficiaries with breast implants.
- Source: NC Medicaid³¹; amended September 15, 2020

- **State of Illinois**

Commercial, Exchange, and Medicaid

- MRI of the entire breast or breasts is approvable for individuals 35 years or older
 - if a mammogram demonstrates heterogenous or dense breast tissue **OR**
 - when determined medically necessary by a physician licensed to practice medicine in all of its branches
- Screening breast MRI approvable when determined medically necessary by a physician licensed to practice medicine in all of its branches

Source: Illinois General Assembly

[Illinois General Assembly - Full Text of SB0162 \(ilga.gov\)](#)³²

- **State of Ohio**

Medicaid

- Section 1 (A)(3): "Supplemental breast cancer screening" means any additional screening method deemed medically necessary by a treating health care provider for proper breast cancer screening in accordance with applicable American college of radiology guidelines, including magnetic resonance imaging, ultrasound, or molecular breast imaging.
- Section 1 (C)(2) The benefits provided under division (B)(2) of this section shall cover expenses for supplemental breast cancer screening for an adult woman who meets either of the following conditions:

- **State of North Carolina**

- Medicaid and NCHC cover magnetic resonance imaging (MRI) for the detection of:
 - Breast cancer in beneficiaries who are at a high genetic risk for breast cancer:
 - known BRCA 1 or 2 mutation in beneficiary;
 - known BRCA 1 or 2 mutation in relatives; or
 - pattern of breast cancer history in multiple first-degree relatives, often at a young age and bilaterally.
 - Breast cancer in beneficiaries who have breast characteristics limiting the sensitivity of mammography (such as dense breasts, implants, scarring after treatment for breast cancer).
 - A suspected occult breast primary tumor in beneficiaries with axillary nodal adenocarcinoma with negative mammography and clinical breast exam.
 - Breast cancer in beneficiaries with a new diagnosis of breast cancer. It can be used to determine the extent of the known cancer and/or to detect disease in the contralateral breast.
 - To evaluate implant integrity in beneficiaries with breast implants.
- Source: NC Medicaid³¹; amended September 15, 2020

- **State of Illinois**

Commercial, Exchange, and Medicaid

- MRI of the entire breast or breasts is approvable for individuals 35 years or older
 - if a mammogram demonstrates heterogenous or dense breast tissue **OR**
 - when determined medically necessary by a physician licensed to practice medicine in all of its branches
- Screening breast MRI approvable when determined medically necessary by a physician licensed to practice medicine in all of its branches

Source: Illinois General Assembly

[Illinois General Assembly - Full Text of SB0162 \(ilga.gov\)](#)³²

- **State of Ohio**

Medicaid

- Section 1 (A)(3): "Supplemental breast cancer screening" means any additional screening method deemed medically necessary by a treating health care provider for proper breast cancer screening in accordance with applicable American college of radiology guidelines, including magnetic resonance imaging, ultrasound, or molecular breast imaging.
- Section 1 (C)(2) The benefits provided under division (B)(2) of this section shall cover expenses for supplemental breast cancer screening for an adult woman who meets either of the following conditions:

- (a) The woman's screening mammography demonstrates, based on the breast imaging reporting and data system established by the American college of radiology, that the woman has dense breast tissue;
- (b) The woman is at an increased risk of breast cancer due to family history, prior personal history of breast cancer, ancestry, genetic predisposition, or other reasons as determined by the woman's health care provider.

Source: Ohio General Assembly – HB 371³³
[AM 134 3269-1 \(state.oh.us\)](#)

BACKGROUND

Magnetic resonance imaging (MRI) of the breast is a useful tool for the detection and characterization of breast disease, assessment of local extent of disease, evaluation of treatment response, and guidance for biopsy and localization.³⁴ Breast MRI should always be bilateral to allow for assessment of symmetry between the breasts. MRI findings should be correlated with clinical history, physical examination, and the results of mammography and any other prior breast imaging.

OVERVIEW

MRI and risk evaluation – The age of a family member's diagnosis is **only** relevant for patients under the age of 40. Anyone 40 or over should be getting annual mammograms and breast MRIs if their lifetime risk is 20% or greater.

Nipple discharge – Nipple discharge is a common complaint with at least 80% of women having at least 1 episode. Discharge that is considered pathologic is unilateral, spontaneous, from one duct orifice and serous or bloody. Physiologic discharge will be bilateral, from multiple ducts, and white, green, or yellow in color. "In general, MRI may be considered in cases in which **mammography and US** have failed to identify an underlying cause of pathologic nipple discharge. The sensitivities of breast MRI for detecting the cause of the pathologic nipple discharge are 86% to 100% for invasive cancer and 40% to 100% for noninvasive disease".³⁵ Ductography (galactography) has the ability to demonstrate small lesions in the specific duct that is secreting the pathologic nipple discharge. However, it is invasive and may cause discomfort and pain. It can be time-consuming and technically challenging and the rate of inadequate or incomplete ductography is as high as 15%. The discharge must be present on the day of the study so that a cannula can be placed in the appropriate duct. Failure to cannulate the discharging duct may occur and cannulation of the wrong duct may cause a false-negative ductogram.³⁵

REFERENCES

1. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic Version 2.2023. National Comprehensive Cancer Network (NCCN). Updated January 10, 2023. Accessed January 19, 2023. https://www.nccn.org/professionals/physician_gls/pdf/genetics_bop.pdf
2. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Breast Cancer Screening and Diagnosis Version 1.2022. National Comprehensive Cancer Network (NCCN). Updated June 2, 2022. Accessed November 20, 2022. https://www.nccn.org/professionals/physician_gls/pdf/breast-screening.pdf
3. Consensus Guideline on Diagnostic and Screening Magnetic Resonance Imaging of the Breast. American Society of Breast Surgeons (ASBrS). Updated June 22, 2017. Accessed December 17, 2021. June 22, 2017
4. ACR practice parameter for the performance of contrast-enhanced magnetic resonance imaging (MRI) of the breast. American College of Radiology. Updated 2018. Accessed November 20, 2022. <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/mr-contrast-breast.pdf>
5. Levitan D. Which Breast Cancer Risk Models Are Most Accurate? Cancer Network. Updated February 27, 2019. Accessed November 20, 2022. <https://www.cancernetwork.com/view/which-breast-cancer-risk-models-are-most-accurate>
6. Marino MA, Riedl CC, Bernathova M, et al. Imaging Phenotypes in Women at High Risk for Breast Cancer on Mammography, Ultrasound, and Magnetic Resonance Imaging Using the Fifth Edition of the Breast Imaging Reporting and Data System. *Eur J Radiol*. Sep 2018;106:150-159. doi:10.1016/j.ejrad.2018.07.026
7. Feldman L, Babagbemi K. Patient-Friendly Summary of the ACR Appropriateness Criteria: Supplemental Breast Cancer Screening Based on Breast Density. *J Am Coll Radiol*. May 2022;19(5):e29. doi:10.1016/j.jacr.2022.02.008
8. Expert Panel on Breast I, Weinstein SP, Slanetz PJ, et al. ACR Appropriateness Criteria(®) Supplemental Breast Cancer Screening Based on Breast Density. *J Am Coll Radiol*. Nov 2021;18(11S):S456-S473. doi:10.1016/j.jacr.2021.09.002
9. Giess CS, Chikarmane SA, Sippo DA, Birdwell RL. Clinical Utility of Breast MRI in the Diagnosis of Malignancy After Inconclusive or Equivocal Mammographic Diagnostic Evaluation. *AJR Am J Roentgenol*. Jun 2017;208(6):1378-1385. doi:10.2214/ajr.16.16751
10. Yadav P, Chauhan S. Effectivity of combined diffusion-weighted imaging and contrast-enhanced MRI in malignant and benign breast lesions. *Pol J Radiol*. 2018;83:e82-e93. doi:10.5114/pjr.2018.74363
11. Killelea B, Snowden M. Nipple inversion. Wolters Kluwer. Updated February 16, 2022. Accessed November 20, 2022. <https://www.uptodate.com/contents/nipple-inversion>
12. Del Riego J, Pitarch M, Codina C, et al. Multimodality approach to the nipple-areolar complex: a pictorial review and diagnostic algorithm. *Insights Imaging*. Aug 5 2020;11(1):89. doi:10.1186/s13244-020-00896-1
13. Geffroy D, Doutriaux-Dumoulins I. Clinical abnormalities of the nipple-areola complex: The role of imaging. *Diagn Interv Imaging*. Oct 2015;96(10):1033-44. doi:10.1016/j.diii.2015.07.001

14. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Breast Cancer Version 4.2022. National Comprehensive Cancer Network (NCCN). Updated June 21, 2022. Accessed November 20, 2022. https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf
15. Monticciolo DL, Newell MS, Moy L, Niell B, Monsees B, Sickles EA. Breast Cancer Screening in Women at Higher-Than-Average Risk: Recommendations From the ACR. *J Am Coll Radiol*. Mar 2018;15(3 Pt A):408-414. doi:10.1016/j.jacr.2017.11.034
16. Bahl M, Baker JA, Greenup RA, Ghatge SV. Evaluation of Pathologic Nipple Discharge: What is the Added Diagnostic Value of MRI? *Ann Surg Oncol*. Dec 2015;22 Suppl 3:S435-41. doi:10.1245/s10434-015-4792-9
17. Grau AM, Chakravarthy AB, Chugh R. Phyllodes tumors of the breast. Wolters Kluwer. Updated July 14, 2021. Accessed December 20, 2022. <https://www.uptodate.com/contents/phyllodes-tumors-of-the-breast>
18. Li X, Guo H, Cong C, et al. The Potential Value of Texture Analysis Based on Dynamic Contrast-Enhanced MR Images in the Grading of Breast Phyllode Tumors. *Front Oncol*. 2021;11:745242. doi:10.3389/fonc.2021.745242
19. Ma W, Guo X, Liu L, et al. Magnetic resonance imaging semantic and quantitative features analyses: an additional diagnostic tool for breast phyllodes tumors. *Am J Transl Res*. 2020;12(5):2083-2092.
20. Lee KA, Talati N, Oudsema R, Steinberger S, Margolies LR. BI-RADS 3: Current and Future Use of Probably Benign. *Curr Radiol Rep*. 2018;6(2):5-5. doi:10.1007/s40134-018-0266-8
21. Panigrahi B, Harvey SC, Mullen LA, et al. Characteristics and Outcomes of BI-RADS 3 Lesions on Breast MRI. *Clin Breast Cancer*. Feb 2019;19(1):e152-e159. doi:10.1016/j.clbc.2018.08.011
22. Spick C, Bickel H, Polanec SH, Baltzer PA. Breast lesions classified as probably benign (BI-RADS 3) on magnetic resonance imaging: a systematic review and meta-analysis. *Eur Radiol*. May 2018;28(5):1919-1928. doi:10.1007/s00330-017-5127-y
23. Park VY, Kim EK, Kim MJ, Moon HJ, Yoon JH. Breast magnetic resonance imaging for surveillance of women with a personal history of breast cancer: outcomes stratified by interval between definitive surgery and surveillance MR imaging. *BMC Cancer*. Jan 22 2018;18(1):91. doi:10.1186/s12885-018-3998-1
24. Radiology ACo. ACR Appropriateness Criteria® Imaging after Breast Surgery. American College of Radiology. May 9, 2023. Updated New 2022. Accessed March 7, 2023. <https://acsearch.acr.org/docs/3178300/Narrative/>
25. Slanetz PJ, Moy L, Baron P, et al. ACR Appropriateness Criteria(®) Monitoring Response to Neoadjuvant Systemic Therapy for Breast Cancer. *J Am Coll Radiol*. Nov 2017;14(11s):S462-s475. doi:10.1016/j.jacr.2017.08.037
26. Lourenco AP, Moy L, Baron P, et al. ACR Appropriateness Criteria(®) Breast Implant Evaluation. *J Am Coll Radiol*. May 2018;15(5s):S13-s25. doi:10.1016/j.jacr.2018.03.009
27. Susnik B, Schneider L, Swenson KK, et al. Predictive value of breast magnetic resonance imaging in detecting mammographically occult contralateral breast cancer: Can we target women more likely to have contralateral breast cancer? *J Surg Oncol*. Jul 2018;118(1):221-227. doi:10.1002/jso.25130

28. Wong SM, Prakash I, Trabulsi N, et al. Evaluating the Impact of Breast Density on Preoperative MRI in Invasive Lobular Carcinoma. *J Am Coll Surg*. May 2018;226(5):925-932. doi:10.1016/j.jamcollsurg.2018.01.045
29. Pennsylvania GAO. The General Assembly of Pennsylvania Senate Bill No. 8 Session of 2023. June 1, 2023. Updated May 1, 2023. Accessed June 1, 2023. <https://www.legis.state.pa.us/cfdocs/billinfo/billinfo.cfm?year=2023&body=S&type=B&bn=0008>
30. Connecticut General Assembly: § 38a-530. Mandatory coverage for mammography, breast ultrasound and magnetic resonance imaging. Accessed November 20, 2022. https://www.cga.ct.gov/current/pub/chap_700c.htm
31. NC Medicaid Division of Health Benefits. Breast Imaging Procedures. Clinical Coverage Policy No: 1K-1; 3.2.1(c). Breast Magnetic Resonance Imaging. Accessed November 20, 2022. <https://medicaid.ncdhhs.gov/media/7865/open>
32. Illinois General Assembly. Senate Bill 0162: 215 ILCS 5/356g (a)(4); 215 ILCS 125/4-6.1 (a)(4); and 305 ILCS 5/5-5 (D) & (E). Effective date January 1, 2020. Accessed November 20, 2022. <https://www.ilga.gov/legislation/fulltext.asp?DocName=&SessionId=108&GA=101&DocTypeId=SB&DocNum=162&GAID=15&LegID=&SpecSess=&Session=>
33. Ohio General Assembly. House Bill Number 371 (amendment). Section 1: (A)3; (C)(2)(a); (C)(2)(b). Effective September 23, 2022. Accessed February 25, 2023. https://search-prod.lis.state.oh.us/solarapi/v1/general_assembly_134/bills/hb371/EN/06/hb371_06_EN?format=pdf
34. Panourgias E, Bourgioti C, Koureas A, Koutoulidis V, Metaxas G, Mouloupoulos LA. MR imaging features and tumor biomarkers of screen-detected and non-screen detected breast cancers: preliminary results of a comparative study. *Clin Imaging*. Nov-Dec 2018;52:350-355. doi:10.1016/j.clinimag.2018.08.011
35. American College of Radiology. ACR Appropriateness Criteria® Evaluation of Nipple Discharge. Updated 2022. Accessed November 30, 2022, 2022. <https://acsearch.acr.org/docs/3099312/Narrative/>

POLICY HISTORY

Date	Summary
May 2023	<ul style="list-style-type: none">• Updated background• Updated references• Added dense breast to indications for breast MRI• Change screening ages based on society recommendations for high-risk conditions• Added language regarding lactating and pregnant patients• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Added statement regarding further evaluation of indeterminate findings on prior imaging
September 2022	Added mandate language for State of Illinois
June 2022	<ul style="list-style-type: none">• Added criteria for an intermediate lifetime risk of breast cancer• Reformatted mandates
April 2022	<ul style="list-style-type: none">• Revised high-risk screening section for germline mutations• Updated background section on genetic syndromes• Updated citations

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolut Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolut uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolut Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolut reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***



EVOLENT CLINICAL GUIDELINE 060-2 FOR CT BONE DENSITY STUDY

Guideline or Policy Number: Evolent_CG_060-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1999 - 2025 Evolent. All rights Reserved.		
Original Date: April 1999	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
SPECIAL NOTE	2
INDICATIONS FOR CT BONE DENSITY STUDY	2
BASELINE STUDY	2
SUSPECTED OSTEOPOROSIS OR OSTEOPENIA	2
KNOWN OSTEOPOROSIS OR OSTEOPENIA	3
INDICATIONS FOR QCT/PQCT IN PEDIATRIC AND ADOLESCENT	4
LEGISLATIVE REQUIREMENTS	4
STATE OF WASHINGTON	4
<i>Health Technology Clinical Committee 20141121A</i>	4
CODING AND STANDARDS	5
CODING	5
<i>CPT Codes</i>	5
APPLICABLE LINES OF BUSINESS	5
BACKGROUND	5
<i>DXA and QTC</i>	6
POLICY HISTORY	6
<i>Summary</i>	6
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL	6
<i>Committee</i>	6
DISCLAIMER	7
REFERENCES	8

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Bone mineral density (BMD) measurement identifies patients with low bone density and increased fracture risk. Methods for measuring BMD are non-invasive, painless, and available on an outpatient basis.

Special Note

See [Legislative Requirements](#) for specific mandates in Washington State.

INDICATIONS FOR CT BONE DENSITY STUDY

Baseline Study ⁽¹⁾

- For first time baseline study

Suspected Osteoporosis or Osteopenia ^(1,2,3,4,5)

Patient with suspected osteoporosis or osteopenia meeting any of the following criteria when DXA scanning is not available or for patients with advanced degenerative changes of the spine or who are severely obese (BMI > 35 kg/m) that may limit the efficacy of DXA scans

- Asymptomatic women 65 years of age or older
- For post-menopausal women age < 65 or during the menopause transition, and men < 70 having at least one of the following applicable risk factors for low bone mass or fractures:
 - Low body weight (< 127 lb. or 57.6 kg or BMI < 20 kg per m)

- A history of fracture
 - History of maternal hip fracture that occurred after the age of 50 years
 - High risk medications (e.g., steroids or glucocorticosteroids, medroxyprogesterone acetate, anticonvulsants, heparin, lithium, estrogen receptor modulators, calcitonin, or bisphosphonates)
 - History of estrogen deficiency
 - History of amenorrhea for greater than 1 year before the age of 42
 - Conditions that cause or contribute to osteoporosis and fractures (e.g., malabsorption syndromes, inflammatory bowel disease and other gastrointestinal conditions, metabolic bone disease, hyperparathyroidism, hypogonadism, thyroid hormone therapy or hyperthyroidism, chemotherapy, long-term heparin therapy, rheumatologic and autoimmune diseases, renal failure, hematologic disorders, multiple myeloma, chronic alcoholism, cerebral palsy, etc.)
 - Current use of cigarettes
 - Loss of body height (> 4 cm (> 1.5 inches))
- Men aged 70 or older
 - Individuals with fragility fractures, including vertebral abnormalities that are indicative of osteoporosis, osteopenia, low bone mineral content, or vertebral fractures seen on other imaging studies/x-ray
 - Individuals aged 50 years and older who develop a wrist, hip, spine, or proximal humerus fracture with minimal or no trauma, excluding pathologic fractures
 - Eating disorders, including anorexia nervosa and bulimia
 - Individuals who have had gastric bypass for obesity (accuracy of DXA may be affected by obesity)
 - Males and females greater than or equal to 50 years of age with advanced degenerative changes of the spine (with or without scoliosis), or other conditions that may falsely elevate bone marrow density

Known Osteoporosis or Osteopenia ^(6,7)

- In women with low to moderate risk reassess fracture risk in 2-4 years
- In post-menopausal women with a low bone mineral density at high risk for fractures on treatment, monitor the spine and hip every 1-3 years
- For patients on bisphosphonates, reassess fracture risk every 3-5 years
- No previous bone density within past 23 months **AND** meets any one of the above risk factor criteria. (More frequent BMD testing may be warranted in certain clinical situations and should be determined on a case-by-case basis.)

Indications for QCT/pQCT in Pediatric and Adolescent ⁽²⁾

- Individuals receiving (or expected to receive) glucocorticoid therapy for more than 3 months
- Individuals receiving radiation or chemotherapy for malignancies
- Individuals with an endocrine disorder known to adversely affect BMD (e.g., hyperparathyroidism, hyperthyroidism, growth hormone deficiency or Cushing's syndrome)
- Individuals with bone dysplasias known to have excessive fracture risk (osteogenesis imperfecta, osteopetrosis) or high BMD, such as prolonged exposure to fluoride
- Individuals with medical conditions that could alter bone marrow density, such as: (chronic renal failure, inflammatory arthritides, eating disorders, organ transplantation, prolonged immobilization, sprue, inflammatory bowel disease, malnutrition, cystic fibrosis, osteomalacia, acromegaly, cirrhosis, HIV infection, prolonged exposure to fluorides, and hematologic disorders (thalassemia, sickle cell disease))

LEGISLATIVE REQUIREMENTS

State of Washington ⁽⁸⁾

Health Technology Clinical Committee 20141121A

Number and Coverage Topic:

20141121A – Screening & Monitoring Tests for Osteopenia/ Osteoporosis

HTCC Coverage Determination:

Bone mineral density testing with dual x-ray absorptiometry (DXA) is a **covered benefit with conditions** consistent with the criteria identified in the reimbursement determination.

HTCC Reimbursement Determination:

Limitations of Coverage:

Initial Screening:

Asymptomatic women

- Women ≥ 65 ,
Or
- Younger women with equivalent ten year fracture risk to women age 65 as calculated by FRAX* (Fracture Risk Assessment) tool or other validated scoring tool

Men or women

- Long term glucocorticoids (i.e. current or past exposure to glucocorticoids for more than 3 months),



- Androgen deprivation,
Or
- Other conditions known to be associated with low bone mass

Repeat Screening:

- T-score** > -1.5, 15 years to next screening test
 - T-score -1.5 to -1.99, 5 years to next screening test
 - T-score ≤ -2.0, 1 year to next screening test
- Or
- Use of medication associated with low bone mass or presence of a condition known to be associated with low bone mass

Monitoring Treatment:

- Once treatment for osteoporosis has begun, serial monitoring is not covered
- Development of a fragility fracture alone is not a covered indication

* FRAX available at: <http://www.shef.ac.uk/FRAX/>

**"T-Score" refers to result of a DXA scan compared to a reference population

CODING AND STANDARDS

Coding

CPT Codes

77078

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Dual energy x-ray absorptiometry (DXA), previously referred to as DEXA, is the most commonly used method of evaluating BMD and is the only BMD technology for which World Health Organization (WHO) criteria for the diagnosis of osteoporosis can be used. Patients



who have a BMD that is 2.5 standard deviations below that of a “young normal” adult (T-score at or below -2.5) are deemed to have osteoporosis. Quantitative computed tomography (QCT) has not been validated for WHO criteria but can identify patients with low BMD compared to the QCT reference database, and it can be used to identify patients who are at risk of fracture.

DXA and QTC

Dual energy x-ray absorptiometry (DXA) is most often used to measure bone mineral density due to its low radiation exposure, low precision error, and capacity to measure multiple skeletal sites (spine, hip, or total body).

Axial DXA provides the “gold standard”. Axial DXA predicts fracture risk at the site being measured.

Peripheral DXA measures BMD at peripheral sites, generally at the heel or wrist. It is relatively cheap and portable and is an option when there is limited access to axial DXA.

Quantitative computed tomography (QCT) measures volumetric integral, trabecular, and cortical bone density at the spine and hip and can be used to determine bone strength. Radiation dose is increased when compared with DXA. Indications are the same for QCT as DXA; however, DXA is recommended as the first-line test in most cases. ^(1,3)

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none">• Reduced background• Updated references• Added WA legislative requirement
March 2023	<ul style="list-style-type: none">• Updated references• Added section on DJD of spine and qCT• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Removed additional resources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee



Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Yu J S, Krishna N G, Fox M G, Blankenbaker D G, Frick M A et al. ACR Appropriateness Criteria® Osteoporosis and Bone Mineral Density: 2022 Update. Journal of the American College of Radiology. 2022; 19: S417 - S432. 10.1016/j.jacr.2022.09.007.
2. ACR-SPR-SSR. ACR–SPR–SSR PRACTICE PARAMETER FOR THE PERFORMANCE OF QUANTITATIVE COMPUTED TOMOGRAPHY (QCT) BONE MINERAL DENSITY. American College of Radiology. 2023.
3. Cosman F, de Beur S J, LeBoff M S, Lewiecki E M, Tanner B et al. Clinicians Guide to Prevention and Treatment of Osteoporosis. Osteoporosis international. 2014; 25: 2359-81. 10.1007/s00198-014-2794-2.
4. Curry S, Krist A, Owens D, Barry M, Caughey A et al. Screening for Osteoporosis to Prevent Fractures: US Preventive Services Task Force Recommendation Statement. Jama. Jun 26, 2018; 319: 2521-2531. 10.1001/jama.2018.7498.
5. Jeremiah M, Unwin B, Greenawald M, Casiano V. Diagnosis and Management of Osteoporosis. Am Fam Physician. Aug 15, 2015; 92: 261-8.
6. Eastell R, Rosen C, Black D, Cheung A, Murad M. Pharmacological Management of Osteoporosis in Postmenopausal Women: An Endocrine Society* Clinical Practice Guideline. J Clin Endocrinol Metab. May 1, 2019; 104: 1595-1622. 10.1210/jc.2019-00221.
7. Shoback D, Rosen C, Black D, Cheung A, Murad M. Pharmacological Management of Osteoporosis in Postmenopausal Women: An Endocrine Society Guideline Update. J Clin Endocrinol Metab. 2020; 105: 587-594. 10.1210/clinem/dgaa048.
8. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20141121A – Screening & Monitoring Tests for Osteopenia/ Osteoporosis. [Final Adoption: January 16, 2015]. 2015; <https://www.hca.wa.gov/assets/program/osteo-final-findings-decision-012715.pdf>.



EVOLENT CLINICAL GUIDELINE 059 FOR BONE MARROW MRI

Guideline or Policy Number: Evolent_CG_059	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2008 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 2008	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
MRI	2
INDICATIONS FOR BONE MARROW MRI	2
HEMATOLOGIC MALIGNANCIES	2
BONE MARROW DISORDERS	3
CODING AND STANDARDS	3
CODING	3
CPT Codes	3
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	3
CONTRAINDICATIONS AND PREFERRED STUDIES	3
POLICY HISTORY	4
Summary	4
LEGAL AND COMPLIANCE	4
GUIDELINE APPROVAL	4
Committee	4
DISCLAIMER	4
REFERENCES	5

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

MRI

Magnetic Resonance Imaging (MRI) is currently used for the detection of disease in the bone marrow. Bone marrow MRI is primarily used for detection of tumor in the bone marrow (metastatic or primary) or for disorders of the bone marrow. The study covers from the top of the skull to the heels.

INDICATIONS FOR BONE MARROW MRI

Hematologic Malignancies

- Bone Marrow MRI is indicated for the evaluation of the following conditions:
 - Multiple Myeloma - monoclonal proliferation of plasma cells with myeloma-defining CRAB (Calcium level elevation, Renal failure, Anemia, or Bone lesions) findings
 - Monoclonal Gammopathy of Undetermined Significance (MGUS) - monoclonal proliferation of plasma cells without myeloma-defining CRAB
 - Solitary Plasmacytoma - monoclonal plasma cells manifesting as a single tumor
 - Smoldering Multiple Myeloma - monoclonal proliferation of plasma cells in bone marrow and/or serum/urine with abnormal levels of monoclonal protein (asymptomatic precursor state of MM)⁽¹⁾
 - Leukemia and other related hematological malignancies^(2,3,4)
- Bone Marrow MRI for the **above conditions** is indicated at the following intervals:
 - Suspected Disease
 - Initial Staging of Known Disease

- Restaging on Active Treatment
- Surveillance
 - Annually if in asymptomatic
 - More frequent imaging as clinically indicated by signs/symptoms, laboratory, or radiographic concern for disease relapse or progression

Bone Marrow MRI using CPT 77084 is used for evaluation of the bone marrow. For conditions where imaging of the soft tissue and bone is needed (such as screening for genetic predisposition syndromes such as Li-Fraumeni syndrome (LFS) with whole body MRI using CPT 76498), see indications for Whole Body MRI (**Evolent_CG_063 for Unlisted Study**)

Bone Marrow Disorders

- Diagnosis and assessment of treatment response in diffuse or multifocal marrow disorders (e.g., chronic recurrent multifocal osteomyelitis; marrow involvement in storage diseases, such as Gaucher's, or hematologic malignancies/ processes (e.g., Waldenström macroglobulinemia) when the diagnosis is in doubt)^(3,5)

CODING AND STANDARDS

Coding

CPT Codes

77084

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)

- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none"> • Clarified purpose of Bone Marrow MRI vs Whole Body MRI • Hematologic Malignancies re-structured • Reduced the Background section • Added Contraindications and Preferred studies section to background
March 2023	<ul style="list-style-type: none"> • Removed duplicate statement for treatment follow up • Updated references • Removed additional resources • Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Mateos M, Kumar S, Dimopoulos M, González-Calle V, Kastritis E et al. International Myeloma Working Group risk stratification model for smoldering multiple myeloma (SMM). *Blood Cancer Journal*. 2020; 10: 10.1038/s41408-020-00366-3.
2. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) NCCN Guidelines Index Table of Contents Discussion Multiple Myeloma Version 2.2024. National Comprehensive Cancer Network®. 2023; https://www.nccn.org/professionals/physician_gls/pdf/myeloma.pdf.
3. Rajkumar V, Dimopoulos M, Palumbo A, Blade J, Merlini G et al. International Myeloma Working Group updated criteria for the diagnosis of multiple myeloma. *The Lancet Oncology*. 2014; 538-548. 10.1016/S1470-2045(14)70442-5.
4. Rodríguez-Laval V, Lumbreras-Fernández B, Aguado-Bueno B, Gómez-León N. Imaging of Multiple Myeloma: Present and Future. *J Clin Med*. 2024; 13: J Clin Med.
5. Degnan A, Ho-Fung V, Ahrens-Nicklas R, Barrera C, Serai S et al. Imaging of non-neuronopathic Gaucher disease: recent advances in quantitative imaging and comprehensive assessment of disease involvement. *Insights into imaging*. 2019; 10: 70. 10.1186/s13244-019-0743-5.



EVOLENT CLINICAL GUIDELINE 079 FOR HEART PET WITH CT FOR ATTENUATION

Guideline or Policy Number: Evolent_CG_079	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1999 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 1999	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
SPECIAL NOTE	3
CLINICAL REASONING.....	3
INDICATIONS FOR HEART PET WITH CT FOR ATTENUATION	4
Suspected CAD	4
Abnormal Calcium Scores (CAC).....	4
Inconclusive CAD Evaluation and Obstructive CAD remain a Concern	5
Follow-Up Of Patient's Post Coronary Revascularization (PCI or CABG)	5
Follow-Up Of Known CAD.....	6
Special Diagnostic Conditions Requiring Coronary Evaluation	6
Prior To Elective Non-Cardiac Surgery	8
Post Cardiac Transplant.....	9
LEGISLATIVE REQUIREMENTS	9
STATE OF WASHINGTON	9
Health Technology Clinical Committee 20211105A.....	9
CODING AND STANDARDS	10
CODING	10
CPT Codes	10
APPLICABLE LINES OF BUSINESS.....	11
BACKGROUND	11
General Overview.....	11
AUC Score.....	11
Definitions.....	11
Acronyms / Abbreviations.....	15
POLICY HISTORY	16
Summary	16
LEGAL AND COMPLIANCE	17



GUIDELINE APPROVAL	17
<i>Committee</i>	17
DISCLAIMER.....	17
REFERENCES.....	18

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

A Heart PET scan for Ischemic evaluation is indicated when all the criteria for MPI are met **AND** there is likely to be equivocal imaging results because of BMI, large breasts or implants, mastectomy, chest wall deformity, pleural or pericardial effusion, or prior thoracic surgery or results of a prior MPI ^(1,2). **(AUC 7)** ⁽³⁾

Cardiac PET scanning, when used in conjunction with CT attenuation, includes evaluation of perfusion, function, viability, inflammation, anatomy, and risk stratification for cardiac-related events such as myocardial infarction and death. Maximum diagnostic accuracy of cardiac PET/CT is achieved when images are interpreted in conjunction with other relevant imaging, clinical information, and laboratory data.

See **Legislative Requirements** for specific mandates in Washington State

CLINICAL REASONING

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(4,5,6,7,8)

INDICATIONS FOR HEART PET WITH CT FOR ATTENUATION ^(9,10,11)

Suspected CAD

When neither SE nor MPI have provided or are expected to provide optimal imaging

- **Symptomatic patients without known CAD. No imaging stress test within the last 12 months.** The terms "typical," "atypical," and "non-anginal symptoms" can still be observed in medical records (consult the Diamond Forrester table in the Definitions section). However, the ACC has simplified its terminology to "Less likely anginal symptoms" and "Likely anginal symptoms" (refer to Definitions section) and utilized below.
 - Less-likely anginal symptoms (**AUC 4-6**)
 - When a patient cannot walk a treadmill
 - When baseline EKG makes standard exercise test inaccurate (see Definitions section).
 - When a noncardiac explanation is provided for symptoms, no testing is required (**AUC 8**)
 - Likely Anginal Symptoms (typical angina)
 - < 50 years old with ≤ one risk factor if an ECG treadmill test cannot be done. **AUC scores for this bullet point are identical for MPI, stress echo, and ETT (**AUC 7**). Although the ACC guideline does not specify youth and gender, decisions should be guided by best medical judgment, considering factors such as safety and radiation exposure.
 - ≥ 50 years old (**AUC 8**)
 - Repeat testing in a patient with new or worsening symptoms and negative result at least one year ago **AND** meets one of the criteria above
- **Asymptomatic patients without known CAD**
 - Previously unevaluated ECG evidence of possible myocardial ischemia including substantial ischemic ST segment or T wave abnormalities (see Background section)
 - Previously unevaluated pathologic Q waves (see Background section)
 - Unevaluated complete left bundle branch block (**AUC 8**) ⁽³⁾

Abnormal Calcium Scores (CAC) ^(9,12,13,14,15)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **STABLE SYMPTOMS** with a prior Coronary Calcium Agatston Score of > 100. No prior MPI done within the last 12 months ⁽¹⁶⁾

- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of > 100. No prior MPI done within the last 12 months ⁽¹⁶⁾
- Asymptomatic patient with Coronary Calcium Agatston Score > 400. No prior MPI done within the last 12 months

Inconclusive CAD Evaluation and Obstructive CAD remain a Concern

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5) (see **Background** section) but patient's current symptoms indicate increasing likelihood of disease
- Exercise stress ECG with an intermediate Duke treadmill score (**AUC 8**) ⁽³⁾
- Inconclusive/borderline coronary computed tomography angiography (CCTA) or SPECT nuclear stress testing (e.g., 40 - 70% lesions) (**AUC 9**) ⁽³⁾
- Cardiac PET stress-rest perfusion and metabolic activity study (with ¹⁸F-FDG PET) is appropriate in patients with ischemic cardiomyopathy to determine myocardial viability prior to revascularization following an inconclusive SPECT ^(9,17) (**AUC 9**) ⁽³⁾
- Non-diagnostic exercise stress test with physical inability to achieve target heart rate (THR)
- An intermediate evaluation by prior stress imaging
- Coronary stenosis of unclear significance on previous coronary angiography ⁽⁹⁾ (**AUC 8**) ⁽³⁾

Follow-Up Of Patient's Post Coronary Revascularization (PCI or CABG)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging ⁽⁹⁾

- **Asymptomatic, follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI), (whichever is later), is appropriate only for patients with:
 - **High risk:** diabetes with accelerated progression of CAD, CKD, PAD, prior brachytherapy, ISR, or SVG intervention.
 - a history of silent ischemia or
 - a history of a prior left main stent

OR

- For patients with high occupational risk (e.g., associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers, and firefighters)

New, recurrent, or worsening symptoms post coronary revascularization treated medically or by revascularization is an indication for stress imaging, if it will alter management for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization if no imaging stress test within the last 12 months. **(AUC 8)**

Follow-Up Of Known CAD ⁽⁹⁾

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or $\text{FFR} \leq 0.80$ or significant stenosis in a major vessel ($\geq 50\%$ left main coronary artery or $\geq 70\%$ LAD, LCX or RCA)), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management

Special Diagnostic Conditions Requiring Coronary Evaluation

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Unevaluated ACS**
 - Prior acute coronary syndrome (as documented in MD notes), without subsequent invasive or non-invasive coronary evaluation within the last 12 months
 - Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months
 - The addition of Coronary CTA to the PETCT study may be considered for patients facing complex coronary interventions, suspected global myocardial ischemia, necessitating correlation between anatomy and perfusion ⁽¹⁷⁾ **(AUC 7)**
- **Heart Failure**
 - Newly diagnosed systolic heart failure or diastolic heart failure, with *reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned or adequate stress imaging has been done within the last 12 months ^(10,18,19) **(AUC 9)** ⁽³⁾

- **Suboptimal Revascularization**

- To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA), as documented in provider notes (no MPI diversion required) ⁽¹³⁾.

- **Viability**

- Reduced LVEF $\leq 50\%$ requiring myocardial viability assessment to assist with decisions regarding coronary revascularization. (Diversion from PET not required when LVEF less than or equal to 40%) ^(18,19,20) **(AUC 9)** ⁽³⁾

- **Ischemia and Nonobstructive Coronary Artery Disease (INOCA)**

- To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA), as documented in provider notes (*no MPI diversion required*).

- **Arrhythmias**

- Ventricular arrhythmias
 - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not the immediately planned test ⁽²¹⁾
 - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, frequent PVC's (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed

- **Anti-arrhythmic Drug Therapy**

- Class IC antiarrhythmic drug
 - In the intermediate and high global risk patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide)
 - Annually for intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) ⁽²²⁾ **(AUC 7)** ⁽³⁾

- **Coronary Anomaly and Aneurism**

- Assessment of hemodynamic significance of one of the following documented conditions: ⁽²³⁾
 - Anomalous coronary arteries ⁽²⁴⁾
 - Muscle bridging of coronary artery ^(9,25)
- Coronary aneurysms in Kawasaki's disease ⁽²⁶⁾ or due to atherosclerosis

- **Radiation**

- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter ⁽²⁷⁾

- **Cardiac Sarcoidosis** ^(28,29,30)

- May be approved as a combination study with MPI for the evaluation and treatment of sarcoidosis. ⁽³¹⁾
 - Evaluation and therapy monitoring in patients with sarcoidosis, after documentation of suspected cardiac involvement by echo or ECG, when CMR has not been performed
 - Evaluation of suspected cardiac sarcoid, after CMR has shown equivocal or negative findings in the setting of a high clinical suspicion ⁽³⁰⁾
 - Evaluation of CMR findings showing highly probable cardiac sarcoidosis, when PET could serve to identify inflammation and the consequent potential role for immunosuppressive therapy ⁽³⁰⁾ **(AUC 9)** ⁽³⁾
 - Initial and follow-up PET in monitoring therapy for cardiac sarcoid with immunosuppressive therapy, typically about 4 times over 2 years

- **Infective Endocarditis**

- In suspected infective endocarditis with moderate to high probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when TTE and TEE have been inconclusive with respect to diagnosis of infective endocarditis or characterization of paravalvular invasive complications ^(32,33,34)

- **Aortitis**

- For diagnosis and surveillance of Aortitis, PET/CT or PET/MRI[‡] hybrid imaging ⁽³⁵⁾
- [‡]**NOTE:** If PET/MR study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required.

Prior To Elective Non-Cardiac Surgery

When neither SE nor MPI have provided or are expected to provide optimal imaging

- An intermediate or high-risk surgery with of one or more risk factors (see below), **AND** documentation of an inability to walk (or < 4 METs) **AND** there has not been an imaging stress test within 1 year ^(36,37,38)
 - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine > 2.0 mg/dL.

- **Surgical Risk:**
 - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
 - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
 - **Low risk surgery:** Endoscopic procedures, superficial procedure, cataract surgery, breast surgery
- Planning for any organ or stem cell transplantation is an indication for preoperative stress imaging, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service ⁽³⁹⁾

Post Cardiac Transplant

SE diversion not required ⁽⁴⁰⁾

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

LEGISLATIVE REQUIREMENTS

State of Washington ⁽⁴¹⁾

Health Technology Clinical Committee 20211105A

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
 - Adult patients with known CAD who have new or worsening symptoms.

- Single Positron Emission Tomography (SPECT) for:
 - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
 - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
 - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
 - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
 - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation
 - Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
 - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
 - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Coding

CPT Codes

78459, 78491, 78492, +78434, 78429, 78430, 78431, 78432, 78433

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview ^(1,42)

A PET study is a diagnostic test used to evaluate blood flow to the heart. During the test, a small amount of radioactive tracer is injected into a vein. A special camera, called a gamma camera, detects the radiation released by the tracer to produce computer images of the heart. Combined with a medication, the test can help determine if there is adequate blood flow to the heart during activity versus at rest. The medication simulates exercise for patients unable to exercise on a treadmill or stationary cycle.

PET perfusion studies illustrate myocardial blood flow by demonstrating tracer uptake. PET metabolic evaluation studies are used to demonstrate inflammation produced by infiltrative disease such as sarcoidosis, but also enhance the detection of viable (hibernating) myocardium. Hybrid PET-CT scanning combines anatomical information with blood flow assessment and is useful for assessing viable myocardium, especially in CHF patients with global ischemia, or in patients with multivessel diffuse coronary artery disease as opposed to focal stenotic lesions.

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. ⁽⁴⁾

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Coronary application of PET includes evaluation of stable patients without known CAD, who fall into two categories ^(9,10,11)

- **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
- **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant ($\geq 50\%$) CAD (below)
- The medical record should provide enough detail to establish the type of chest pain:
 - **Likely Anginal symptoms** encompass chest/epigastric/shoulder/arm/jaw pain, chest pressure/discomfort occurring with exertion or emotional stress and relieved by rest, nitroglycerine or both.
 - **Less-Likely Anginal symptoms** include dyspnea, or fatigue not relieved by rest/nitroglycerin, as well as generalized fatigue or chest discomfort with a time course not indicative of angina (e.g., resolving spontaneously within seconds or lasting for an extended period unrelated to exertion).
- **Risk Factors for Coronary disease include (but not limited to):** diabetes mellitus, smoking, family history of premature CAD (men age less than 55, females less than 65), hypertension, dyslipidemia.
- Beginning 2023, the classification terms for angina were updated within the ACC's Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease to **Less Likely Anginal Symptoms** and **Likely Anginal Symptoms**. Previously, the document referred to "Typical Angina", "Atypical Angina" and "Non-Anginal" symptoms, defined by the Diamond Forrester Table. We still provide this information for your reference ^(9,10,11):

Diamond Forrester Table ^(43,44)

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: $< 5\%$ pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: $> 90\%$ pretest probability of CAD

- ECG Stress Test Alone versus Stress Testing with Imaging
 - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3

minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise: ⁽⁹⁾

- The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG ⁽⁹⁾
 - The patient who is under evaluation for exercise-induced arrhythmia
 - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
 - For the evaluation of syncope or presyncope during exertion ⁽⁴⁵⁾
 - When exercise cannot be performed, pharmacologic stress can be considered.
- Duke Exercise ECG Treadmill Score ⁽⁴⁶⁾
 - Calculates risk from ECG treadmill alone:
 - The equation for calculating the Duke treadmill score (DTS) is: $DTS = \text{exercise time in minutes} - (5 \times \text{ST deviation in mm or } 0.1 \text{ mV increments}) - (4 \times \text{exercise angina score})$, with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
 - The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of $\geq + 5$), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of $\leq - 11$) categories
 - An uninterpretable baseline ECG includes: ⁽¹⁰⁾
 - ST segment depression 1 mm or more; (not for non-specific ST- T wave changes)
 - Ischemic-looking T waves; at least 2.5 mm inversions (excluding V1 and V2)
 - LVH with repolarization abnormalities, pre-excitation pattern such as WPW, ventricular paced rhythm, or left bundle branch block
 - Digitalis use with associated ST segment abnormalities
 - Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
 - > 40 ms (1 mm) wide
 - > 2 mm deep
 - > 25% of depth of QRS complex
 - Global Risk of Cardiovascular Disease
 - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years. **High global risk by itself**

generally lacks scientific support as an indication for stress imaging.

There are rare exceptions, such as patients requiring IC antiarrhythmic drugs who might require coronary risk stratification prior to initiation of the drug.

■ **CAD Risk—Low**

- 10-year absolute coronary or cardiovascular risk less than 10%

■ **CAD Risk—Moderate**

- 10-year absolute coronary or cardiovascular risk between 10% and 20%

■ **CAD Risk—High**

- 10-year absolute coronary or cardiovascular risk of greater than 20%

Websites for Global Cardiovascular Risk Calculators* (47,48,49,50,51)

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk
Reynolds Risk Score Can use if no diabetes Unique for use of family history	http://www.reynoldsriskscore.org/
Pooled Cohort Equation	http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example
ACC/AHA Risk Calculator	http://tools.acc.org/ASCVD-Risk-Estimator/
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease (10,11,14)
 - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
 - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the MESA risk calculator.

- Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
 - Suggested by percentage diameter stenosis $\geq 70\%$ by angiography; intermediate lesions are 50 – 69% ⁽⁹⁾
 - For a left main artery, suggested by a percentage stenosis $\geq 50\%$ or minimum lumen cross-sectional area on IVUS ≤ 6 square mm ^(10,52)
 - FFR (fractional flow reserve) ≤ 0.80 for a major vessel ⁽⁵²⁾
 - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
- A major vessel would be a coronary vessel that would be amenable to revascularization if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
- FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
- Newer technology that estimates FFR from CCTA image is covered under the Evolent Clinical Guideline 062-1 for Fractional Flow Reserve CT.
- Anginal Equivalent ^(10,45)
 - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data, such as respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Most syncope per se is not an anginal equivalent.

Acronyms / Abbreviations

ADLs: Activities of daily living
 BMI: Body mass index
 CABG: Coronary artery bypass grafting
 CAC: Coronary artery calcium
 CAD: Coronary artery disease
 CCTA: Coronary computed tomography angiography

CMR: Cardiac magnetic resonance imaging
 CT(A): Computed tomography (angiography)
 DTS: Duke Treadmill Score
 ECG: Electrocardiogram
 FFR: Fractional flow reserve
 IVUS: Intravascular ultrasound
 LBBB: Left bundle-branch block
 LVEF: Left ventricular ejection fraction
 LVH: Left ventricular hypertrophy
 MESA: Multi-Ethnic Study of Atherosclerosis
 MET: Estimated metabolic equivalent of exercise
 MI: Myocardial infarction
 MPI: Myocardial perfusion imaging
 MR(I): Magnetic resonance (imaging)
 PCI: Percutaneous coronary intervention
 PET: Positron emission tomography
 PFT: Pulmonary function test
 PVCs: Premature ventricular contractions
 SE: Stress echocardiography
 TEE: Transesophageal echocardiography
 THR: Target heart rate
 TTE: Transthoracic echocardiography
 VF: Ventricular fibrillation
 VT: Ventricular tachycardia
 WPW: Wolff-Parkinson-White

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> • Formatting change • Addition of clinical reasoning statement with AUC scoring described • AUC scores added to bullet points • Change in definition to symptomatic patients as per ACC AUC guidelines including likely and less likely anginal symptoms • Calcium score – asymptomatic patient with high global risk statement added • References updated • WA legislative requirements added
May 2023	<ul style="list-style-type: none"> • Removed time limitation “within past two years” for further evaluation inconclusive prior CAD evaluation • Added coronary stenosis of unclear significance on previous coronary angiography



Date	Summary
	<ul style="list-style-type: none">• Added indication for evaluation of ischemia and nonobstructive coronary artery disease (INOCA)• Clarified indication for PET/MPI combination study for evaluation of cardiac sarcoidosis• Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bateman T, Dilsizian V, Beanlands R, DePuey E, Heller G. American Society of Nuclear Cardiology and Society of Nuclear Medicine and Molecular Imaging Joint Position Statement on the Clinical Indications for Myocardial Perfusion PET. *J Nucl Med*. Oct 2016; 57: 1654-1656. 10.2967/jnumed.116.180448.
2. Fazel R, Dilsizian V, Einstein A J, Ficaro E P, Henzlova M. Strategies for defining an optimal risk-benefit ratio for stress myocardial perfusion SPECT. *J Nucl Cardiol*. 2011; 18: 385-92. 10.1007/s12350-011-9353-4.
3. Schindler T H, Bateman T M, Berman D S, Chareonthaitawee P, De Blanche L E et al. Appropriate Use Criteria for PET Myocardial Perfusion Imaging. *J Nucl Med*. 2020; 61: 1221-1265. 10.2967/jnumed.120.246280.
4. Hendel R C, Lindsay B D, Allen J M, Brindis R G, Patel M R et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2018; 71: 935-948. 10.1016/j.jacc.2018.01.007.
5. Hendel R C, Patel M R, Allen J M, Min J K, Shaw L J et al. Appropriate use of cardiovascular technology: 2013 ACCF appropriate use criteria methodology update: a report of the American College of Cardiology Foundation appropriate use criteria task force. *J Am Coll Cardiol*. 2013; 61: 1305-17. 10.1016/j.jacc.2013.01.025.
6. Bonow R O, Douglas P S, Buxton A E, Cohen D J, Curtis J P et al. ACCF/AHA methodology for the development of quality measures for cardiovascular technology: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Performance Measures. *Circulation*. 2011; 124: 1483-502. 10.1161/CIR.0b013e31822935fc.
7. Fitch K, Bernstein S J, Aguilar M D, Burnand B, LaCalle J R et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
8. Patel M R, Spertus J A, Brindis R G, Hendel R C, Douglas P S et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *J Am Coll Cardiol*. 2005; 46: 1606-13. 10.1016/j.jacc.2005.08.030.
9. Winchester D E, Maron D J, Blankstein R, Chang I C, Kirtane A J et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *J Cardiovasc Magn Reson*. 2023; 25: 58. 10.1186/s12968-023-00958-5.
10. Fihn S, Gardin J, Abrams J, Berra K, Blankenship J et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. Dec 18, 2012; 126: e354-471. 10.1161/CIR.0b013e318277d6a0.
11. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. Oct 2013; 34: 2949-3003. 10.1093/eurheartj/ehj296.
12. Budoff M, Raggi P, Beller G, Berman D, Druz R et al. Noninvasive Cardiovascular Risk Assessment of the Asymptomatic Diabetic Patient: The Imaging Council of the American College of Cardiology. *JACC Cardiovasc Imaging*. Feb 2016; 9: 176-92. 10.1016/j.jcmg.2015.11.011.

13. Gulati M, Levy P, Mukherjee D, Amsterdam E, Bhatt D et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. Nov 30, 2021; 78: e187-e285. 10.1016/j.jacc.2021.07.053.
14. Patel M, Calhoun J, Dehmer G, Grantham J, Maddox T et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2017 Appropriate Use Criteria for Coronary Revascularization in Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. May 2, 2017; 69: 2212-2241. 10.1016/j.jacc.2017.02.001.
15. Guzmán A, Navarro E, Obando L, Pacheco J, Quirós K et al. Effectiveness of interventions for the reversal of a metabolic syndrome diagnosis: An update of a meta-analysis of mixed treatment comparison studies. *Biomedica*. 2019; 39: 647-662. 10.7705/biomedica.4684.
16. Brindis R G, Douglas P S, Hendel R C, Peterson E D, Wolk M J et al. ACCF/ASNC appropriateness criteria for single-photon emission computed tomography myocardial perfusion imaging (SPECT MPI): a report of the American College of Cardiology Foundation Quality Strategic Directions Committee Appropriateness Criteria Working Group and the American Society of Nuclear Cardiology endorsed by the American Heart Association. *J Am Coll Cardiol*. 2005; 46: 1587-605. 10.1016/j.jacc.2005.08.029.
17. Truong Q A, Gewirtz H. Cardiac PET-CT for monitoring medical and interventional therapy in patients with CAD: PET alone versus hybrid PET-CT? *Curr Cardiol Rep*. 2014; 16: 460. 10.1007/s11886-013-0460-5.
18. Patel M, White R, Abbara S, Bluemke D, Herfkens R et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. May 28, 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.
19. Heidenreich P A, Bozkurt B, Aguilar D, Allen L A, Byun J J et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 145: e876-e894. 10.1161/CIR.0000000000001062.
20. Xu J, Cai F, Geng C, Wang Z, Tang X. Diagnostic Performance of CMR, SPECT, and PET Imaging for the Identification of Coronary Artery Disease: A Meta-Analysis. *Front Cardiovasc Med*. 2021; 8: 621389. 10.3389/fcvm.2021.621389.
21. Al-Khatib S, Stevenson W, Ackerman M, Bryant W, Callans D et al. 2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Oct 2, 2018; 72: e91-e220. 10.1016/j.jacc.2017.10.054.
22. Reiffel J, Camm A, Belardinelli L, Zeng D, Karwatowska-Prokopczuk E et al. The HARMONY Trial: Combined Ranolazine and Dronedarone in the Management of Paroxysmal Atrial Fibrillation: Mechanistic and Therapeutic Synergism. *Circ Arrhythm Electrophysiol*. Oct 2015; 8: 1048-56. 10.1161/circep.115.002856.

23. Anagnostopoulos C, Harbinson M, Kelion A, Kundley K, Loong C et al. Procedure guidelines for radionuclide myocardial perfusion imaging. *Heart (British Cardiac Society)*. 2004; 90 Suppl 1: i1-i10. 10.1136/heart.90.suppl_1.i1.
24. Gräni C, Bigler M R, Kwong R Y. Noninvasive Multimodality Imaging for the Assessment of Anomalous Coronary Artery. *Curr Cardiol Rep*. 2023; 25: 1233-1246. 10.1007/s11886-023-01948-w.
25. Evbayekha E O, Nwogwugwu E, Olawoye A, Bolaji K, Adeosun A A et al. A Comprehensive Review of Myocardial Bridging: Exploring Diagnostic and Treatment Modalities. *Cureus*. 2023; 15: e43132. 10.7759/cureus.43132.
26. McCrindle B, Rowley A, Newburger J, Burns J, Bolger A et al. Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease: A Scientific Statement for Health Professionals From the American Heart Association. *Circulation*. Apr 25, 2017; 135: e927-e999. 10.1161/cir.0000000000000484.
27. Lancellotti P, Nkomo V, Badano L, Bergler-Klein J, Bogaert J et al. Expert consensus for multi-modality imaging evaluation of cardiovascular complications of radiotherapy in adults: a report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Eur Heart J Cardiovasc Imaging*. Aug 2013; 14: 721-40. 10.1093/ehjci/jet123.
28. Birnie D, Nery P, Ha A, Beanlands R. Cardiac Sarcoidosis. *J Am Coll Cardiol*. Jul 26 2016; 68: 411-21. 10.1016/j.jacc.2016.03.605.
29. Blankstein R, Waller A. Evaluation of Known or Suspected Cardiac Sarcoidosis. *Circ Cardiovasc Imaging*. Mar 2016; 9: e000867. 10.1161/circimaging.113.000867.
30. Vita T, Okada D, Veillet-Chowdhury M, Bravo P, Mullins E et al. Complementary Value of Cardiac Magnetic Resonance Imaging and Positron Emission Tomography/Computed Tomography in the Assessment of Cardiac Sarcoidosis. *Circ Cardiovasc Imaging*. Jan 2018; 11: e007030. 10.1161/circimaging.117.007030.
31. Tersalvi G, Beltrani V, Grübler M R, Molteni A, Cristoforetti Y et al. Positron Emission Tomography in Heart Failure: From Pathophysiology to Clinical Application. *J Cardiovasc Dev Dis*. 2023; 10: 220. 10.3390/jcdd10050220.
32. Doherty J, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Sep 26, 2017; 70: 1647-1672. 10.1016/j.jacc.2017.07.732.
33. Habib G, Lancellotti P, Antunes M, Bongiorni M, Casalta J et al. 2015 ESC Guidelines for the management of infective endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). *Eur Heart J*. Nov 21, 2015; 36: 3075-3128. 10.1093/eurheartj/ehv319.
34. Baddour L M, Wilson W R, Bayer A S, Fowler V G J, Tleyjeh I M et al. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Scientific Statement for Healthcare Professionals From the American Heart Association. *Circulation*. 2015; 132: 1435-86. 10.1161/CIR.0000000000000296.

35. Isselbacher E, Preventza O, Hamilton Black J 3, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. Dec 13, 2022; 146: e334-e482. 10.1161/cir.0000000000001106.
36. Kristensen S, Knuuti J, Saraste A, Anker S, Bøtker H et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur Heart J*. Sep 14, 2014; 35: 2383-431. 10.1093/eurheartj/ehu282.
37. Fleisher L, Fleischmann K, Auerbach A, Barnason S, Beckman J et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. *J Am Coll Cardiol*. Dec 09, 2014; 64: e77-137. 10.1016/j.jacc.2014.07.944.
38. Velasco A, Reyes E, Hage F. Guidelines in review: Comparison of the 2014 ACC/AHA guidelines on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery and the 2014 ESC/ESA guidelines on noncardiac surgery: Cardiovascular assessment and management. *J Nucl Cardiol*. 02 2017; 24: 165-170. 10.1007/s12350-016-0643-8.
39. Lentine K, Costa S, Weir M, Robb J, Fleisher L et al. Cardiac disease evaluation and management among kidney and liver transplantation candidates: a scientific statement from the American Heart Association and the American College of Cardiology Foundation. *J Am Coll Cardiol*. Jul 31, 2012; 60: 434-80. 10.1016/j.jacc.2012.05.008.
40. Mc Ardle B, Dowsley T, deKemp R, Wells G, Beanlands R. Does rubidium-82 PET have superior accuracy to SPECT perfusion imaging for the diagnosis of obstructive coronary disease? A systematic review and meta-analysis. *J Am Coll Cardiol*. Oct 30, 2012; 60: 1828-37. 10.1016/j.jacc.2012.07.038.
41. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease. [Final Adoption: March 18, 2022]. 2022; <https://www.hca.wa.gov/assets/program/noninvasive-cardiac-imaging-final-findings-and-decision-2022-03-18.pdf>.
42. Fazel R, Dilsizian V, Einstein A, Ficaro E, Henzlova M. Strategies for defining an optimal risk-benefit ratio for stress myocardial perfusion SPECT. *J Nucl Cardiol*. May 2011; 18: 385-92. 10.1007/s12350-011-9353-4.
43. Wolk M J, Bailey S R, Doherty J U, Douglas P S, Hendel R C et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2014; 63: 380-406. 10.1016/j.jacc.2013.11.009.
44. Diamond G A, Forrester J S. Analysis of probability as an aid in the clinical diagnosis of coronary-artery disease. *N Engl J Med*. 1979; 300: 1350-8. 10.1056/NEJM197906143002402.
45. Shen W, Sheldon R, Benditt D, Cohen M, Forman D et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice



- Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* Aug 1, 2017; 70: 620-663. 10.1016/j.jacc.2017.03.002.
46. Shaw L J, Peterson E D, Shaw L K, Kesler K L, DeLong E R et al. Use of a prognostic treadmill score in identifying diagnostic coronary disease subgroups. *Circulation.* 1998; 98: 1622-30. 10.1161/01.cir.98.16.1622.
47. Arnett D, Blumenthal R, Albert M, Buroker A, Goldberger Z et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol.* Sep 10, 2019; 74: e177-e232. 10.1016/j.jacc.2019.03.010.
48. D'Agostino R S, Vasan R, Pencina M, Wolf P, Cobain M et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation.* Feb 12, 2008; 117: 743-53. 10.1161/circulationaha.107.699579.
49. Goff D J, Lloyd-Jones D, Bennett G, Coady S, D'Agostino R S et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* Jul 1, 2014; 63: 2935-2959. 10.1016/j.jacc.2013.11.005.
50. McClelland R, Jorgensen N, Budoff M, Blaha M, Post W et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol.* Oct 13, 2015; 66: 1643-53. 10.1016/j.jacc.2015.08.035.
51. Ridker P, Buring J, Rifai N, Cook N. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. *Jama.* Feb 14, 2007; 297: 611-9. 10.1001/jama.297.6.611.
52. Lotfi A, Davies J, Fearon W, Grines C, Kern M. Focused update of expert consensus statement: Use of invasive assessments of coronary physiology and structure: A position statement of the society of cardiac angiography and interventions. *Catheter Cardiovasc Interv.* Aug 1, 2018; 92: 336-347. 10.1002/ccd.27672.

EVOLENT CLINICAL GUIDELINE 024 FOR MYOCARDIAL PERFUSION IMAGING

Guideline or Policy Number: Evolutent_CG_024	<u>Applicable Codes</u>	
<i>"Evolutent" refers to Evolutent Health LLC and Evolutent Specialty Services, Inc.</i> © 2009 - 2025 Evolutent. All rights Reserved.		
Original Date: October 2009	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
SPECIAL NOTE	3
CLINICAL REASONING	3
INDICATIONS FOR MPI.....	3
SUSPECTED CORONARY ARTERY DISEASE (CAD)	3
ABNORMAL CALCIUM SCORES	4
INCONCLUSIVE CAD EVALUATION AND OBSTRUCTIVE CAD	5
FOLLOW-UP OF PATIENT'S POST CORONARY REVASCULARIZATION (PCI OR CABG)	5
FOLLOW-UP OF KNOWN CAD	6
SPECIAL DIAGNOSTIC CONDITIONS REQUIRING CORONARY EVALUATION	6
<i>Unevaluated ACS</i>	6
<i>Heart Failure</i>	6
<i>Viability</i>	6
<i>Suboptimal Revascularization</i>	6
<i>Arrhythmias</i>	7
<i>Anti-Arrhythmic Drug Therapy</i>	7
<i>Coronary Anomaly and Aneurism</i>	7
<i>Radiation and Chemotherapy</i>	7
<i>Sarcoidosis and Amyloidosis (PYP study)</i>	7
PRIOR TO ELECTIVE NON-CARDIAC SURGERY IN ASYMPTOMATIC PATIENT	8
POST CARDIAC TRANSPLANT (SE DIVERSION NOT REQUIRED)	8
LEGISLATIVE REQUIREMENTS	8
STATE OF WASHINGTON	8
<i>Health Technology Clinical Committee 20211105A</i>	8
CODING AND STANDARDS	10
CODING	10
<i>CPT Codes</i>	10
APPLICABLE LINES OF BUSINESS	10
BACKGROUND	10



AUC SCORE	10
DEFINITIONS	11
<i>Diamond Forrester Table</i>	12
<i>Websites for Global Cardiovascular Risk Calculators</i>	14
ACRONYMS / ABBREVIATIONS	16
POLICY HISTORY	16
<i>Summary</i>	16
LEGAL AND COMPLIANCE	17
GUIDELINE APPROVAL	17
DISCLAIMER	17
REFERENCES	18


STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

Medical necessity for myocardial perfusion imaging (MPI) will consider the preference for appropriate alternatives, such as stress echocardiography (SE), when deemed more suitable, unless contraindications are present (see **DEFINITIONS** section). Preference toward stress echocardiography will be denoted by  (SE).

See **Legislative Requirements** for specific mandates in Washington State.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(1,2,3,4,5)

INDICATIONS FOR MPI (6,7,8,9,10)

Suspected Coronary Artery Disease (CAD)

- **Symptomatic patients without known CAD. No imaging stress test within the last 12 months.** The terms "typical," "atypical," and "non-anginal symptoms" can still be observed in medical records (consult the **DIAMOND FORRESTER TABLE** in the

DEFINITIONS section). However, the ACC has simplified its terminology to "Less likely anginal symptoms" and "Likely anginal symptoms" (refer to definitions) and utilized below.

- Less-likely anginal symptoms (**AUC 4-6**)
 - When a patient cannot walk a treadmill
 - When baseline EKG makes standard exercise test inaccurate (see **Definitions** section). ^{SE}
 - When a noncardiac explanation is provided for symptoms, no testing is required (**AUC 8**)
- Likely Anginal Symptoms (typical angina)
 - < 50 years old with ≤ one risk factor if an ECG treadmill test cannot be done. **AUC scores for this bullet point are identical for MPI, stress echo, and ETT (**AUC = 7**). Although the ACC guideline does not specify youth and gender, decisions should be guided by best medical judgment, considering factors such as safety and radiation exposure.
 - ≥ 50 years old (**AUC 8**)
- Repeat testing in a patient with new or worsening symptoms **AND** negative result at least one year prior **AND** meets one of the criteria above. ^{SE}
- **Asymptomatic patients without known CAD AUC Score = 7**
 - A pharmacologic MPI is indicated for those unable to exercise with previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see **DEFINITIONS** section).
 - Previously unevaluated pathologic Q waves (see **DEFINITIONS** section)
 - Previously unevaluated complete left bundle branch block

Abnormal Calcium Scores (9,11,12,13,14)

AUC Score = 7

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months⁽⁶⁾ ^{SE}
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months⁽⁶⁾ ^{SE}
- Asymptomatic patient with Coronary Calcium Agatston Score > 400. No prior stress imaging done within the last 12 months ^{SE}

Inconclusive CAD Evaluation and Obstructive CAD

REMAINS A CONCERN;

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5), (see **DEFINITIONS** section) but patient's current symptoms indicate increasing likelihood of disease **AUC score = 8**
- Exercise stress ECG with an intermediate Duke treadmill score ^{SE} (of note, SE diversion is not required for symptoms consistent with likely anginal symptoms)
- Intermediate coronary computed tomography angiography (CCTA) (40 - 70% lesions) performed less than 90 days ago. **(AUC Score = 7)**
- Non-diagnostic exercise stress test with inability to achieve target heart rate (THR) defined as greater than 85% age predicted maximal heart rate by physiologic exercise). **AUC Score = 8**
- An indeterminate (equivocal, borderline, or discordant) evaluation by prior stress imaging (SE or CMR) within the last 12 months
- Coronary stenosis of unclear significance on previous coronary angiography not previously evaluated⁽⁹⁾


Follow-Up of Patient's Post Coronary Revascularization (PCI or CABG) ⁽⁹⁾

- **Asymptomatic follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) (whichever is later) is appropriate for patients with: **(AUC = 6)** ^{SE} (of note, SE diversion is not required for post CABG patients)
 - **High risk:** diabetes with accelerated progression of CAD, CKD, PAD, prior brachytherapy, ISR, or SVG intervention.
 - a history of silent ischemia or
 - a history of a prior left main stent

OR

- For patients with high occupational risk, associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers and firefighters ^{SE} (of note, SE diversion not required for post-CABG patients)
- **New, recurrent, or worsening symptoms, treated medically or by revascularization** is an indication for stress imaging, if it will alter management for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization if no imaging stress test within the last 12 months. **(AUC Score 8)** ⁽⁶⁾

Follow-Up of Known CAD

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or $\text{FFR} \leq 0.80$ or significant stenosis in a major vessel ($\geq 50\%$ left main coronary artery or $\geq 70\%$ LAD, LCX, RCA)), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management. 

Special Diagnostic Conditions Requiring Coronary Evaluation

AUC Score = 8

Unevaluated ACS

- Prior acute coronary syndrome (with documentation in MD notes), without invasive or non-invasive coronary evaluation within last 12 months
- Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months

Heart Failure

- Newly diagnosed systolic heart failure or diastolic heart failure, *with reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned. ^(7,15,16,17) No imaging stress test done within the last 12 months.

Viability

- LVEF requiring myocardial viability assessment to assist with decisions regarding coronary revascularization **(AUC Score 9)** ^(6,9)

Suboptimal Revascularization

- MPI is being done to evaluate the effectiveness of the intervention in a high-risk patient who has undergone cardiovascular re-perfusion (CABG or Percutaneous Coronary Intervention, PCI) with suboptimal and/or incomplete revascularization results. No imaging stress test has been done within the last 12 months. **(AUC Score 7)** ^(6,9)

Arrhythmias

- Ventricular arrhythmias (**AUC Score = 7**)
 - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not immediately planned ⁽¹⁸⁾
 - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, or frequent PVCs (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed ⁽¹⁹⁾

Anti-Arrhythmic Drug Therapy

- Class IC antiarrhythmic drug
 - In the intermediate and high global risk patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide)
 - Annually in intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) ⁽²⁰⁾

Coronary Anomaly and Aneurism

- Assessment of hemodynamic significance of one of the following documented conditions:
 - Anomalous coronary arteries ⁽²¹⁾
 - Myocardial bridging of coronary artery
- Coronary aneurysms in Kawasaki's disease ⁽²²⁾ or due to atherosclerosis

Radiation and Chemotherapy

- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter ⁽²³⁾

Sarcoidosis and Amyloidosis (PYP study)

- Cardiac sarcoidosis: as a combination study with Heart PET for the evaluation and treatment of cardiac sarcoidosis ⁽²⁴⁾
- Cardiac amyloidosis: for the diagnosis of cardiac transthyretin amyloidosis (ATTR)

***Not** to be used for the diagnosis of cardiac light chain amyloidosis (AL) ⁽²⁵⁾

Prior To Elective Non-Cardiac Surgery In Asymptomatic Patient

AUC score = 8

- An intermediate or high risk surgery with of one or more risk factors (see below), AND documentation of an inability to walk (or < 4 METs) AND there has not been an imaging stress test within 1 year^(26,27,28)
 - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine > 2.0 mg/dL
 - **Surgical Risk:**
 - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
 - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
 - **Low risk surgery:** Endoscopic procedures, superficial procedure, cataract surgery, breast surgery
- Planning for any organ or stem cell transplantation is an indication for preoperative MPI, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service.^(8,29)

Post Cardiac Transplant (SE Diversion Not Required)

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

LEGISLATIVE REQUIREMENTS

State of Washington⁽³⁰⁾

Health Technology Clinical Committee 20211105A

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are covered with conditions:

- Stress echocardiography for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
 - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
 - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
 - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
 - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
 - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
 - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation
 - Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
 - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
 - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Coding

CPT Codes

78451, 78452, 78453, 78454, 78466, 78468, 78469, 78481, 78483, 78499, +0742T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Myocardial perfusion imaging is used primarily for the evaluation of coronary artery disease and determining prognosis. Myocardial perfusion imaging is a cardiac radionuclide imaging procedure that evaluates blood flow to the cardiac muscle during rest or stress. Stress may be provided by exercise or with pharmacologic agents. A variety of radionuclides may be used, including Technetium tc-99M sestamibi, thallium201 and Technetiumtc-99M tetrofosmin.

For those patients who are unable to complete the exercise protocol without achieving >85% of predicted maximal heart rate, a pharmacological nuclear stress test is recommended. This testing method uses a drug to mimic the response of the cardiovascular system to exercise. Adenosine, Persantine, Dobutamine, or Regadenoson are vasodilators used in pharmacological nuclear stress testing. A gamma camera is used to record images in planar or tomographic (single photon emission computed tomography, SPECT) projections.

High global CAD risk is defined as 10-year CAD risk of >20%. CAD equivalents (e.g., DM, PAD) can also define high risk.

10 year CAD risk (%) is defined based on the risk factors- Sex, Age, Race, Total Cholesterol, HDL Cholesterol, Systolic Blood Pressure, and Treatment for High Blood Pressure, Diabetes Mellitus, and Smoker.

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost effective manner.⁽³⁾

Appropriate Care - Median Score 7-9

May be Appropriate Care - Median Score 4-6

Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories:^(7,8,9)
 - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see **Websites for Global Cardiovascular Risk Calculators** section).
 - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):
- The medical record should provide enough detail to establish the type of chest pain:
 - **Likely Anginal symptoms** encompass chest/epigastric/shoulder/arm/jaw pain, chest pressure/discomfort occurring with exertion or emotional stress and relieved by rest, nitroglycerine or both.
 - **Less-Likely Anginal symptoms** include dyspnea, or fatigue not relieved by rest/nitroglycerin, as well as generalized fatigue or chest discomfort with a time course not indicative of angina (e.g., resolving spontaneously within seconds or lasting for an extended period unrelated to exertion).
- **Risk Factors for Coronary disease include (but not limited to):** diabetes mellitus, smoking, family history of premature CAD (men age less than 55, females less than 65), hypertension, dyslipidemia.
- Beginning 2023, the classification terms for angina were updated within the ACC's Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease to **Less Likely Anginal Symptoms** and **Likely Anginal Symptoms** as in #2. Previously, the document referred to "Typical Angina", "Atypical Angina" and "Non-Anginal" symptoms, defined by the **Diamond Forrester Table**. We still provide this information for your reference: ^(7,8,9)

Diamond Forrester Table ^(31,32)

Age (Years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

- **Very low:** < 5% pretest probability of CAD, usually not requiring stress evaluation
- **Low:** 5 - 10% pretest probability of CAD
- **Intermediate:** 10% - 90% pretest probability of CAD
- **High:** > 90% pretest probability of CAD
- An uninterpretable baseline ECG includes:⁽⁷⁾
 - ST segment depression is considered significant when there is 1 mm or more, not for non-specific ST - T wave changes
 - Ischemic looking T waves are considered significant when there are at least 2.5 mm inversions (excluding V1 and V2)
 - Bundle Branch Blocks
 - LBBB
 - RBBB or IVCD, containing ST or T wave abnormalities
 - LVH with repolarization abnormalities
 - Ventricular paced rhythm
 - Digitalis use with associated ST segment abnormalities
 - Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with an anticipated suboptimal workload
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
 - 40 ms (1 mm) wide
 - 2 mm deep
 - 25% of depth of QRS complex
- ECG Stress Test Alone versus Stress Testing with Imaging

Prominent scenarios suitable for an ECG stress test WITHOUT imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3

minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise:⁽⁹⁾

- The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG⁽⁹⁾
- The patient who is under evaluation for exercise-induced arrhythmia
- The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
- For the evaluation of syncope or presyncope during exertion⁽³³⁾

When exercise cannot be performed, pharmacologic stress can be considered.

- Duke Exercise ECG Treadmill Score⁽³⁴⁾

Calculates risk from ECG treadmill alone:

- The equation for calculating the Duke treadmill score (DTS) is: $DTS = \text{exercise time in minutes} - (5 \times \text{ST deviation in mm or } 0.1 \text{ mV increments}) - (4 \times \text{exercise angina score})$, with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
- The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of $\geq + 5$), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of $\leq - 11$) categories

- MPI may be performed without diversion to a SE in any of the following:^(9,35)

- Inability to Exercise
 - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
 - Limited functional capacity (< 4 METS) **such as one** of the following:
 - Unable to take care of their ADLs or ambulate
 - Unable to walk 2 blocks on level ground
 - Unable to climb 1 flight of stairs
- Other Comorbidities
 - Severe chronic obstructive pulmonary disease (COPD) with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
 - Poorly controlled hypertension, with systolic BP > 180 or diastolic BP > 120 (and clinical urgency not to delay MPI)
- ECG and Echo-Related Baseline Findings
 - Prior cardiac surgery (coronary artery bypass graft or valvular)
 - Documented poor acoustic imaging window
 - Left ventricular ejection fraction $\leq 40\%$

- Pacemaker or ICD
- Persistent atrial fibrillation
- Resting wall motion abnormalities that would make SE interpretation difficult
- Complete left bundle branch block (LBBB)
- Risk-Related scenarios
 - High pretest probability in suspected CAD
 - Intermediate or high global risk in patients requiring type IC antiarrhythmic drugs (prior to initiation of therapy and annually)
 - Arrhythmia risk with exercise
 - Previously unevaluated pathologic Q waves (in two contiguous leads)
- Global Risk of Cardiovascular Disease
 - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years.
 - **CAD Risk—Low**
10-year absolute coronary or cardiovascular risk less than 10%.
 - **CAD Risk—Moderate**
10-year absolute coronary or cardiovascular risk between 10% and 20%.
 - **CAD Risk—High**
10-year absolute coronary or cardiovascular risk of greater than 20%.

Websites for Global Cardiovascular Risk Calculators* (36,37,38,39,40)

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk
Reynolds Risk Score Can use if no diabetes Unique for use of family history	http://www.reynoldsriskscore.org/
Pooled Cohort Equation	http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example
ACC/AHA Risk Calculator	http://tools.acc.org/ASCVD-Risk-Estimator/

Risk Calculator	Websites for Online Calculator
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease ^(7,8,13,41)

Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).

- Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the MESA risk calculator.
- Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
 - Suggested by percentage diameter stenosis $\geq 70\%$ by angiography; intermediate lesions are 50 – 69%⁽⁹⁾
 - For a left main artery, suggested by a percentage stenosis $\geq 50\%$ ^(7,41,42)
 - FFR (fractional flow reserve) ≤ 0.80 for a major vessel^(41,42)
 - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
- FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion. Less than or equal to 0.80 is considered a significant reduction in coronary flow.

- Anginal Equivalent ^(7,33)

Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia). This may include respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Syncope per se is not an anginal equivalent.

Acronyms / Abbreviations

ADLs: Activities of daily living
 BSA: Body surface area in square meters
 CABG: Coronary artery bypass grafting
 CAD: Coronary artery disease
 CMR: Cardiac magnetic resonance imaging
 CTA: Computed tomography angiography
 ECG: Electrocardiogram
 FFR: Fractional flow reserve
 IVUS: Intravascular ultrasound
 LBBB: Left bundle-branch block
 LVEF: Left ventricular ejection fraction
 LVH: Left ventricular hypertrophy
 MI: Myocardial infarction
 MET: Estimated metabolic equivalent of exercise
 MPI: Myocardial perfusion imaging
 PCI: Percutaneous coronary intervention
 PFT: Pulmonary function test
 PVCs: Premature ventricular contractions
 SE: Stress echocardiography
 THR: Target heart rate
 VT: Ventricular tachycardia
 VF: Ventricular fibrillation
 WPW: Wolf Parkinson White

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> Added AUC Scoring to Cardiac Guidelines from published Societies. When an AUC score was not published by a Society, we assigned an AUC score of 6 based upon AUC scoring standards – this has been explained in Clinical Reasoning Anginal symptoms have been changed to ‘less likely’ and ‘likely’ to coincide with the changed National Standards Diamond Forrester Table has been taken out of the National Standards, however, it will remain in the guidelines as a historical information reference source Added new marker to the guidelines for Stress Echo (SE) to clarify when to defer to a stress echo vs. continue with the selected imaging study Added in language that there were no other stress testing done within the last 12 months

Date	Summary
May 2023	<ul style="list-style-type: none"> • Added WA legislative requirement • Removed time limitation “within past two years” for further evaluation inconclusive prior CAD evaluation • Added coronary stenosis of unclear significance on coronary angiography • Clarified indication for combination PET/MPI in evaluation of cardiac sarcoidosis • Added indication for diagnosis of ATTR amyloidosis • Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members’ health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bonow R O, Douglas P S, Buxton A E, Cohen D J, Curtis J P et al. ACCF/AHA Methodology for the Development of Quality Measures for Cardiovascular Technology. *Circulation*. 2011; 124: 1483 - 1502. 10.1161/CIR.0b013e31822935fc.
2. Fitch K, Bernstein S J, Aguilar M D, Burnand B, LaCalle J R et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
3. Hendel R C, Lindsay B D, Allen J M, Brindis R G, Patel M R et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. *Journal of the American College of Cardiology*. 2018; 71: 935 - 948. 10.1016/j.jacc.2018.01.007.
4. Hendel R C, Patel M R, Allen J M, Min J K, Shaw L J et al. Appropriate Use of Cardiovascular Technology: 2013 ACCF Appropriate Use Criteria Methodology Update: A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *Journal of the American College of Cardiology*. 2013; 61: 1305 - 1317. 10.1016/j.jacc.2013.01.025.
5. Patel M, Spertus J, Brindis R, Hendel R, Douglas P et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *Journal of the American College of Cardiology*. 2005; 46: 1606-13. doi: 10.1016/j.jacc.2005.08.030.
6. Brindis R G, Douglas P S, Hendel R C, Peterson E D, Wolk M J et al. ACCF/ASNC Appropriateness Criteria for Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging (SPECT MPI). *Journal of the American College of Cardiology*. 2005; 46: 1587 - 1605. 10.1016/j.jacc.2005.08.029.
7. Fihn S, Gardin J, Abrams J, Berra K, Blankenship J et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. 2012; 126: e354-471. 10.1161/CIR.0b013e318277d6a0.
8. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. 2013; 34: 2949-3003. 10.1093/eurheartj/ehs296.
9. Winchester D E, Maron D J, Blankstein R, Chang I C, Kirtane A J et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *Journal of Cardiovascular Magnetic Resonance*. 2023; 25. <https://doi.org/10.1186/s12968-023-00958-5>.
10. Bandettini W P, Kwong R Y, Patel A R, Plein S, S f C M R. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 multi-modality appropriate use criteria for the detection and risk assessment of chronic coronary disease. *Journal of Cardiovascular Magnetic Resonance*. 2023; 25: <https://doi.org/10.1186/s12968-023-00959-4>.
11. Budoff M, Raggi P, Beller G, Berman D, Druz R et al. Noninvasive Cardiovascular Risk Assessment of the Asymptomatic Diabetic Patient: The Imaging Council of the American College of Cardiology. *JACC Cardiovasc Imaging*. 2016; 9: 176-92. 10.1016/j.jcmg.2015.11.011.
12. Gulati M, Levy P, Mukherjee D, Amsterdam E, Bhatt D et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest

Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Cardiovasc Comput Tomogr*. 2021; 10.1016/j.jcct.2021.11.009.

13. Patel M, Calhoon J, Dehmer G, Grantham J, Maddox T et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2017 Appropriate Use Criteria for Coronary Revascularization in Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2017; 69: 2212-2241. 10.1016/j.jacc.2017.02.001.

14. Guzman A, Navarro E, Obando L, Pacheco J, Quiros K et al. Effectiveness of interventions to reverse the diagnosis of metabolic syndrome: update of a mixed treatment comparison meta-analysis. *Biomedica*. 2019; 39: 647-662. <https://doi.org/10.7705/biomedica.4684>.

15. Patel M, White R, Abbara S, Bluemke D, Herfkens R et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.

16. Yancy C, Jessup M, Bozkurt B, Butler J, Casey D J et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2013; 62: e147-239. 10.1016/j.jacc.2013.05.019.

17. Doherty John U, Kort S, Mehran R, Schoenhagen P, Soman P et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease. *Journal of the American College of Cardiology*. 2019; 73: 488-516. 10.1016/j.jacc.2018.10.038.

18. Lasica R, Djukanovic L, Savic L, Krljanac G, Zdravkovic M et al. Update on Myocarditis: From Etiology and Clinical Picture to Modern Diagnostics and Methods of Treatment. 2023; 13: 10.3390/diagnostics13193073.

19. Zimetbaum PJ, Wylie JV. Nonsustained ventricular tachycardia: Clinical manifestations, evaluation, and management. *UpToDate*. August 26, 2022; 2023:

20. Reiffel J, Camm A, Belardinelli L, Zeng D, Karwatowska-Prokopczuk E et al. The HARMONY Trial: Combined Ranolazine and Dronedarone in the Management of Paroxysmal Atrial Fibrillation: Mechanistic and Therapeutic Synergism. *Circ Arrhythm Electrophysiol*. Oct 2015; 8: 1048-56. 10.1161/circep.115.002856.

21. Gräni C, Bigler M R, Kwong R Y. Noninvasive Multimodality Imaging for the Assessment of Anomalous Coronary Artery. *Current Cardiology Reports*. 2023; 25: 1233 - 1246. 10.1007/s11886-023-01948-w.

22. Newburger J, Takahashi M, Burns J. Kawasaki Disease. *J Am Coll Cardiol*. 2016; 67: 1738-49. 10.1016/j.jacc.2015.12.073.

23. Lancellotti P, Nkomo V, Badano L, Bergler-Klein J, Bogaert J et al. Expert consensus for multimodality imaging evaluation of cardiovascular complications of radiotherapy in adults: a report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Eur Heart J Cardiovasc Imaging*. Aug 2013; 14: 721-40. 10.1093/ehjci/jet123.

24. Tersalvi G, Beltrani V, Gröbler M R, Molteni A, Cristoforetti Y et al. Positron Emission Tomography in Heart Failure: From Pathophysiology to Clinical Application. 2023; 10: 10.3390/jcdd10050220.
25. Tahara N, Lairez O, Endo J, Okada A, Ueda M et al. 99mTechnetium-pyrophosphate scintigraphy: a practical guide for early diagnosis of transthyretin amyloid cardiomyopathy. ESC Heart Failure. 2022; 9: 251 - 262. <https://doi.org/10.1002/ehf2.13693>.
26. Fleisher L, Fleischmann K, Auerbach A, Barnason S, Beckman J et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. J Am Coll Cardiol. 2014; 64: e77-137. 10.1016/j.jacc.2014.07.944.
27. Kristensen S, Knuuti J, Saraste A, Anker S, Bøtker H et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). Eur Heart J. 2014; 35: 2383-431. 10.1093/eurheartj/ehu282.
28. Velasco A, Reyes E, Hage F. Guidelines in review: Comparison of the 2014 ACC/AHA guidelines on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery and the 2014 ESC/ESA guidelines on noncardiac surgery: Cardiovascular assessment and management. J Nucl Cardiol. 02 2017; 24: 165-170. 10.1007/s12350-016-0643-8.
29. Lentine K, Costa S, Weir M, Robb J, Fleisher L et al. Cardiac disease evaluation and management among kidney and liver transplantation candidates: a scientific statement from the American Heart Association and the American College of Cardiology Foundation. J Am Coll Cardiol. 2012; 60: 434-80. 10.1016/j.jacc.2012.05.008.
30. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease. [Final Adoption: March 18, 2022]. 2022.
31. Diamond G, Forrester J. Analysis of probability as an aid in the clinical diagnosis of coronary-artery disease. The New England journal of medicine. 1979; 300: 1350 - 1358. 10.1056/nejm197906143002402.
32. Wolk M, Bailey S, Doherty J, Douglas P, Hendel R et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2014; 63: 380-406. 10.1016/j.jacc.2013.11.009.
33. Shen W, Sheldon R, Benditt D, Cohen M, Forman D et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol. 2017; 70: 620-663. 10.1016/j.jacc.2017.03.002.
34. Shaw L, Peterson E, Shaw L, Kesler K, DeLong E et al. Use of a prognostic treadmill score in identifying diagnostic coronary disease. Circulation. 1998; 98: 1622-30. doi: 10.1161/01.cir.98.16.1622.

35. Henzlova M, Duvall W, Einstein A, Travin M, Verberne H. ASNC imaging guidelines for SPECT nuclear cardiology procedures: Stress, protocols, and tracers. *J Nucl Cardiol*. 2016; 23: 606-39. 10.1007/s12350-015-0387-x.
36. Arnett D, Blumenthal R, Albert M, Buroker A, Goldberger Z et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019; 74: e177-e232. 10.1016/j.jacc.2019.03.010.
37. D'Agostino R S, Vasan R, Pencina M, Wolf P, Cobain M et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation*. 2008; 117: 743-53. 10.1161/circulationaha.107.699579.
38. Goff D J, Lloyd-Jones D, Bennett G, Coady S, D'Agostino R et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014; 129: S49-73. 10.1161/01.cir.0000437741.48606.98.
39. McClelland R, Jorgensen N, Budoff M, Blaha M, Post W et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol*. 2015; 66: 1643-53. 10.1016/j.jacc.2015.08.035.
40. Ridker P, Buring J, Rifai N, Cook N. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. *Jama*. 2007; 297: 611-9. 10.1001/jama.297.6.611.
41. Shlofmitz E, Ali Z A, Maehara A, Mintz G S, Shlofmitz R. Intravascular Imaging-Guided Percutaneous Coronary Intervention. *Circulation: Cardiovascular Interventions*. 2020; 13: 10.1161/CIRCINTERVENTIONS.120.008686.
42. Lotfi A, Davies J, Fearon W, Grines C, Kern M. Focused update of expert consensus statement: Use of invasive assessments of coronary physiology and structure: A position statement of the society of cardiac angiography and interventions. *Catheter Cardiovasc Interv*. 2018; 92: 336-347. 10.1002/ccd.27672.

*Evolut	
Clinical guidelines MYOCARDIAL PERFUSION IMAGING (aka NUCLEAR CARDIAC IMAGING STUDY)	Original Date: October 2009
CPT Codes: 78451, 78452, 78453, 78454, 78466, 78468, 78469, 78481, 78483, 78499, +0742T	Last Revised Date: May 2023
Guideline Number: Evolent_CG_024	Implementation Date: January 2024

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

This guideline is for stress imaging, specifically myocardial perfusion imaging (MPI), with appropriate preference for suitable alternatives, such as stress echocardiography (SE), when more suitable, unless otherwise stated (refer to [Overview](#)).

INDICATIONS for MPI¹⁻⁴

SUSPECTED CORONARY ARTERY DISEASE (CAD)

- **Symptomatic patients without known CAD (use [Diamond Forrester Table](#))**
 - Low or intermediate pretest probability and unable to exercise (SE diversion not required)
 - High pretest probability (SE diversion not required)
 - Repeat testing in a patient with new or worsening symptoms and negative result at least one year prior AND meets one of the criteria above
- **Asymptomatic patients without known CAD (SE diversion not required)**
 - Previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see [Overview section](#))
 - Previously unevaluated pathologic Q waves (see [Overview section](#))

- Previously unevaluated complete left bundle branch block

ABNORMAL CALCIUM SCORES (CAC)⁴⁻⁸

- ASYMPTOMATIC patient with a calcium score > 400, not previously evaluated
- SYMPTOMATIC patient with prior CAC \geq 100

INCONCLUSIVE CAD EVALUATION AND OBSTRUCTIVE CAD REMAINS A CONCERN

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5), ([see section in Overview](#)) but patient's current symptoms indicate an intermediate or high pretest probability (SE diversion not required for high pretest probability)
- Exercise stress ECG with an intermediate Duke treadmill score (SE diversion not required for symptoms consistent with high pretest probability)
- Intermediate coronary computed tomography angiography (CCTA) (e.g., 40 - 70% lesions)
- Non-diagnostic exercise stress test with inability to achieve target heart rate (THR) (SE diversion not required)
- An indeterminate (equivocal, borderline, or discordant) evaluation by prior stress imaging (SE or CMR) (SE diversion not required)
- Coronary stenosis of unclear significance on previous coronary angiography⁴

FOLLOW-UP OF PATIENT'S POST CORONARY REVASCULARIZATION (PCI or CABG)⁴

- **Asymptomatic follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) (whichever is later) is appropriate for patients with a history of silent ischemia or a history of a prior left main stent.⁴ (SE diversion not required for CABG)

OR

For patients with high occupational risk, associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers and firefighters (SE diversion not required)

- **New, recurrent, or worsening symptoms post coronary revascularization** is an indication for stress imaging, if it will alter management (SE diversion not required for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization).

FOLLOW-UP OF KNOWN CAD

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or FFR \leq 0.80 or significant stenosis in a major vessel (\geq 50% left main coronary artery or \geq 70 % LAD, LCX, RCA)), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management

SPECIAL DIAGNOSTIC CONDITIONS REQUIRING CORONARY EVALUATION

- Prior acute coronary syndrome (with documentation in MD notes), without invasive or non-invasive coronary evaluation (SE diversion not required)
- Newly diagnosed systolic heart failure or diastolic heart failure, *with reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned (SE diversion not required)^{1, 9-11}
- LVEF requiring myocardial viability assessment to assist with decisions regarding coronary revascularization^{9, 12}
- Ventricular arrhythmias
 - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not immediately planned¹³ (SE diversion not required)
 - Nonsustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, or frequent PVCs (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed¹⁴
- Prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide), as well as annually in intermediate and high global risk patients (SE diversion not required)¹⁵
- Assessment of hemodynamic significance of one of the following documented conditions:
 - Anomalous coronary arteries¹⁶
 - Myocardial bridging of coronary artery
- Coronary aneurysms in Kawasaki's disease¹⁷ or due to atherosclerosis
- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter¹⁸
- Cardiac sarcoidosis: as a combination study with Heart PET for the evaluation and treatment of cardiac sarcoidosis.¹⁹
- Cardiac amyloidosis: for the diagnosis of cardiac transthyretin amyloidosis (ATTR). **Not** to be used for the diagnosis of cardiac light chain amyloidosis (AL)²⁰

PRIOR TO ELECTIVE NON-CARDIAC SURGERY IN ASYMPTOMATIC PATIENT

- An intermediate or high risk surgery with of one or more risk factors (see below), AND documentation of an inability to walk (or <4 METs) AND there has not been an imaging stress test within 1 year²¹⁻²³
 - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine >2.0 mg/dL.
 - **Surgical Risk:**
 - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
 - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery

- **Low risk surgery:** Endoscopic procedures, superficial procedure, cataract surgery, breast surgery
- Planning for any organ or stem cell transplantation is an indication for preoperative MPI, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service.^{3, 24}

POST CARDIAC TRANSPLANT (*SE diversion not required*)

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography
- After the first five years post cardiac transplantation, patients with documented transplant coronary vasculopathy can be screened annually unless invasive coronary arteriography is planned

BACKGROUND

This guideline is for stress imaging, specifically myocardial perfusion imaging (MPI), with appropriate preference for alternatives, such as stress echocardiography (SE) or stress ECG alone when more suitable (see section below).

Radionuclide myocardial perfusion imaging (MPI) allows for evaluation of cardiac perfusion at rest and at exercise, as well as using pharmacologic agents for the diagnosis and management of coronary artery disease. With radionuclide MPI, pharmacologic stress may be performed with an inotropic agent or vasodilator. These agents are indicated for patients who cannot reach an adequate endpoint with physical exercise stress testing.²⁵

Stable patients without known CAD fall into 2 categories^{1, 3, 4}:

- **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see [Websites for Global Cardiovascular Risk Calculators](#) section).
- **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):

The 3 Types of Chest Pain or Discomfort

- **Typical Angina (Definite)** is defined as including all **3** characteristics:
 - Substernal chest pain or discomfort with characteristic quality and duration
 - Provoked by exertion or emotional stress
 - Relieved by rest and/or nitroglycerine
- **Atypical Angina (Probable)** has only **2** of the above characteristics
- **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics

The medical record should provide enough detail to establish the type of chest pain. From those details, The Pretest Probability of obstructive CAD is estimated from the [Diamond Forrester Table](#) below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability^{1, 4}:

Diamond Forrester Table

Age (Years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

- **Very low:** < 5% pretest probability of CAD, usually not requiring stress evaluation
- **Low:** 5 - 10% pretest probability of CAD
- **Intermediate:** 10% - 90% pretest probability of CAD
- **High:** > 90% pretest probability of CAD

OVERVIEW

MPI may be performed without diversion to a SE in any of the following^{4, 26}:

- Inability to Exercise
 - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
 - Limited functional capacity (< 4 METS) **such as one** of the following:
 - Unable to take care of their ADLs or ambulate
 - Unable to walk 2 blocks on level ground
 - Unable to climb 1 flight of stairs
- Other Comorbidities
 - Severe chronic obstructive pulmonary disease (COPD) with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
 - Poorly controlled hypertension, with systolic BP > 180 or diastolic BP > 120 (and clinical urgency not to delay MPI)
- ECG and Echo-Related Baseline Findings

Abbreviations

ADLs	Activities of daily living
BSA	Body surface area in square meters
CABG	Coronary artery bypass grafting
CAD	Coronary artery disease
CMR	Cardiac magnetic resonance imaging
CTA	Computed tomography angiography
ECG	Electrocardiogram
FFR	Fractional flow reserve
IVUS	Intravascular ultrasound
LBBB	Left bundle-branch block
LVEF	Left ventricular ejection fraction
LVH	Left ventricular hypertrophy
MI	Myocardial infarction
MET	Estimated metabolic equivalent of exercise
MPI	Myocardial perfusion imaging
PCI	Percutaneous coronary intervention
PFT	Pulmonary function test
PVCs	Premature ventricular contractions
SE	Stress echocardiography
THR	Target heart rate
VT	Ventricular tachycardia
VF	Ventricular fibrillation
WPW	Wolf Parkinson White

Abbreviations

ADLs	Activities of daily living
BSA	Body surface area in square meters
CABG	Coronary artery bypass grafting
CAD	Coronary artery disease
CMR	Cardiac magnetic resonance imaging
CTA	Computed tomography angiography
ECG	Electrocardiogram
FFR	Fractional flow reserve
IVUS	Intravascular ultrasound
LBBB	Left bundle-branch block
LVEF	Left ventricular ejection fraction
LVH	Left ventricular hypertrophy
MI	Myocardial infarction
MET	Estimated metabolic equivalent of exercise
MPI	Myocardial perfusion imaging
PCI	Percutaneous coronary intervention
PFT	Pulmonary function test
PVCs	Premature ventricular contractions
SE	Stress echocardiography
THR	Target heart rate
VT	Ventricular tachycardia
VF	Ventricular fibrillation
WPW	Wolf Parkinson White

REFERENCES

1. Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. Dec 18 2012;126(25):e354-471. doi:10.1161/CIR.0b013e318277d6a0
2. Hendel RC, Berman DS, Di Carli MF, et al. ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009 Appropriate Use Criteria for Cardiac Radionuclide Imaging: A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the American Society of Nuclear Cardiology, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the Society of Cardiovascular Computed Tomography, the Society for Cardiovascular Magnetic Resonance, and the Society of Nuclear Medicine. *J Am Coll Cardiol*. Jun 9 2009;53(23):2201-29. doi:10.1016/j.jacc.2009.02.013
3. Montalescot G, Sechtem U, Achenbach S, et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. Oct 2013;34(38):2949-3003. doi:10.1093/eurheartj/ehs296
4. Wolk MJ, Bailey SR, Doherty JU, et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Feb 4 2014;63(4):380-406. doi:10.1016/j.jacc.2013.11.009
5. Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Cardiovasc Comput Tomogr*. Dec 01 2021;doi:10.1016/j.jcct.2021.11.009
6. Patel MR, Calhoon JH, Dehmer GJ, et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2017 Appropriate Use Criteria for Coronary Revascularization in Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. May 2 2017;69(17):2212-2241. doi:10.1016/j.jacc.2017.02.001
7. Budoff MJ, Raggi P, Beller GA, et al. Noninvasive Cardiovascular Risk Assessment of the Asymptomatic Diabetic Patient: The Imaging Council of the American College of Cardiology. *JACC Cardiovasc Imaging*. Feb 2016;9(2):176-92. doi:10.1016/j.jcmg.2015.11.011

8. Aguilar-Salinas CA, Rojas R, Gomez-Perez FJ, et al. Analysis of the agreement between the World Health Organization criteria and the National Cholesterol Education Program-III definition of the metabolic syndrome: results from a population-based survey. *Diabetes Care*. May 2003;26(5):1635.
9. Patel MR, White RD, Abbara S, et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. May 28 2013;61(21):2207-31. doi:10.1016/j.jacc.2013.02.005
10. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. Oct 15 2013;62(16):e147-239. doi:10.1016/j.jacc.2013.05.019
11. Doherty John U, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease. *Journal of the American College of Cardiology*. 2019/02/05 2019;73(4):488-516. doi:10.1016/j.jacc.2018.10.038
12. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. May 3 2022;145(18):e876-e894. doi:10.1161/cir.0000000000001062
13. Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Oct 2 2018;72(14):e91-e220. doi:10.1016/j.jacc.2017.10.054
14. Zimetbaum PJ, Wylie JV. Nonsustained ventricular tachycardia: Clinical manifestations, evaluation, and management. Wolters Kluwer. Updated August 26, 2022. Accessed February 2, 2023. <https://www.uptodate.com/contents/nonsustained-ventricular-tachycardia-clinical-manifestations-evaluation-and-management>
15. Reiffel JA, Camm AJ, Belardinelli L, et al. The HARMONY Trial: Combined Ranolazine and Dronedarone in the Management of Paroxysmal Atrial Fibrillation: Mechanistic and Therapeutic Synergism. *Circ Arrhythm Electrophysiol*. Oct 2015;8(5):1048-56. doi:10.1161/circep.115.002856
16. Gräni C, Buechel RR, Kaufmann PA, Kwong RY. Multimodality Imaging in Individuals With Anomalous Coronary Arteries. *JACC Cardiovasc Imaging*. Apr 2017;10(4):471-481. doi:10.1016/j.jcmg.2017.02.004
17. Newburger JW, Takahashi M, Burns JC. Kawasaki Disease. *J Am Coll Cardiol*. Apr 12 2016;67(14):1738-49. doi:10.1016/j.jacc.2015.12.073
18. Lancellotti P, Nkomo VT, Badano LP, et al. Expert consensus for multi-modality imaging evaluation of cardiovascular complications of radiotherapy in adults: a report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Eur Heart J Cardiovasc Imaging*. Aug 2013;14(8):721-40. doi:10.1093/ehjci/jet123
19. Skali H, Schulman AR, Dorbala S. 18F-FDG PET/CT for the assessment of myocardial sarcoidosis. *Curr Cardiol Rep*. Apr 2013;15(4):352.

20. Gillmore JD, Maurer MS, Falk RH, et al. Nonbiopsy Diagnosis of Cardiac Transthyretin Amyloidosis. *Circulation*. Jun 14 2016;133(24):2404-12. doi:10.1161/circulationaha.116.021612
21. Kristensen SD, Knuuti J, Saraste A, et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur Heart J*. Sep 14 2014;35(35):2383-431. doi:10.1093/eurheartj/ehu282
22. Fleisher LA, Fleischmann KE, Auerbach AD, et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. *J Am Coll Cardiol*. Dec 09 2014;64(22):e77-137. doi:10.1016/j.jacc.2014.07.944
23. Velasco A, Reyes E, Hage FG. Guidelines in review: Comparison of the 2014 ACC/AHA guidelines on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery and the 2014 ESC/ESA guidelines on noncardiac surgery: Cardiovascular assessment and management. *J Nucl Cardiol*. 02 2017;24(1):165-170. doi:10.1007/s12350-016-0643-8
24. Lentine KL, Costa SP, Weir MR, et al. Cardiac disease evaluation and management among kidney and liver transplantation candidates: a scientific statement from the American Heart Association and the American College of Cardiology Foundation. *J Am Coll Cardiol*. Jul 31 2012;60(5):434-80. doi:10.1016/j.jacc.2012.05.008
25. Pagnanelli RA, Camposano HL. Pharmacologic Stress Testing with Myocardial Perfusion Imaging. *J Nucl Med Technol*. Dec 2017;45(4):249-252. doi:10.2967/jnmt.117.199208
26. Henzlova MJ, Duvall WL, Einstein AJ, Travin MI, Verberne HJ. ASNC imaging guidelines for SPECT nuclear cardiology procedures: Stress, protocols, and tracers. *J Nucl Cardiol*. Jun 2016;23(3):606-39. doi:10.1007/s12350-015-0387-x
27. Shen WK, Sheldon RS, Benditt DG, et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Aug 1 2017;70(5):620-663. doi:10.1016/j.jacc.2017.03.002
28. Mark DB, Hlatky MA, Harrell FE, Jr., Lee KL, Califf RM, Pryor DB. Exercise treadmill score for predicting prognosis in coronary artery disease. *Ann Intern Med*. Jun 1987;106(6):793-800. doi:10.7326/0003-4819-106-6-793
29. McClelland RL, Jorgensen NW, Budoff M, et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol*. Oct 13 2015;66(15):1643-53. doi:10.1016/j.jacc.2015.08.035
30. Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. Sep 10 2019;74(10):e177-e232. doi:10.1016/j.jacc.2019.03.010
31. D'Agostino RB, Sr., Vasan RS, Pencina MJ, et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation*. Feb 12 2008;117(6):743-53. doi:10.1161/circulationaha.107.699579

32. Goff DC, Jr., Lloyd-Jones DM, Bennett G, et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. Jun 24 2014;129(25 Suppl 2):S49-73. doi:10.1161/01.cir.0000437741.48606.98
33. Ridker PM, Buring JE, Rifai N, Cook NR. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. *Jama*. Feb 14 2007;297(6):611-9. doi:10.1001/jama.297.6.611
34. Mintz G. IVUS in PCI Guidance. American College of Cardiology. Updated June 13, 2016. Accessed January 27, 2023. <https://www.acc.org/latest-in-cardiology/articles/2016/06/13/10/01/ivus-in-pci-guidance>
35. Patel MR, Bailey SR, Bonow RO, et al. ACCF/SCAI/AATS/AHA/ASE/ASNC/HFSA/HRS/SCCM/SCCT/SCMR/STS 2012 appropriate use criteria for diagnostic catheterization: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, Society for Cardiovascular Angiography and Interventions, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, Society of Thoracic Surgeons. *J Thorac Cardiovasc Surg*. Jul 2012;144(1):39-71. doi:10.1016/j.jtcvs.2012.04.013
36. Mintz G. IVUS in PCI Guidance. American College of Cardiology. Updated June 13, 2016. Accessed October 22, 2021. <https://www.acc.org/latest-in-cardiology/articles/2016/06/13/10/01/ivus-in-pci-guidance>
37. Lotfi A, Davies JE, Fearon WF, Grines CL, Kern MJ, Klein LW. Focused update of expert consensus statement: Use of invasive assessments of coronary physiology and structure: A position statement of the society of cardiac angiography and interventions. *Catheter Cardiovasc Interv*. Aug 1 2018;92(2):336-347. doi:10.1002/ccd.27672

POLICY HISTORY

Date	Summary
May 2023	<ul style="list-style-type: none"> • Removed time limitation “within past two years” for further evaluation inconclusive prior CAD evaluation • Added coronary stenosis of unclear significance on coronary angiography • Clarified indication for combination PET/MPI in evaluation of cardiac sarcoidosis • Added indication for diagnosis of ATTR amyloidosis • Added statement on clinical indications not addressed in this guideline
February 2022	<ul style="list-style-type: none"> • Moved the sentence regarding utilization of suitable alternatives such as Stress Echocardiography to the General Information section • Placed Link to Overview Section in General Information • Clarified evaluation of possible ischemia in newly diagnosed heart failure by stating “with reasonable suspicion of cardiac ischemia (prior events, risk factors, or symptoms and signs)” • Clarified “intermediate lesions are 50-69%” for ischemia-producing disease • Added stress imaging approval for calcium score > 100 with low to intermediate probability symptoms • Deleted the requirement for diabetes when calcium score > 400 for stress imaging • Deleted “≤50%” from “LVEF ≤50% requiring myocardial viability assessment to assist with decisions regarding coronary revascularization” • Added Calcium score section: <ul style="list-style-type: none"> ○ Added stress imaging approval for calcium score > 100 with symptoms consistent with low to intermediate pretest probability • Added reminder <u>(SE diversion not required for CABG)</u> • Changed preoperative guideline to include intermediate risk surgery with one or more risk factors AND documentation of an inability to walk (or <4 METs) AND there has not been an imaging stress test within 1 year • Changed solid organ transplant guideline to include stem cell transplant and “any” organ transplant • Added definition of surgical risk to preop guidelines • In Background section clarified the requirement for description of chest pain by adding sentence “The medical record should provide enough detail to establish the type of chest pain.” • Added definition of Q waves

	<ul style="list-style-type: none"> • Deleted sentence regarding calcium scoring within the Global Risk Section • Deleted sentence regarding using calcium score solely for risk stratification • Deleted IFR references
--	--

Reviewed / Approved by Clinical Guideline Committee

Disclaimer: *Evolut Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment and medical advice. Evolut uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolut Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolut reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. **Members should contact their Plan customer service representative for specific coverage information.***



EVOLENT CLINICAL GUIDELINE 072 FOR HEART (CARDIAC) PET

Guideline or Policy Number: Evolent_CG_072	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1999 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 1999	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
SPECIAL NOTE	3
CLINICAL REASONING.....	3
INDICATIONS FOR HEART PET	4
Suspected CAD	4
Abnormal Calcium Scores (CAC)	4
Inconclusive CAD Evaluation and Obstructive CAD remain a Concern	4
Follow-Up Of Patient's Post Coronary Revascularization (PCI or CABG)	5
Follow-Up Of Known CAD	5
Special Diagnostic Conditions Requiring Coronary Evaluation	6
Prior To Elective Non-Cardiac Surgery	8
Post Cardiac Transplant	8
LEGISLATIVE REQUIREMENTS	9
STATE OF WASHINGTON	9
Health Technology Clinical Committee 20211105A	9
CODING AND STANDARDS	10
CODING	10
CPT Codes	10
APPLICABLE LINES OF BUSINESS.....	10
BACKGROUND	10
General Overview	10
AUC Score	11
Definitions	11
Acronyms / Abbreviations	15
POLICY HISTORY	16
Summary	16
LEGAL AND COMPLIANCE	17



GUIDELINE APPROVAL	17
<i>Committee</i>	17
DISCLAIMER.....	17
REFERENCES.....	18

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

Indications for determining medical necessity for myocardial perfusion imaging (MPI) with appropriate preference for suitable alternatives, such as stress echocardiography (SE), when more suitable, unless otherwise stated (see **Definitions** section).

Indicated when all the criteria for MPI are met **AND** there is likely to be equivocal imaging results because of BMI, large breasts or implants, mastectomy, chest wall deformity, pleural or pericardial effusion, or prior thoracic surgery or results of a prior MPI. ^(1,2) **(AUC 7)** ⁽³⁾

See **Legislative Requirements** for specific mandates in Washington State.

CLINICAL REASONING

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(4,5,6,7,8)

INDICATIONS FOR HEART PET (9,10,11)

Suspected CAD

When neither SE nor MPI have provided or are expected to provide optimal imaging

- **Symptomatic patients without known CAD** (use Diamond Forrester Table) (**AUC 9**) ⁽³⁾
 - Low or intermediate pretest probability and unable to exercise (SE diversion not required)
 - High pretest probability (SE diversion not required)
 - Repeat testing in a patient with new or worsening symptoms and negative result at least one year ago **AND** meets one of the criteria above
- **Asymptomatic patients without known CAD** (SE diversion not required)
 - Previously unevaluated ECG evidence of possible myocardial ischemia including substantial ischemic ST segment or T wave abnormalities (see **Background** section)
 - Previously unevaluated pathologic Q waves (see **Background** section)
 - Unevaluated complete left bundle branch block (**AUC 8**) ⁽³⁾

Abnormal Calcium Scores (CAC) (9,12,13,14,15)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months ⁽¹⁶⁾
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months ⁽¹⁶⁾
- Asymptomatic patient with Coronary Calcium Agatston Score > 400. No prior MPI done within the last 12 months

Inconclusive CAD Evaluation and Obstructive CAD remain a Concern

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5) (see **Background** section) but patient's current symptoms indicate an intermediate or high pretest probability (SE diversion not required for high pretest probability)
- Exercise stress ECG with an intermediate Duke treadmill score (SE diversion not required for symptoms consistent with high pretest probability) (**AUC 8**) ⁽³⁾

- Inconclusive/borderline coronary computed tomography angiography (CCTA) or SPECT nuclear stress testing (e.g., 40 - 70% lesions) (**AUC 9**)⁽³⁾
- Cardiac PET stress-rest perfusion and metabolic activity study (with ¹⁸F-FDG PET) is appropriate in patients with ischemic cardiomyopathy to determine myocardial viability prior to revascularization following an inconclusive SPECT^(9,17) (**AUC 9**)⁽³⁾
- Non-diagnostic exercise stress test with physical inability to achieve target heart rate (THR) (SE diversion not required)
- An intermediate evaluation by prior stress imaging (SE diversion not required)
- Coronary stenosis of unclear significance on previous coronary angiography⁽⁹⁾ (**AUC 8**)⁽³⁾

Follow-Up Of Patient's Post Coronary Revascularization (PCI or CABG)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging⁽⁹⁾

- **Asymptomatic, follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI), (whichever is later), is appropriate only for patients with:
 - High risk: diabetes with accelerated progression of CAD, CKD, PAD, prior brachytherapy, ISR, or SVG intervention.
 - a history of silent ischemia or
 - a history of a prior left main stent

OR

- For patients with high occupational risk (e.g., associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers, and firefighters)

New, recurrent, or worsening symptoms post coronary revascularization are an indication for stress imaging, if it will alter management (SE diversion not required for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization)

Follow-Up Of Known CAD⁽⁹⁾

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or FFR \leq 0.80 or significant stenosis in a major vessel (\geq 50% left main coronary artery or \geq 70% LAD, LCX or RCA)), over two years ago,



without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management

Special Diagnostic Conditions Requiring Coronary Evaluation

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Unevaluated ACS**
 - Prior acute coronary syndrome (as documented in MD notes), without subsequent invasive or non-invasive coronary evaluation within the last 12 months
 - Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months
- **Heart Failure**
 - Newly diagnosed systolic heart failure or diastolic heart failure, with *reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned or adequate stress imaging has been done within the last 12 months ^(10,18,19) **(AUC 9)** ⁽³⁾
- **Viability**
 - Reduced LVEF $\leq 50\%$ requiring myocardial viability assessment to assist with decisions regarding coronary revascularization. (Diversion from PET not required when LVEF less than or equal to 40%) ^(18,19,20) **(AUC 9)** ⁽³⁾
- **Ischemia and Nonobstructive Coronary Artery Disease (INOCA)**
 - To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA), as documented in provider notes (*no MPI diversion required*).
- **Arrhythmias**
 - Ventricular arrhythmias
 - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not the immediately planned test ⁽²¹⁾
 - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, frequent PVC's (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed

- **Anti-arrhythmic Drug Therapy**

- Class IC antiarrhythmic drug
 - In the intermediate and high global risk patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide)
 - Annually for intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) ⁽²²⁾ **(AUC 7)** ⁽³⁾

- **Coronary Anomaly and Aneurism**

- Assessment of hemodynamic significance of one of the following documented conditions: ⁽²³⁾
 - Anomalous coronary arteries ⁽²⁴⁾
 - Muscle bridging of coronary artery ^(9,25)
- Coronary aneurysms in Kawasaki's disease ⁽²⁶⁾ or due to atherosclerosis

- **Radiation**

- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter ⁽²⁷⁾

- **Cardiac Sarcoidosis** ^(28,29,30)

- May be approved as a combination study with MPI for the evaluation and treatment of sarcoidosis ⁽³¹⁾
 - Evaluation and therapy monitoring in patients with sarcoidosis, after documentation of suspected cardiac involvement by echo or ECG, when CMR has not been performed
 - Evaluation of suspected cardiac sarcoid, after CMR has shown equivocal or negative findings in the setting of a high clinical suspicion ⁽³⁰⁾
 - Evaluation of CMR findings showing highly probable cardiac sarcoidosis, when PET could serve to identify inflammation and the consequent potential role for immunosuppressive therapy ⁽³⁰⁾ **(AUC 9)** ⁽³⁾
 - Initial and follow-up PET in monitoring therapy for cardiac sarcoid with immunosuppressive therapy, typically about 4 times over 2 years

- **Infective Endocarditis**

- In suspected infective endocarditis with moderate to high probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when TTE and TEE have been inconclusive with respect to diagnosis of infective endocarditis or characterization of paravalvular invasive complications ^(32,33)

- **Aortitis**

- For diagnosis and surveillance of Aortitis, PET/CT or PET/MRI[‡] hybrid imaging⁽³⁴⁾
- [‡]**NOTE:** If PET/MR study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required.

Prior To Elective Non-Cardiac Surgery

When neither SE nor MPI have provided or are expected to provide optimal imaging

- An intermediate or high-risk surgery with of one or more risk factors (see below), **AND** documentation of an inability to walk (or < 4 METs) **AND** there has not been an imaging stress test within 1 year^(35,36,37)
 - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine >2.0 mg/dL.
 - **Surgical Risk:**
 - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
 - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
 - **Low risk surgery:** Endoscopic procedures, superficial procedure, cataract surgery, breast surgery
- Planning for any organ or stem cell transplantation is an indication for preoperative stress imaging, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service⁽³⁸⁾

Post Cardiac Transplant

SE diversion not required⁽³⁹⁾

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

LEGISLATIVE REQUIREMENTS

State of Washington ⁽⁴⁰⁾

Health Technology Clinical Committee 20211105A

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
 - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
 - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
 - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
 - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
 - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
 - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation



- Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
 - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
 - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Coding

CPT Codes

78459, 78491, 78492, +78434

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

General Overview ^(1,2)

A PET study is a diagnostic test used to evaluate blood flow to the heart. During the test, a small amount of radioactive tracer is injected into a vein. A special camera, called a gamma camera, detects the radiation released by the tracer to produce computer images of the heart. Combined with a medication, the test can help determine if there is adequate blood flow to the heart during activity versus at rest. The medication simulates exercise for patients unable to exercise on a treadmill or stationary cycle.

PET perfusion studies illustrate myocardial blood flow by demonstrating tracer uptake. PET metabolic evaluation studies are used to demonstrate inflammation produced by infiltrative disease such as sarcoidosis, but also enhance the detection of viable (hibernating) myocardium. Hybrid PET-CT scanning combines anatomical information with blood flow assessment and is useful for assessing viable myocardium, especially in CHF patients with global ischemia, or in patients with multivessel diffuse coronary artery disease as opposed to focal stenotic lesions.

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. ⁽⁴⁾

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories: ^(9,10,11)
 - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
 - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):
- The THREE Types of Chest Pain or Discomfort
 - **Typical Angina (Definite)** is defined as including all **3** characteristics:
 - Substernal chest pain or discomfort with characteristic quality and duration
 - Provoked by exertion or emotional stress
 - Relieved by rest and/or nitroglycerine
 - **Atypical Angina (Probable)** has only **2** of the above characteristics
 - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics
- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of obstructive CAD is estimated from the Diamond Forrester Table below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability: ^(9,10,11)

Diamond Forrester Table ^(41,42)

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes: ⁽¹⁰⁾
 - ST segment depression 1 mm or more; (not for non-specific ST- T wave changes)
 - Ischemic looking T waves; at least 2.5 mm inversions (excluding V1 and V2)
 - Bundle Branch Blocks
 - LBBB
 - RBBB or IVCD, either containing ST or T wave abnormalities (see above)
 - LVH with repolarization abnormalities
 - Ventricular paced rhythm
 - Digitalis use with associated ST segment abnormalities
 - Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with an anticipated suboptimal workload
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
 - 40 ms (1 mm) wide
 - 2 mm deep
 - 25% of depth of QRS complex
- ECG Stress Test Alone versus Stress Testing with Imaging
 - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise: ⁽⁹⁾
 - The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG ⁽⁹⁾
 - The patient who is under evaluation for exercise-induced arrhythmia
 - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription

- For the evaluation of syncope or presyncope during exertion ⁽⁴³⁾
- Duke Exercise ECG Treadmill Score ⁽⁴⁴⁾
 - Calculates risk from ECG treadmill alone:
 - The equation for calculating the Duke treadmill score (DTS) is: $DTS = \text{exercise time in minutes} - (5 \times \text{ST deviation in mm or } 0.1 \text{ mV increments}) - (4 \times \text{exercise angina score})$, with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
 - The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of $\geq + 5$), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of $\leq - 11$) categories
- Coronary application of PET includes evaluation of stable patients without known CAD, who fall into two categories ^(9,10,11)
 - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
 - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant ($\geq 50\%$) CAD (below)
- An uninterpretable baseline ECG includes: ⁽¹⁰⁾
 - ST segment depression 1 mm or more (not for non-specific ST- T wave changes)
 - Ischemic-looking T waves; at least 2.5 mm inversions (excluding V1 and V2)
 - LVH with repolarization abnormalities, pre-excitation pattern such as WPW, ventricular paced rhythm, or left bundle branch block
 - Digitalis use with associated ST segment abnormalities
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
 - > 40 ms (1 mm) wide
 - > 2 mm deep
 - > 25% of depth of QRS complex
- Global Risk of Cardiovascular Disease
 - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years. **High global risk by itself generally lacks scientific support as an indication for stress imaging.** There are rare exceptions, such as patients requiring IC antiarrhythmic drugs who might require coronary risk stratification prior to initiation of the drug.

■ **CAD Risk—Low**

- 10-year absolute coronary or cardiovascular risk less than 10%

■ **CAD Risk—Moderate**

- 10-year absolute coronary or cardiovascular risk between 10% and 20%

■ **CAD Risk—High**

- 10-year absolute coronary or cardiovascular risk of greater than 20%

Websites for Global Cardiovascular Risk Calculators* (45,46,47,48,49)

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk
Reynolds Risk Score Can use if no diabetes Unique for use of family history	http://www.reynoldsriskscore.org/
Pooled Cohort Equation	http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example
ACC/AHA Risk Calculator	http://tools.acc.org/ASCVD-Risk-Estimator/
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease (10,11,14)
 - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
 - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the MESA risk calculator.
 - Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:

- Suggested by percentage diameter stenosis $\geq 70\%$ by angiography; intermediate lesions are 50 – 69%
 - For a left main artery, suggested by a percentage stenosis $\geq 50\%$ or minimum lumen cross-sectional area on IVUS ≤ 6 square mm (10,50)
 - FFR (fractional flow reserve) ≤ 0.80 for a major vessel (50)
 - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
- A major vessel would be a coronary vessel that would be amenable to revascularization if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
- FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
- Newer technology that estimates FFR from CCTA image is covered under the Evolent Clinical Guideline 062-1 for Fractional Flow Reserve CT.
- Anginal Equivalent (10,43)
 - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data, such as respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Most syncope per se is not an anginal equivalent.

Acronyms / Abbreviations

ADLs: Activities of daily living
 BMI: Body mass index
 CABG: Coronary artery bypass grafting
 CAC: Coronary artery calcium
 CAD: Coronary artery disease
 CCTA: Coronary computed tomography angiography
 CMR: Cardiac magnetic resonance imaging
 CT(A): Computed tomography (angiography)
 DTS: Duke Treadmill Score
 ECG: Electrocardiogram

FFR: Fractional flow reserve
 IVUS: Intravascular ultrasound
 LBBB: Left bundle-branch block
 LVEF: Left ventricular ejection fraction
 LVH: Left ventricular hypertrophy
 MESA: Multi-Ethnic Study of Atherosclerosis
 MET: Estimated metabolic equivalent of exercise
 MI: Myocardial infarction
 MPI: Myocardial perfusion imaging
 MR(I): Magnetic resonance (imaging)
 PCI: Percutaneous coronary intervention
 PET: Positron emission tomography
 PFT: Pulmonary function test
 PVCs: Premature ventricular contractions
 SE: Stress echocardiography
 TEE: Transesophageal echocardiography
 THR: Target heart rate
 TTE: Transthoracic echocardiography
 VF: Ventricular fibrillation
 VT: Ventricular tachycardia
 WPW: Wolff-Parkinson-White

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none"> ● Formatting change ● Addition of clinical reasoning statement with AUC scoring described ● AUC scores added to bullet points ● Change in definition to symptomatic patients as per ACC AUC guidelines including likely and less likely anginal symptoms ● Calcium score – asymptomatic patient with high global risk statement added ● References updated ● WA legislative requirements added
May 2023	<ul style="list-style-type: none"> ● Removed time limitation “within past two years” for further evaluation inconclusive prior CAD evaluation ● Added coronary stenosis of unclear significance on previous coronary angiography. ● Added indication for evaluation of ischemia and nonobstructive coronary artery disease (INOCA)



Date	Summary
	<ul style="list-style-type: none">• Clarified indication for PET/MPI combination study for evaluation of cardiac sarcoidosis• Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Bateman T, Dilsizian V, Beanlands R, DePuey E, Heller G. American Society of Nuclear Cardiology and Society of Nuclear Medicine and Molecular Imaging Joint Position Statement on the Clinical Indications for Myocardial Perfusion PET. *J Nucl Med*. Oct 2016; 57: 1654-1656. 10.2967/jnumed.116.180448.
2. Fazel R, Dilsizian V, Einstein A, Ficaro E, Henzlova M. Strategies for defining an optimal risk-benefit ratio for stress myocardial perfusion SPECT. *J Nucl Cardiol*. May 2011; 18: 385-92. 10.1007/s12350-011-9353-4.
3. Schindler T H, Bateman T M, Berman D S, Chareonthaitawee P, De Blanche L E et al. Appropriate Use Criteria for PET Myocardial Perfusion Imaging. *J Nucl Med*. 2020; 61: 1221-1265. 10.2967/jnumed.120.246280.
4. Hendel R C, Lindsay B D, Allen J M, Brindis R G, Patel M R et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2018; 71: 935-948. 10.1016/j.jacc.2018.01.007.
5. Hendel R C, Patel M R, Allen J M, Min J K, Shaw L J et al. Appropriate use of cardiovascular technology: 2013 ACCF appropriate use criteria methodology update: a report of the American College of Cardiology Foundation appropriate use criteria task force. *J Am Coll Cardiol*. 2013; 61: 1305-17. 10.1016/j.jacc.2013.01.025.
6. Bonow R O, Douglas P S, Buxton A E, Cohen D J, Curtis J P et al. ACCF/AHA methodology for the development of quality measures for cardiovascular technology: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Performance Measures. *Circulation*. 2011; 124: 1483-502. 10.1161/CIR.0b013e31822935fc.
7. Fitch K, Bernstein S J, Aguilar M D, Burnand B, LaCalle J R et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
8. Patel M R, Spertus J A, Brindis R G, Hendel R C, Douglas P S et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *J Am Coll Cardiol*. 2005; 46: 1606-13. 10.1016/j.jacc.2005.08.030.
9. Winchester D E, Maron D J, Blankstein R, Chang I C, Kirtane A J et al. ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease. *J Cardiovasc Magn Reson*. 2023; 25: 58. 10.1186/s12968-023-00958-5.
10. Fihn S, Gardin J, Abrams J, Berra K, Blankenship J et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. Dec 18, 2012; 126: e354-471. 10.1161/CIR.0b013e318277d6a0.
11. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J*. Oct 2013; 34: 2949-3003. 10.1093/eurheartj/ehs296.
12. Budoff M, Raggi P, Beller G, Berman D, Druz R et al. Noninvasive Cardiovascular Risk Assessment of the Asymptomatic Diabetic Patient: The Imaging Council of the American College of Cardiology. *JACC Cardiovasc Imaging*. Feb 2016; 9: 176-92. 10.1016/j.jcmg.2015.11.011.

13. Gulati M, Levy P, Mukherjee D, Amsterdam E, Bhatt D et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. Nov 30, 2021; 78: e187-e285. 10.1016/j.jacc.2021.07.053.
14. Patel M, Calhoun J, Dehmer G, Grantham J, Maddox T et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2017 Appropriate Use Criteria for Coronary Revascularization in Patients With Stable Ischemic Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. May 2, 2017; 69: 2212-2241. 10.1016/j.jacc.2017.02.001.
15. Guzmán A, Navarro E, Obando L, Pacheco J, Quirós K et al. Effectiveness of interventions for the reversal of a metabolic syndrome diagnosis: An update of a meta-analysis of mixed treatment comparison studies. *Biomedica*. 2019; 39: 647-662. 10.7705/biomedica.4684.
16. Brindis R G, Douglas P S, Hendel R C, Peterson E D, Wolk M J et al. ACCF/ASNC appropriateness criteria for single-photon emission computed tomography myocardial perfusion imaging (SPECT MPI): a report of the American College of Cardiology Foundation Quality Strategic Directions Committee Appropriateness Criteria Working Group and the American Society of Nuclear Cardiology endorsed by the American Heart Association. *J Am Coll Cardiol*. 2005; 46: 1587-605. 10.1016/j.jacc.2005.08.029.
17. Truong Q A, Gewirtz H. Cardiac PET-CT for monitoring medical and interventional therapy in patients with CAD: PET alone versus hybrid PET-CT? *Curr Cardiol Rep*. 2014; 16: 460. 10.1007/s11886-013-0460-5.
18. Patel M, White R, Abbara S, Bluemke D, Herfkens R et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. May 28, 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.
19. Yancy C, Jessup M, Bozkurt B, Butler J, Casey D J et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. Oct 15, 2013; 62: e147-239. 10.1016/j.jacc.2013.05.019.
20. Xu J, Cai F, Geng C, Wang Z, Tang X. Diagnostic Performance of CMR, SPECT, and PET Imaging for the Identification of Coronary Artery Disease: A Meta-Analysis. *Front Cardiovasc Med*. 2021; 8: 621389. 10.3389/fcvm.2021.621389.
21. Al-Khatib S, Stevenson W, Ackerman M, Bryant W, Callans D et al. 2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Oct 2, 2018; 72: e91-e220. 10.1016/j.jacc.2017.10.054.
22. Reiffel J, Camm A, Belardinelli L, Zeng D, Karwatowska-Prokopczuk E et al. The HARMONY Trial: Combined Ranolazine and Dronedarone in the Management of Paroxysmal Atrial Fibrillation: Mechanistic and Therapeutic Synergism. *Circ Arrhythm Electrophysiol*. Oct 2015; 8: 1048-56. 10.1161/circep.115.002856.

23. Anagnostopoulos C, Harbinson M, Kelion A, Kundley K, Loong C et al. Procedure guidelines for radionuclide myocardial perfusion imaging. *Heart (British Cardiac Society)*. 2004; 90 Suppl 1: i1-i10. 10.1136/heart.90.suppl_1.i1.
24. Gräni C, Bigler M R, Kwong R Y. Noninvasive Multimodality Imaging for the Assessment of Anomalous Coronary Artery. *Curr Cardiol Rep*. 2023; 25: 1233-1246. 10.1007/s11886-023-01948-w.
25. Evbayekha E O, Nwogwugwu E, Olawoye A, Bolaji K, Adeosun A A et al. A Comprehensive Review of Myocardial Bridging: Exploring Diagnostic and Treatment Modalities. *Cureus*. 2023; 15: e43132. 10.7759/cureus.43132.
26. McCrindle B, Rowley A, Newburger J, Burns J, Bolger A et al. Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease: A Scientific Statement for Health Professionals From the American Heart Association. *Circulation*. Apr 25, 2017; 135: e927-e999. 10.1161/cir.0000000000000484.
27. Lancellotti P, Nkomo V, Badano L, Bergler-Klein J, Bogaert J et al. Expert consensus for multi-modality imaging evaluation of cardiovascular complications of radiotherapy in adults: a report from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Eur Heart J Cardiovasc Imaging*. Aug 2013; 14: 721-40. 10.1093/ehjci/jet123.
28. Birnie D, Nery P, Ha A, Beanlands R. Cardiac Sarcoidosis. *J Am Coll Cardiol*. Jul 26, 2016; 68: 411-21. 10.1016/j.jacc.2016.03.605.
29. Blankstein R, Waller A. Evaluation of Known or Suspected Cardiac Sarcoidosis. *Circ Cardiovasc Imaging*. Mar 2016; 9: e000867. 10.1161/circimaging.113.000867.
30. Vita T, Okada D, Veillet-Chowdhury M, Bravo P, Mullins E et al. Complementary Value of Cardiac Magnetic Resonance Imaging and Positron Emission Tomography/Computed Tomography in the Assessment of Cardiac Sarcoidosis. *Circ Cardiovasc Imaging*. Jan 2018; 11: e007030. 10.1161/circimaging.117.007030.
31. Tersalvi G, Beltrani V, Grüber M R, Molteni A, Cristoforetti Y et al. Positron Emission Tomography in Heart Failure: From Pathophysiology to Clinical Application. *J Cardiovasc Dev Dis*. 2023; 10: 220. 10.3390/jcdd10050220.
32. Habib G, Lancellotti P, Antunes M, Bongiorno M, Casalta J et al. 2015 ESC Guidelines for the management of infective endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). *Eur Heart J*. Nov 21, 2015; 36: 3075-3128. 10.1093/eurheartj/ehv319.
33. Doherty J, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Sep 26, 2017; 70: 1647-1672. 10.1016/j.jacc.2017.07.732.
34. Isselbacher E, Preventza O, Hamilton Black J 3, Augoustides J, Beck A et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. Dec 13, 2022; 146: e334-e482. 10.1161/cir.0000000000001106.

35. Kristensen S, Knuuti J, Saraste A, Anker S, Bøtker H et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management: The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur Heart J*. Sep 14, 2014; 35: 2383-431. 10.1093/eurheartj/ehu282.
36. Fleisher L, Fleischmann K, Auerbach A, Barnason S, Beckman J et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines. *J Am Coll Cardiol*. Dec 09, 2014; 64: e77-137. 10.1016/j.jacc.2014.07.944.
37. Velasco A, Reyes E, Hage F. Guidelines in review: Comparison of the 2014 ACC/AHA guidelines on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery and the 2014 ESC/ESA guidelines on noncardiac surgery: Cardiovascular assessment and management. *J Nucl Cardiol*. 02 2017; 24: 165-170. 10.1007/s12350-016-0643-8.
38. Lentine K, Costa S, Weir M, Robb J, Fleisher L et al. Cardiac disease evaluation and management among kidney and liver transplantation candidates: a scientific statement from the American Heart Association and the American College of Cardiology Foundation. *J Am Coll Cardiol*. Jul 31, 2012; 60: 434-80. 10.1016/j.jacc.2012.05.008.
39. Mc Ardle B, Dowsley T, deKemp R, Wells G, Beanlands R. Does rubidium-82 PET have superior accuracy to SPECT perfusion imaging for the diagnosis of obstructive coronary disease? A systematic review and meta-analysis. *J Am Coll Cardiol*. Oct 30, 2012; 60: 1828-37. 10.1016/j.jacc.2012.07.038.
40. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease. [Final Adoption: March 18, 2022]. 2022. <https://www.hca.wa.gov/assets/program/noninvasive-cardiac-imaging-final-findings-and-decision-2022-03-18.pdf>.
41. Wolk M J, Bailey S R, Doherty J U, Douglas P S, Hendel R C et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2014; 63: 380-406. 10.1016/j.jacc.2013.11.009.
42. Diamond G A, Forrester J S. Analysis of probability as an aid in the clinical diagnosis of coronary-artery disease. *N Engl J Med*. 1979; 300: 1350-8. 10.1056/NEJM197906143002402.
43. Shen W, Sheldon R, Benditt D, Cohen M, Forman D et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Aug 1, 2017; 70: 620-663. 10.1016/j.jacc.2017.03.002.
44. Shaw L J, Peterson E D, Shaw L K, Kesler K L, DeLong E R et al. Use of a prognostic treadmill score in identifying diagnostic coronary disease subgroups. *Circulation*. 1998; 98: 1622-30. 10.1161/01.cir.98.16.1622.
45. Arnett D, Blumenthal R, Albert M, Buroker A, Goldberger Z et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of



Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. Sep 10, 2019; 74: e177-e232. 10.1016/j.jacc.2019.03.010.

46. D'Agostino R S, Vasan R, Pencina M, Wolf P, Cobain M et al. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. Circulation. Feb 12, 2008; 117: 743-53. 10.1161/circulationaha.107.699579.

47. Goff D J, Lloyd-Jones D, Bennett G, Coady S, D'Agostino R S et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. Jul 1, 2014; 63: 2935-2959. 10.1016/j.jacc.2013.11.005.

48. McClelland R, Jorgensen N, Budoff M, Blaha M, Post W et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). J Am Coll Cardiol. Oct 13, 2015; 66: 1643-53. 10.1016/j.jacc.2015.08.035.

49. Ridker P, Buring J, Rifai N, Cook N. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. Jama. Feb 14, 2007; 297: 611-9. 10.1001/jama.297.6.611.

50. Lotfi A, Davies J, Fearon W, Grines C, Kern M. Focused update of expert consensus statement: Use of invasive assessments of coronary physiology and structure: A position statement of the society of cardiac angiography and interventions. Catheter Cardiovasc Interv. Aug 1, 2018; 92: 336-347. 10.1002/ccd.27672.



EVOLENT CLINICAL GUIDELINE 027 FOR MULTIPLE GATED ACQUISITION SCAN

Guideline or Policy Number: Evolent_CG_027	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 1997 - 2025 Evolent. All rights Reserved.		
Original Date: September 1997	Last Revised Date: July 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
SPECIAL NOTE	2
CLINICAL REASONING	2
INDICATIONS FOR MULTIPLE GATED ACQUISITION (MUGA) SCAN	3
LEGISLATIVE REQUIREMENTS	3
STATE OF WASHINGTON	3
<i>Health Technology Clinical Committee 20211105A</i>	3
CODING AND STANDARDS	4
CODING	4
<i>CPT Codes</i>	4
APPLICABLE LINES OF BUSINESS	5
BACKGROUND	5
AUC SCORE	5
ACRONYMS / ABBREVIATIONS	5
POLICY HISTORY	6
<i>Summary</i>	6
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL	6
<i>Committee</i>	6
DISCLAIMER	6
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose (1,2,3,4)

Multiple-gated acquisition (MUGA) scanning uses radiolabeled red blood cells to scan right and left ventricular images in a cine loop format that is synchronized with the electrocardiogram.

A prior MUGA scan is not an indication for repeat MUGA (if another modality would be suitable, i.e., TTE).

Special Note

See **Legislative Requirements** for specific mandates in Washington State

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. ^(5,6,7,8,9)

INDICATIONS FOR MULTIPLE GATED ACQUISITION (MUGA) SCAN ⁽¹⁰⁾

- To evaluate left ventricular function in a patient with coronary artery disease, valvular heart disease, myocardial disease, or congenital heart disease, in any of the following scenarios:
 - When ventricular function is required for management, and transthoracic echocardiography (TTE) or other imaging has proven inadequate ^(1,11)
 - Radionuclide ventriculography is being performed for assessment of RV function with no prior MUGA done within the last 3 months
- In the course of treatment with cardiotoxic medication when TTE images are inadequate to evaluate left ventricular systolic function: ^(1,11,12,13,14)
 - Baseline assessment prior to initiation of therapy
 - Monitoring during therapy. The frequency of testing should be left to the discretion of the ordering provider but in the absence of new abnormal findings, generally no more often than every 6 weeks while on active therapy
 - Long term surveillance after completion of therapy may be required, especially for those who have been exposed to anthracycline medication. The frequency of testing is generally every 6-12 months, or at the discretion of the provider

LEGISLATIVE REQUIREMENTS

State of Washington ⁽¹⁵⁾

Health Technology Clinical Committee 20211105A

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
 - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
 - Adult patients with known CAD who have new or worsening symptoms.

- Single Positron Emission Tomography (SPECT) for:
 - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
 - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
 - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
 - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
 - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
 - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation
 - Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
 - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
 - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Coding

CPT Codes

78472, 78473, 78494, +78496

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

The two types of radionuclide studies commonly used for cardiac evaluation are myocardial perfusion imaging and ventriculography. Myocardial perfusion imaging is used primarily for the evaluation of coronary artery disease. Ventriculography is sometimes referred to as multiple gated acquisition scanning (MUGA) and is primarily used to evaluate valvular disease and cardiomyopathies. Either type of study may be obtained at rest or stress.

Radionuclide Ventriculography is a medical imaging test used to determine a patient's cardiac function in the right, or more typically, left ventricle. Cardiac ventriculography involves injecting a radioisotope into the heart's ventricle(s) through a peripheral vein to measure the volume of blood pumped. Both regional and global left ventricular function (ejection fraction) as well as left ventricular size is measured.

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost effective manner. ⁽⁸⁾

Appropriate Care - Median Score 7-9

May be Appropriate Care - Median Score 4-6

Rarely Appropriate Care - Median Score 1-3

Acronyms / Abbreviations

EF: Ejection fraction

MUGA: Multiple gated acquisition (nuclear scan of ventricular function)

TTE: Transthoracic echocardiography

POLICY HISTORY

Summary

Date	Summary
July 2024	<ul style="list-style-type: none">Added AUC Scoring to Cardiac Guidelines from published Societies. When an AUC score was not published by a Society, we assigned an AUC score of 6 based upon AUC scoring standards – this has been explained in Clinical ReasoningNo other substantive changesAdded WA legislative requirement
April 2023	<ul style="list-style-type: none">Added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Patel M, White R, Abbara S, Bluemke D, Herfkens R et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2013; 61: 2207-31. 10.1016/j.jacc.2013.02.005.
2. Friedman J, Berman D, Borges-Neto S, Hayes S, Johnson L et al. First-pass radionuclide angiography. *J Nucl Cardiol*. Nov 2006; 13: e42-55. 10.1016/j.nuclcard.2006.08.006.
3. Mitra D, Basu S. Equilibrium radionuclide angiocardiology: Its usefulness in current practice and potential future applications. *World J Radiol*. 2012; 4: 421-30. 10.4329/wjr.v4.i10.421.
4. Ritchie J, Bateman T, Bonow R, Crawford M, Gibbons R et al. Guidelines for clinical use of cardiac radionuclide imaging. Report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Radionuclide Imaging), developed in collaboration with the American Society of Nuclear Cardiology. *J Am Coll Cardiol*. Feb 1995; 25: 521-47. 10.1016/0735-1097(95)90027-6.
5. Bonow R, Douglas P, Buxton A, Cohen D, Curtis J et al. ACCF/AHA Methodology for the Development of Quality Measures for Cardiovascular Technology. *Circulation*. 2011; 124: 1483 - 1502. 10.1161/CIR.0b013e31822935fc.
6. Fitch K, Bernstein S, Aguilar M, Burnand B, LaCalle J et al. The RAND/UCLA Appropriateness Method User's Manual. 2001.
7. Hendel R, Patel M, Allen J, Min J, Shaw L et al. Appropriate Use of Cardiovascular Technology: 2013 ACCF Appropriate Use Criteria Methodology Update: A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *Journal of the American College of Cardiology*. 2013; 61: 1305 - 1317. <https://doi.org/10.1016/j.jacc.2013.01.025>.
8. Hendel R C, Lindsay B D, Allen J M, Brindis R G, Patel M R et al. ACC Appropriate Use Criteria Methodology: 2018 Update: A Report of the American College of Cardiology Appropriate Use Criteria Task Force. *Journal of the American College of Cardiology*. 2018; 71: 935 - 948. <https://doi.org/10.1016/j.jacc.2018.01.007>.
9. Patel M, Spertus J, Brindis R, Hendel R, Douglas P et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *Journal of the American College of Cardiology*. 2005; 46: 1606-13.
10. Doherty J U, Kort S, Mehran R, Schoenhagen P, Soman P et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2019; 73: 488-516. 10.1016/j.jacc.2018.10.038.
11. Heidenreich P, Bozkurt B, Aguilar D, Allen L, Byun J et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022; 145: e876-e894. 10.1161/cir.0000000000001062.
12. Plana J, Galderisi M, Barac A, Ewer M, Ky B et al. Expert consensus for multimodality imaging evaluation of adult patients during and after cancer therapy: a report from the American Society of

Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr. Sep 2014; 27: 911-39. 10.1016/j.echo.2014.07.012.

13. Zamorano J, Lancellotti P, Rodriguez Muñoz D, Aboyans V, Asteggiano R et al. 2016 ESC Position Paper on cancer treatments and cardiovascular toxicity developed under the auspices of the ESC Committee for Practice Guidelines: The Task Force for cancer treatments and cardiovascular toxicity of the European Society of Cardiology (ESC). Eur Heart J. 2016; 37: 2768-2801. 10.1093/eurheartj/ehw211.

14. Baldassarre L, Ganatra S, Lopez-Mattei J, Yang E, Zaha V et al. Advances in Multimodality Imaging in Cardio-Oncology: JACC State-of-the-Art Review. J Am Coll Cardiol. 2022; 80: 1560-1578. 10.1016/j.jacc.2022.08.743.

15. Washington State Health Care Authority. WSHCA Health Technology Clinical Committee: 20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease. [Final Adoption: March 18, 2022]. 2022; <https://www.hca.wa.gov/assets/program/noninvasive-cardiac-imaging-final-findings-and-decision-2022-03-18.pdf>.

EVOLENT CLINICAL GUIDELINE 071 FOR BRAIN PET SCAN

Guideline or Policy Number: Evolent_CG_071	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 1999 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 1999	Last Revised Date: August 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
SPECIAL NOTE	2
INDICATIONS FOR BRAIN PET SCAN	2
KNOWN BRAIN TUMOR OR CANCER	2
REFRACTORY SEIZURES	2
POST-TREATMENT/PROCEDURAL EVALUATION	3
MILD COGNITIVE IMPAIRMENT OR DEMENTIA	3
FURTHER EVALUATION OF INDETERMINATE FINDINGS	3
LEGISLATIVE LANGUAGE	3
STATE OF WASHINGTON	3
WSHCA 20150116A	3
CODING AND STANDARDS	4
CODING	4
CPT Codes	4
APPLICABLE LINES OF BUSINESS	4
BACKGROUND	4
CONTRAINDICATION AND PREFERRED STUDIES	5
POLICY HISTORY	5
Summary	5
LEGAL AND COMPLIANCE	6
GUIDELINE APPROVAL	6
Committee	6
DISCLAIMER	6
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

NOTE: When PET is used to image the brain using amyloid or dotatate (SSTR) tracers, it should be reordered as an oncologic PET using CPT codes 78811 and 78814 (see Evolent_CG_070-1).

See Legislative Language section for legislation for the State of Washington.

INDICATIONS FOR BRAIN PET SCAN

Known Brain Tumor or Cancer^(1,2)

FDG-PET indications for brain tumor imaging **after** brain MRI is indeterminant or insufficient to:

- Differentiate radiation necrosis or post-treatment change from residual/recurrent tumor
- Differentiate low from high grade glioma
- Evaluation of primary brain lymphoma
- To guide intervention/biopsy

Refractory Seizures

- To determine operability of refractory seizures^(3,4,5)

Post-Treatment/Procedural Evaluation

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Mild Cognitive Impairment or Dementia ^(6,7,8,9,10,11,12)

- FDG PET for either:
 - Detection of early Alzheimer's disease **OR**
 - Differentiation between Alzheimer's, dementia with Lewy body disease (DLB) and frontotemporal lobar degeneration (FTD)

AND ALL of the following criteria are met (criteria apply to both of the above indications):

- ☐ Brain MRI is insufficient or indeterminant **AND**
- ☐ Objective measures demonstrate objective impairment (MMSE/MoCA < 26 or mild cognitive impairment on neuropsychological testing) **AND**
- ☐ Full lab evaluation (thyroid function tests, CBC, CMP including LFTs and B12) has been completed and if abnormal, have been treated and cognitive difficulty persists **AND**
- ☐ Medication side effect ⁽⁹⁾ and medical causes, such as vascular or traumatic or inflammatory etiologies have been excluded

NOTE: Brain CT is acceptable if brain MRI is contraindicated

Further Evaluation of Indeterminate Findings

On prior imaging (unless follow-up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

LEGISLATIVE LANGUAGE

State of Washington ⁽¹³⁾

WSHCA 20150116A

Number and Coverage Topic:



20150116A – Functional Neuroimaging for Primary Degenerative Dementia or Mild Cognitive Impairment*

HTCC Coverage Determination:

Functional neuroimaging for primary degenerative dementia or mild cognitive impairment is **not covered**.

HTCC Reimbursement Determination:

Limitations of Coverage: N/A

Non-covered Indicators:

Functional imaging technologies including: fludeoxyglucose (FDG) Positron Emission Tomography (PET), (11)C-dihydrotetrabenazine (C-DTBZ) PET, Single Photon Emission Computed Tomography (SPECT), Functional Magnetic Resonance Imaging (fMRI) for the diagnosis of primary degenerative dementia or mild cognitive impairment.

* Beta-amyloid PET imaging is outside the scope of this coverage determination.

CODING AND STANDARDS

Coding

CPT Codes

78608, 78609

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Positron Emission Tomography (PET) scanning can be used to assesses brain metabolism and perfusion. Uses include identifying epileptic foci prior to surgery, differentiation of residual tumor versus scar, helping differentiate inconclusive findings on Brain MRI and identifying causes of cognitive decline.⁽¹⁴⁾

Contraindication and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

POLICY HISTORY

Summary

Date	Summary
August 2024	<ul style="list-style-type: none"> • All Amyloid PET indications were removed from Brain PET and moved to oncologic PET guideline for CPT coding reasons • Updated indications for Known Brain Tumor or Cancer • Added a Special Note about using oncologic PET for brain PET tracer requests
July 2024	<ul style="list-style-type: none"> • Added special Trace PET and moved Meningioma there • Mild Cognitive Impairment PET section: expanded the indications to include if Brain MRI is insufficient, objective measures, labs, and medication side effects or medical causes • Treatment Planning section <ul style="list-style-type: none"> ○ Expanded indications to include Beta-amyloid treatment, Brain MRI is insufficient, objective measures, Neuropsychological testing, labs, and medical causes ○ Removed Aduhelm (as it is off market) • Added Contraindications and Preferred Studies section to Background • Updated References • Added Legislative Language for Washington
May 2023	<ul style="list-style-type: none"> • Added that dotatate is now FDA approved for meningioma imaging • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging • Additional resources removed



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Galldiks N, Albert N, Sommerauer M, Grosu A, Ganswindt U et al. PET imaging in patients with meningioma-report of the RANO/PET Group. *Neuro Oncol*. Nov 29 2017; 19: 1576-1587. 10.1093/neuonc/nox112.
2. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers. March 24, 2023; 2023: Version 1.2023.
3. Govil-Dalela T, Kumar A, Behen M, Chugani H, Juhász C. Evolution of lobar abnormalities of cerebral glucose metabolism in 41 children with drug-resistant epilepsy. *Epilepsia*. Jul 2018; 59: 1307-1315. 10.1111/epi.14404.
4. Jones A, Cascino G. Evidence on Use of Neuroimaging for Surgical Treatment of Temporal Lobe Epilepsy: A Systematic Review. *JAMA Neurol*. Apr 2016; 73: 464-70. 10.1001/jamaneurol.2015.4996.
5. Tang Y, Liow J, Zhang Z, Li J, Long T et al. The Evaluation of Dynamic FDG-PET for Detecting Epileptic Foci and Analyzing Reduced Glucose Phosphorylation in Refractory Epilepsy. *Front Neurosci*. 2018; 12: 993. 10.3389/fnins.2018.00993.
6. Albert M S, DeKosky S T, Dickson D, Dubois B, Feldman H H et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimer's Dement*. 2011; 7: 270-9. 10.1016/j.jalz.2011.03.008.
7. Bohnen N, Djang D, Herholz K, Anzai Y, Minoshima S. Effectiveness and safety of 18F-FDG PET in the evaluation of dementia: a review of the recent literature. *J Nucl Med*. Jan 2012; 53: 59-71. 10.2967/jnumed.111.096578.
8. Caminiti S, Ballarini T, Sala A, Cerami C, Presotto L et al. FDG-PET and CSF biomarker accuracy in prediction of conversion to different dementias in a large multicentre MCI cohort. *Neuroimage Clin*. 2018; 18: 167-177. 10.1016/j.nicl.2018.01.019.
9. Campbell N, Boustani M, Lane K, Gao S, Hendrie H et al. Use of anticholinergics and the risk of cognitive impairment in an African American population. *Neurology*. Jul 13 2010; 75: 152-9. 10.1212/WNL.0b013e3181e7f2ab.
10. Davis D, Creavin S, Yip J, Noel-Storr A, Brayne C. Montreal Cognitive Assessment for the diagnosis of Alzheimer's disease and other dementias. *Cochrane Database Syst Rev*. Oct 29 2015; 2015: Cd010775. 10.1002/14651858.CD010775.pub2.
11. Frey K, Lodge M, Meltzer C, Peller P, Wong T et al. ACR-ASNR Practice Parameter for Brain PET/CT Imaging Dementia. *Clin Nucl Med*. Feb 2016; 41: 118-25. 10.1097/rlu.0000000000001037.
12. Motara H, Olusoga T, Russell G, Jamieson S, Ahmed S et al. Clinical impact and diagnostic accuracy of 2-[(18)F]-fluoro-2-deoxy-d-glucose positron-emission tomography/computed tomography (PET/CT) brain imaging in patients with cognitive impairment: a tertiary centre experience in the UK. *Clin Radiol*. Jan 2017; 72: 63-73. 10.1016/j.crad.2016.08.003.
13. Washington State Health Care Authority. WSHCA 20150116A Functional Neuroimaging for Primary Degenerative Dementia or Mild Cognitive Impairment. 2015; <https://www.hca.wa.gov/about-hca/programs-and-initiatives/health-technology-assessment/functional-neuroimaging-primary-degenerative-dementia-or-mild-cognitive-impairment>.
14. Wippold F 2, Brown D, Broderick D, Burns J, Corey A et al. ACR Appropriateness Criteria Dementia and Movement Disorders. *J Am Coll Radiol*. Jan 2015; 12: 19-28. 10.1016/j.jacr.2014.09.025.



EVOLENT CLINICAL GUIDELINE 078 FOR SINGLE PROTON EMISSION COMPUTED TOMOGRAPHY (SPECT)

RADIOPHARMACEUTICAL TUMOR LOCALIZATION

Guideline or Policy Number: Evolut_CG_078	<u>Applicable Codes</u>	
<i>"Evolut" refers to Evolut Health LLC and Evolut Specialty Services, Inc.</i> © 2008 - 2025 Evolut. All rights Reserved.		
Original Date: July 2008	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	3
GENERAL INFORMATION	3
PURPOSE	3
INDICATIONS	4
BONE/JOINT	4
<i>Malignancy</i>	4
<i>Infection</i>	4
<i>Bone Viability</i>	4
<i>Trauma</i>	4
<i>Inconclusive</i>	5
<i>Post-operative</i>	5
<i>Extremities</i>	5
<i>Follow-Up</i>	5
NON-BONE INFECTION/INFLAMMATION	5
TUMOR	6
CARDIAC	6
NECK	6
<i>Non-Cancer</i>	6
LUNG	7
BRAIN	7
RADIONUCLIDE CISTERNOGRAPHY (CSF)	8
RENAL	8
ABDOMEN/PELVIS	9
FURTHER EVALUATION OF INDETERMINATE FINDINGS ON PRIOR IMAGING	9
CODING AND STANDARDS	10
CODING	10
<i>CPT Codes</i>	10



APPLICABLE LINES OF BUSINESS	10
POLICY HISTORY	10
<i>Summary</i>	10
LEGAL AND COMPLIANCE	11
GUIDELINE APPROVAL	11
<i>Committee</i>	11
DISCLAIMER	11
REFERENCES.....	12

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

SPECT: Single-Photon Emission Computed Tomography (SPECT) is a nuclear medicine imaging technique used to localize data from gamma ray emitting injected radiopharmaceuticals to specific anatomical locations within the patient. The resulting 3D images can be reconstructed in multiple planes much like a CT scan uses XR, SPECT utilizes nuclear scintigraphy.

SPECT can be used to localize a tumor, inflammatory process, or radioactive tracer distribution. Vascular flow and blood pool imaging are included if performed. The 78803 code represents single-day imaging of a single area, such as the head, neck, chest, or pelvis, or a single acquisition on one day.

SPECT/CT: (Single-photon emission computed tomography combined with Computed Tomography) is now available in many places. The CT portion helps correct the attenuation (decrease) of photons from the target as they get absorbed/reflected by the soft tissues before reaching the detector. CT helps with anatomic localization much like the CT of PET/CT.

When SPECT/CT is requested, additional CT approvals are NOT needed/provided (unless approvable for other separate indications per guidelines for that body part). The CT portion of a SPECT/CT is included in the specific CPT (i.e., 78830 – SPECT/CT, single area, single day and 78832 – SPECT/CT, multiple areas).

This guideline includes both to SPECT and SPECT/CT when routine dynamic and planar imaging is, or is projected to be, insufficient for the following indications.

INDICATIONS

Bone/Joint

Malignancy ^(1,2,3)

Note: For known bone metastases, whole body planar bone scan for staging and restaging is typically sufficient. For patients with impaired renal function who cannot receive iodinated or gadolinium-based contrast agents or undergo MRI for other reasons, SPECT imaging can improve the performance of conventional planar nuclear bone imaging.

- Screening evaluation of patients with malignancy presenting with elevated alkaline phosphatase, bone pain, or new pathological fracture
- Staging or Restaging evaluation when recent overlapping whole-body imaging (CT or PET/CT of the neck, chest, abdomen and pelvis) has not been performed, cannot be performed, or is inconclusive in evaluation of bone metastases
- Staging and restaging for radionuclide bone therapy for predominant bone metastases

Infection ^(3,4)

- Osteomyelitis: confirmed by both a plain x-ray **AND** an MRI of the area
 - if MRI is contraindicated/cannot be performed, technically limited or inconclusive, only x-ray is necessary
- Discitis: MRI is contraindicated, technically limited or inconclusive

Bone Viability ⁽⁵⁾

- Detection of early avascular necrosis, bone infarct, or bone graft viability when patient has had a plain x-ray; and MRI is contraindicated/cannot be performed, technically limited or inconclusive

Trauma

- Extremities: Detection of stress fractures and other occult skeletal trauma when there is persistent pain in the suspected area after negative or inconclusive x-ray and MRI ⁽⁶⁾
- Spine:
 - For indications such as spondylolysis or determination of age of fracture after CT/MRI is inconclusive ⁽⁷⁾
 - Spondylolysis evaluation in a child, with persistent pain after MRI and conservative treatment, in determining further treatment plan ⁽⁸⁾

Inconclusive (7,9,10,11)

- Inconclusive MRI/CT
- Identification of a primary etiology (via most reactive/ inflammatory changes) when multiple etiologies are identified by MRI/CT, **AND** intervention planning is needed (includes primary facet joint target localization)

NOTE: Inconclusive includes the scenario when imaging findings do not explain patient clinical symptoms or lack of treatment efficacy.

Post-operative (7,12,13)

- Evaluation of persistent symptoms in postoperative spine/joints/bones, after X-ray and/or CT are negative/inconclusive

Extremities (14,15,16)

- For evaluation of unexplained extremity pain when clinical criteria and other imaging (x-ray, **AND** MRI/ Ultrasound/ CT) evaluation is inconclusive (e.g., differentiating complex regional pain syndrome from other causes of pain)

Follow-Up

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Non-Bone Infection/Inflammation (17,18,19)

When primary standard modality of CT / CTA/MRI / Ultrasound are inconclusive, limited, or cannot be done, including:

- Fever of Unknown Origin when CT/MR are negative/inconclusive/limited
- Non-bone infection/inflammation when primary standard imaging is negative/ inconclusive, including infections related to
 - Transplant and vascular grafts when ultrasound/ CTA are negative/inconclusive/limited
 - Prosthetic valves when echocardiography AND Coronary CTA are inconclusive
 - Cardiac implantable devices when echocardiography is inconclusive

Tumor

- Iodine imaging for subsequent post thyroidectomy staging of differentiated thyroid cancers, in the setting of ⁽²⁰⁾:
 - Post thyroidectomy neck CT/MR showing residual unresectable thyroid tissue/disease in the neck
 - Distant metastases as seen on CT/MR
 - Post thyroidectomy unstimulated thyroglobulin > 5-10ng/ml
 - Radioactive iodine therapy is being considered for high risk or recurrent tumor
 - Post radioiodine treatment (post therapy scan)
 - During surveillance, with rising thyroglobulin or stable / rising antithyroglobulin antibodies or abnormal ultrasound neck

Note: Refer to neck for thyroid nodules

- For initial or restaging of Neuroendocrine tumors (typically In111-octreotide and Iodine-123 MIBG), for any part of the body ⁽²¹⁾
 - When CT/MRI OR PET imaging is not available, cannot be done, has contraindications, or is inconclusive
 - I-131 MIBG: when I131 MIBG therapy is being considered
 - In111- octreotide: Somatostatin analog therapy is being considered and Ga68 Dotatate PET is not available
- Imaging during / post therapy with radiotherapeutic agents when it can change management
- Lymphoscintigraphy with sentinel node localizations, for preoperative planning in melanoma, breast, head and neck, and gynecological cancers

Cardiac

See Evolent Clinical Guideline 024 for Myocardial Perfusion Imaging and Evolent Clinical Guideline 027 for Multiple Gated Acquisition Scan.

Neck

Non-Cancer

- Parathyroid adenoma: Clinically or laboratory proven hyperparathyroidism **AND** ultrasound of the neck has been completed. If CT is already done, it should be inconclusive. ⁽²²⁾
- Thyroid: Abnormal thyroid function tests and planar imaging is inconclusive for the location of a focal thyroid lesion.

NOTE: Parathyroid adenomas are evaluated typically initially by cervical ultrasound. Thyroid disorders that are diffuse typically do not need SPECT imaging. However, it may be needed in cases of differentiation of a single cold nodule in the background of multinodular goiter to direct biopsy.

Lung

- Quantification of lung function prior to lung resection/radiation
- Evaluation of congenital cardiac, thoracic, or pulmonary disease, or lung transplants or bronchopleural fistulae ⁽²³⁾
- Chronic thromboembolic pulmonary hypertension
- Suspected acute pulmonary embolism with comorbidities (such as COPD, left heart failure, pneumonia, tumor) **AND** chest x-ray has been performed, **AND** chest CTA cannot be performed or limited
- Calculation of lung shunt fraction prior to hepatic radioembolization

Brain

- For preoperative localization of epileptic foci after EEG, Brain MRI and PET are done and insufficient ⁽²⁴⁾
- DAT scan ^(25,26)
 - To differentiate essential tremor and drug-induced parkinsonism from parkinsonian syndromes
 - For early/inconclusive parkinsonian features
 - For dementia: differentiating Dementia with Lewy Bodies (DLB) from other dementia types, if FDG PET was inconclusive.
- To evaluate cerebrovascular reserve in planning appropriate endovascular/vascular intervention or neurovascular surgical approach - can include:
 - Evaluation for vascular diseases such as Moyamoya ⁽²⁷⁾
 - Carotid balloon occlusion ⁽²⁸⁾
 - Hyperperfusion syndromes ⁽²⁹⁾
 - Shunting for idiopathic normal pressure hydrocephalus ⁽³⁰⁾
- Brain perfusion study for evaluation of brain death when CT or MRI already done and planar images are inconclusive ⁽³¹⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Radionuclide Cisternography (CSF) ⁽³²⁾

- CSF imaging (for evaluation of hydrocephalus, leak, shunt, normal pressure hydrocephalus, spontaneous intracranial hypotension) when
 - Brain/spine or respective site imaging already performed with appropriate CT/ MRI / CT myelography, and deemed to be insufficient; **AND**
 - Planar images projected to be insufficient for localization of abnormality
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Renal ^(33,34)

Complex clinical scenarios involving the following indications for which cross-sectional imaging and routine dynamic planar imaging alone is, or projected to be, insufficient:

- Evaluation of renal collecting system for trauma, surgery, obstruction in ADULTS, or with signs, symptoms, and laboratory findings supporting the need for such an evaluation in adults; **AND**
 - CT has been performed and is inconclusive or contraindicated
- For evaluation of renal collecting system for obstruction or vesicoureteral reflux in children and young females:
 - After ultrasound and VCUG (voiding cystourethrography) / VUS (voiding urosonography) are inconclusive or discordant with clinical picture
- For diagnosis of reno-vascular hypertension with signs, symptoms, laboratory findings, or other imaging supporting the need for such a diagnosis when
 - Duplex ultrasound is inconclusive; **AND**
 - MRA or CTA cannot be performed or is contraindicated; **AND**
 - The patient has adequate renal function (GFR >30) mL/min/1.73 m²) to undergo the study
- Further evaluation of renal perfusion and split function after completion of ultrasound, including in the setting of surgery, trauma, infection, congenital and mass abnormalities
- Diagnosis of renal transplant complications after ultrasound has been performed
- Evaluation of renal infections and discrimination of pyelonephritis from cortical scarring
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical

reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Abdomen/Pelvis

- Hepatic radioembolization ⁽³⁵⁾
 - For evaluation of pulmonary and gastrointestinal shunts or dosimetry calculations prior to procedure (typically utilizing Tc MAA) (78835 – Radiopharmaceutical quantification measurement)
 - Post-procedure imaging in lieu of PET to determine dose effect/dose toxicity (using the Y90 radiation itself) ⁽³⁶⁾ (78835 – Radiopharmaceutical quantification measurement)
- For evaluation of the following ^(37,38,39):
 - Intermittent/occult gastrointestinal bleeding after initial workup is indeterminate/contraindicated (scopes, CTA)
 - Indeterminate or vascular hepatic lesions or bleed when CT/MRI are contraindicated/inconclusive
 - Indeterminate accessory splenic tissue/asplenia when CT/MRI are contraindicated/inconclusive
- Liver transplant (and other hepatic surgery/radiation) preoperative and postoperative function and complications when ultrasound/CT/MR are indeterminate or contraindicated ^{(37,38)*}
- Localization of:
 - Suspected ectopic/residual gastric tissue (e.g., Meckel's diverticulum)
 - Abnormalities in hepatobiliary scintigraphy (e.g., biliary abnormalities/leaks) when ultrasound (in infants) or CT is inconclusive/contraindicated
- Peritoneal imaging for evaluation of complications of shunts, dialysis, or peritoneal integrity, when CT is inconclusive/contraindicated ⁽³⁷⁾
- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further Evaluation of Indeterminate Findings on Prior Imaging

Unless follow up is otherwise specified within the guideline:



- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

CODING AND STANDARDS

Coding

CPT Codes

78803 – SPECT

78830 – SPECT/CT

78831 – SPECT, multiple areas

78832 – SPECT/CT, multiple areas

78835 – Radiopharmaceutical quantification measurement

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none">● Updated references● Eliminated background sections● Replaced references to drug names with drug class
May 2023	<ul style="list-style-type: none">● Updated and explained CPT codes● Wording adjustments

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Donohoe K, Cohen E, Giammarile F, Grady E, Greenspan B et al. Appropriate Use Criteria for Bone Scintigraphy in Prostate and Breast Cancer: Summary and Excerpts. *J Nucl Med.* Apr 2017; 58: 14n-17n.
2. O'Sullivan G, Carty F, Cronin C. Imaging of bone metastasis: An update. *World J Radiol.* Aug 28, 2015; 7: 202-11. 10.4329/wjr.v7.i8.202.
3. Walker E, Beaman F, Wessell D, Cassidy R, Czuczman G et al. ACR Appropriateness Criteria® Suspected Osteomyelitis of the Foot in Patients with Diabetes Mellitus. *J Am Coll Radiol.* Nov 2019; 16: S440-s450. 10.1016/j.jacr.2019.05.027.
4. Pierce J, Perry M, Wessell D, Lenchik L, Ahlawat S et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot): 2022 Update. *Journal of the American College of Radiology.* 2022; 19: S473 - S487. 10.1016/j.jacr.2022.09.013.
5. Ha A, Chang E, Bartolotta R, Bucknor M, Chen K et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology.* 2022; 19: S409 - S416. 10.1016/j.jacr.2022.09.009.
6. Bencardino J, Stone T, Roberts C, Appel M, Baccei S et al. ACR Appropriateness Criteria (®) Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae. *J Am Coll Radiol.* May 2017; 14: S293-s306. 10.1016/j.jacr.2017.02.035.
7. American College of Radiology. ACR Appropriateness Criteria® Low Back Pain. 2021; 2023:
8. Goetzinger S, Courtney S, Yee K, Welz M, Kalani M. Spondylolysis in Young Athletes: An Overview Emphasizing Nonoperative Management. *J Sports Med (Hindawi Publ Corp).* 2020; 2020: 9235958. 10.1155/2020/9235958.
9. Brusko G, Perez-Roman R, Tapamo H, Burks S, Serafini A. Preoperative SPECT imaging as a tool for surgical planning in patients with axial neck and back pain. *Neurosurg Focus.* Dec 1, 2019; 47: E19. 10.3171/2019.9.Focus19648.
10. Cohen S, Bhaskar A, Bhatia A, Buvanendran A, Deer T et al. Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group. *Reg Anesth Pain Med.* Jun 2020; 45: 424-467. 10.1136/rapm-2019-101243.
11. Tender G, Davidson C, Shields J, Robichaux J, Park J et al. Primary pain generator identification by CT-SPECT in patients with degenerative spinal disease. *Neurosurg Focus.* Dec 1, 2019; 47: E18. 10.3171/2019.9.Focus19608.
12. Bäcker H, Steurer-Dober I, Beck M, Agten C, Decking J et al. Magnetic resonance imaging (MRI) versus single photon emission computed tomography (SPECT/CT) in painful total hip arthroplasty: a comparative multi-institutional analysis. *Br J Radiol.* Jan 2020; 93: 20190738. 10.1259/bjr.20190738.
13. Peters M, Bastiaenen C, Brans B, Weijers R, Willems P. The diagnostic accuracy of imaging modalities to detect pseudarthrosis after spinal fusion-a systematic review and meta-analysis of the literature. *Skeletal Radiol.* Oct 2019; 48: 1499-1510. 10.1007/s00256-019-03181-5.
14. Ha S, Hong S, Paeng J, Lee D, Cheon G et al. Comparison of SPECT/CT and MRI in diagnosing symptomatic lesions in ankle and foot pain patients: diagnostic performance and relation to lesion type. *PLoS One.* 2015; 10: e0117583. 10.1371/journal.pone.0117583.
15. Israel O, Pellet O, Biassoni L, De Palma D, Estrada-Lobato E et al. Two decades of SPECT/CT - the coming of age of a technology: An updated review of literature evidence. *Eur J Nucl Med Mol Imaging.* Sep 2019; 46: 1990-2012. 10.1007/s00259-019-04404-6.

16. Shin S, Kim S. Bone scintigraphy in patients with pain. *Korean J Pain*. Jul 2017; 30: 165-175. 10.3344/kjp.2017.30.3.165.
17. Sethi I, Baum Y, Grady E. Current Status of Molecular Imaging of Infection: A Primer. *AJR Am J Roentgenol*. Aug 2019; 213: 300-308. 10.2214/ajr.19.21094.
18. Lauri C, Iezzi R, Rossi M, Tinelli G, Sica S et al. Imaging Modalities for the Diagnosis of Vascular Graft Infections: A Consensus Paper amongst Different Specialists. *J Clin Med*. May 17, 2020; 9: 10.3390/jcm9051510.
19. Galea N, Bandera F, Lauri C, Autore C, Laghi A. Multimodality Imaging in the Diagnostic Work-Up of Endocarditis and Cardiac Implantable Electronic Device (CIED) Infection. *J Clin Med*. Jul 14, 2020; 9: 10.3390/jcm9072237.
20. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Thyroid Carcinoma Version 1.2024. 2024.
21. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Neuroendocrine and Adrenal Tumors Version 1.2023. 2023.
22. Itani M, Middleton W. Parathyroid Imaging. *Radiol Clin North Am*. Nov 2020; 58: 1071-1083. 10.1016/j.rcl.2020.07.006.
23. American College of Radiology (ACR), Society for Pediatric Radiology (SPR), Society of Thoracic Radiology (STR). ACR-SPR-STR practice parameter for the performance of pulmonary scintigraphy. 2018; 2022:
24. von Oertzen T. PET and ictal SPECT can be helpful for localizing epileptic foci. *Curr Opin Neurol*. Apr 2018; 31: 184-191. 10.1097/wco.0000000000000527.
25. Buchert R, Buhmann C, Apostolova I, Meyer P, Gallinat J. Nuclear Imaging in the Diagnosis of Clinically Uncertain Parkinsonian Syndromes. *Dtsch Arztebl Int*. Nov 1, 2019; 116: 747-754. 10.3238/arztebl.2019.0747.
26. Hustad E, Aasly J. Clinical and Imaging Markers of Prodromal Parkinson's Disease. *Front Neurol*. 2020; 11: 395. 10.3389/fneur.2020.00395.
27. White T, Gandhi S, Langer D, Katz J, Dehdashti A. Does Advanced Imaging Aid in the Preoperative Evaluation of Patients With. *Cureus*. 2022; 14: e29816.
28. Tansavatdi K, Dublin A, Donald P, Dahlin B. Combined Balloon Test Occlusion and SPECT Analysis for Carotid Sacrifice. *Journal of neurological surgery. Part B, Skull base*. 2015; 76: 249-51.
29. Richardson T, Beech P, Cloud G. Limb-shaking TIA: a case of cerebral hypoperfusion in severe cerebrovascular disease in a young adult. *BMC Neurology*. 2021; 21: true. 10.1186/s12883-021-02296-4.
30. Thavarajasingam S, El-Khatib M, Vemulapalli K, Iradukunda H, K S et al. Radiological predictors of shunt response in the diagnosis and treatment of. *Acta neurochirurgica*. 2023; 165: 369-419.
31. Donohoe K, Agrawal G, Frey K, Gerbaudo V, Mariani G et al. SNM practice guideline for brain death scintigraphy 2.0. *J Nucl Med Technol*. Sep 2012; 40: 198-203. 10.2967/jnmt.112.105130.
32. Moonis G, Subramaniam R, Trofimova A, Burns J, Bykowski J et al. ACR Appropriateness Criteria® Dementia. *J Am Coll Radiol*. May 2020; 17: S100-s112. 10.1016/j.jacr.2020.01.040.
33. American College of Radiology (ACR), American College of Nuclear Medicine (ACNM), Society of Nuclear Medicine and Molecular Imaging (SNMMI), Society for Pediatric Radiology (SPR). ACR-ACNM-SNMMI-SPR practice parameter for the performance of radionuclide cystography. 2020; 2022:

34. American College of Radiology (ACR), Society for Pediatric Radiology (SPR). ACR-SPR practice parameter for the performance of renal scintigraphy. 2022; 2023:
35. Hong K, Akinwande O, Bodei L, Chamarthy M, Devlin P et al. ACR-ABS-ACNM-ASTRO-SIR-SNMMI practice parameter for selective internal radiation therapy or radioembolization for treatment of liver malignancies. Brachytherapy. May-Jun 2021; 20: 497-511. 10.1016/j.brachy.2021.01.006.
36. Kim S, Cohalan C, Kopek N, Enger S. A guide to (90)Y radioembolization and its dosimetry. Phys Med. Dec 2019; 68: 132-145. 10.1016/j.ejmp.2019.09.236.
37. American College of Radiology (ACR), American College of Nuclear Medicine (ACNM), Society of Nuclear Medicine and Molecular Imaging (SNMMI), Society for Pediatric Radiology (SPR). ACR-ACNM-SNMMI-SPR practice parameter for the performance of gastrointestinal tract, hepatic, and splenic scintigraphy. 2020; 2022:
38. American College of Radiology (ACR), American College of Nuclear Medicine (ACNM), Society of Nuclear Medicine and Molecular Imaging (SNMMI), Society for Pediatric Radiology (SPR). ACR-ACNM-SNMMI-SPR practice parameter for the performance of hepatobiliary scintigraphy. 2021; 2023:
39. American College of Radiology. ACR Appropriateness Criteria® Liver Lesion-Initial Characterization. 2020; 2023:

Evolent Clinical Guideline 070-1 for PET Scan

Guideline or Policy Number: Evolent_CG_070-1	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> <i>© 1997 - 2025 Evolent. All rights Reserved.</i>		
Original Date: September 1997	Last Revised Date: August 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	4
GENERAL INFORMATION	4
PURPOSE	4
SPECIAL NOTE	4
<i>Legislative Requirements</i>	4
INDICATIONS	4
BONE TUMORS & SARCOMAS	4
<i>Angiosarcoma</i>	4
<i>Chondrosarcoma</i>	5
<i>Chordoma</i>	5
<i>Clear Cell Sarcoma</i>	5
<i>Epithelioid Sarcoma</i>	5
<i>Ewing Sarcoma</i>	6
<i>Giant Cell Tumor of Bone</i>	6
<i>Malignant Peripheral Nerve Sheath Tumor (MPNST)</i>	6
<i>Myxoid/Round Cell Liposarcoma</i>	7
<i>Osteosarcoma</i>	7
<i>Rhabdomyosarcoma</i>	7
<i>Soft Tissue Sarcoma - All Other Histologies</i>	8
BREAST CANCER	8
<i>FDG PET</i>	8
<i>Special Tracer PET (FES/Cerianna)</i>	8
CNS CANCERS	8
<i>All Histologies - Brain PET</i>	8
<i>Meningioma</i>	9
<i>Primary CNS Lymphoma</i>	9
GASTROINTESTINAL TRACT CANCERS	9
<i>Anal Carcinoma</i>	9
<i>Colon Cancer</i>	10
<i>Esophageal & EJ Junction Cancers</i>	10
<i>Gastric Cancer</i>	10
<i>Gastrointestinal Stromal Tumors</i>	11
<i>Rectal Cancer</i>	11

<i>Small Bowel Adenocarcinoma</i>	11
GENITOURINARY CANCERS	12
<i>Bladder Cancer</i>	12
<i>Kidney Cancer</i>	12
<i>Prostate Cancer</i>	12
<i>Penile Cancer</i>	14
<i>Testicular Cancer</i>	14
GYNECOLOGICAL CANCERS	15
<i>Cervical Cancer (including small cell neuroendocrine carcinoma of the cervix (NECC))</i>	15
<i>Uterine Sarcoma</i>	15
<i>Endometrial Cancer</i>	15
<i>Gestational Trophoblastic Neoplasia</i>	16
<i>Ovarian, Fallopian Tube, and Primary Peritoneal Cancer</i>	16
<i>Vulvar Cancer</i>	16
HEAD & NECK CANCER	17
LEUKEMIAS & LYMPHOMAS	17
<i>Acute Lymphoblastic Leukemia (ALL) (Pediatric and Adult</i>	17
<i>Acute Myeloid Leukemia (AML) (Pediatric and Adult</i>	17
<i>B-Lymphoblastic Lymphoma (Adult)</i>	18
<i>B-Lymphoblastic Lymphoma (Pediatric)</i>	18
<i>Burkitt Lymphoma (Adult)</i>	18
<i>Burkitt Lymphoma (Pediatric)</i>	18
<i>Castleman's Disease</i>	19
<i>Chronic Lymphocytic Leukemia (CLL) and Small Lymphocytic Lymphoma (SLL)</i>	19
<i>Chronic Myeloid Leukemia (CML)</i>	19
<i>Diffuse Large B Cell Lymphoma (Adult)</i>	19
<i>Diffuse Large B Cell Lymphoma (Pediatric)</i>	20
<i>Follicular lymphoma</i>	20
<i>Mantle cell lymphoma</i>	20
<i>Hodgkin Lymphoma (Pediatric and Adult)</i>	21
<i>Kaposi Sarcoma</i>	21
<i>Post-Transplant Lymphoproliferative Disease</i>	21
<i>Primary Mediastinal Large B-Cell Lymphoma (Pediatric)</i>	21
<i>T Cell Lymphomas</i> ⁽³³⁾	22
<i>Waldenstrom Macroglobulinemia/Lymphoplasmacytic Lymphoma</i>	22
LIVER & HEPATOBILIARY CANCERS	22
<i>Ampullary Adenocarcinoma</i>	22
<i>Biliary Tract Cancers</i>	23
<i>Hepatocellular Carcinoma</i>	23
<i>YTTRIUM-90 (Y90)</i>	23
LUNG CANCERS	23
<i>Non-Small Cell Lung Cancer</i>	23
<i>Small Cell Lung Cancer</i>	24
LUNG NODULES	24
NEUROENDOCRINE & ADRENAL TUMORS.....	24
<i>Adrenocortical Carcinoma</i>	24
<i>Paraganglioma and Pheochromocytoma</i>	25
<i>Well-Differentiated Neuroendocrine Tumors (NET)</i>	25
<i>Poorly Differentiated Neuroendocrine Tumors</i>	26
NON-MALIGNANT DISEASE.....	27
<i>Dementia</i>	27
<i>Sarcoidosis</i>	27

<i>Vasculitis</i>	28
OTHER MALIGNANCIES	28
<i>Castleman's Disease</i>	28
<i>Histiocytic Neoplasms</i>	28
<i>Melanoma: Uveal</i>	28
<i>Merkel Cell Carcinoma</i>	29
<i>Mesothelioma: Peritoneal</i>	29
<i>Mesothelioma: Pleural</i>	29
<i>Neuroblastoma</i>	29
<i>Occult Primary</i>	30
<i>Post Transplant Lymphoproliferative Disorder (PTLD)</i>	30
<i>Thymomas & Thymic Carcinomas</i>	31
<i>Thyroid Carcinoma</i>	31
<i>Wilms Tumor</i>	32
<i>YTTRIUM-90 (Y90)</i>	32
PANCREATIC CANCER	33
PLASMA CELL DYSCRASIAS	33
<i>MGUS</i>	33
<i>Multiple Myeloma</i>	33
<i>Smoldering Myeloma</i>	34
<i>Solitary Plasmacytoma</i>	34
<i>Systemic Light Chain Amyloidosis</i>	34
SKIN CANCERS	34
<i>Basal Cell Skin Cancer</i>	34
<i>Melanoma: Cutaneous</i>	35
<i>Squamous Cell Skin Cancer</i>	35
LEGISLATIVE REQUIREMENTS	35
<i>State of Washington</i>	35
<i>State of Arkansas</i>	36
CODING AND STANDARDS	36
CODING	36
<i>CPT Codes</i>	36
APPLICABLE LINES OF BUSINESS.....	36
BACKGROUND	37
<i>Definitions</i>	37
<i>Further Information</i>	38
POLICY HISTORY	38
<i>Summary</i>	38
LEGAL AND COMPLIANCE	41
GUIDELINE APPROVAL	41
<i>Committee</i>	41
DISCLAIMER	41
REFERENCES	42

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Oncologic PET is generally indicated for biopsy-proven cancer or strongly suspected cancer based on other diagnostic testing. The appropriateness of an ordered PET/CT study is dependent on the type of cancer and which radiopharmaceutical will be used for the PET/CT.

Special Note

Legislative Requirements

See **Legislative Requirements** for specific mandates in the State of Washington

See **Legislative Requirements** for specific mandates in the State of Arkansas

INDICATIONS

Bone Tumors & Sarcomas

Angiosarcoma ⁽¹⁾

- Initial Staging
 - Indicated
 - Chest CT, CT or MRI of the primary site, Brain MRI **AND** whole spine MRI are indicated in addition to PET
- Restaging
 - Indicated

- Chest CT, CT or MRI of the primary site, Brain MRI **AND** whole spine MRI are indicated in addition to PET

Chondrosarcoma ⁽²⁾

- Initial Staging
 - **NOT** Indicated
- Restaging
 - **NOT** Indicated

Chordoma ⁽²⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

Clear Cell Sarcoma ⁽¹⁾

- Initial Staging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET

Epithelioid Sarcoma ⁽¹⁾

- Initial Staging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET

Ewing Sarcoma ⁽²⁾

- Initial Staging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Surveillance
 - For patients with a history of metastatic disease, indicated every 3 months for 2 years, then every 4 months up to year 3 post completion of treatment
 - CT or MRI of the primary site are indicated in addition to PET

Giant Cell Tumor of Bone ⁽²⁾

- Initial Staging
 - Not Indicated
- Restaging
 - Not Indicated

Malignant Peripheral Nerve Sheath Tumor (MPNST) ⁽¹⁾

- Initial Staging - biopsy confirmed diagnosis (regardless of NF1 Status)
 - Indicated if considering neoadjuvant therapy **OR**
 - With prior indeterminate imaging
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET for both indications
- Initial Staging - suspected diagnosis in setting of known Neurofibromatosis Type 1 (NF1)
 - Indicated if there is concern for malignant transformation of neurofibroma to MPNST based on **ANY** of the following:
 - Change in conventional imaging (e.g. growth or change in characteristics of mass) **OR**
 - Change in texture on exam **OR**
 - Change in symptoms (new or worsening pain)
- Restaging (for confirmed MPNST, regardless of NF1 status)

- Indicated if being treated with chemotherapy **OR**
- With prior indeterminate imaging
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET for either restaging indication

Myxoid/Round Cell Liposarcoma ⁽¹⁾

- Initial Staging
 - Indicated
 - Chest CT, CT or MRI of the primary site, Brain MRI **AND** whole spine MRI are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT, CT or MRI of the primary site, Brain MRI **AND** whole spine MRI are indicated in addition to PET

Osteosarcoma ⁽²⁾

- Initial Staging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET

Rhabdomyosarcoma ⁽¹⁾

- Initial Staging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET

Soft Tissue Sarcoma - All Other Histologies ⁽¹⁾

- Initial Staging
 - Indicated if considering neoadjuvant therapy **OR**
 - With prior indeterminate imaging
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET
- Restaging
 - Indicated if being treated with chemotherapy **OR**
 - With prior indeterminate imaging
 - Chest CT **AND** CT or MRI of the primary site are indicated in addition to PET

Breast Cancer ⁽³⁾

FDG PET

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

Special Tracer PET (FES/Cerianna)

- Initial Staging
 - Not Indicated
- Restaging
 - **FES** (Fluoroestradiol F 18 or Cerianna®) is indicated for recurrent or metastatic breast cancer when all of the following are present:
 - Biopsy of recurrent or metastatic site is inconclusive or unable to be performed **AND**
 - ER status is needed to make a treatment decision

CNS Cancers ⁽⁴⁾

All Histologies

When an oncologic PET using FDG (using CPT codes 78811 and 78814) is requested for a primary brain malignancy, it should be reordered as a Brain PET (CPT 78608).

When a tracer other than FDG is used (such as SSTR (dotatate) for meningioma), the CPT codes covered by this guideline (78811 and 78814) apply when medical necessity is met (see indications below) rather than the Brain PET code (CPT code 78608).

NOTE: See non-malignant disease section for amyloid/dementia

Meningioma

- Special Tracer PET: **SSTR** (Dotatate) PET
 - Initial Staging:
 - Indicated after Brain MRI is insufficient or indeterminant for diagnosis
 - Restaging
 - Indicated after Brain MRI is insufficient or indeterminant for detection of residual or recurrent disease

NOTE: See above all histologies section regarding FDG

Primary CNS Lymphoma

- Initial Staging:
 - Indicated
 - Brain MRI **AND** whole spine MRI are indicated in addition to PET
- Restaging:
 - Indicated
 - Brain MRI **AND** whole spine MRI are indicated in addition to PET

Gastrointestinal Tract Cancers

Anal Carcinoma⁽⁵⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - For radiation planning (to define radiation field)
- Restaging
 - With prior indeterminate imaging **OR**
 - For radiation planning (to define radiation field) **OR**
 - Following radiation if PET was used prior to radiation

NOTE: Normal pelvic lymph nodes are often not seen on imaging. When pelvic lymph nodes are visualized on imaging, even if normal in size, that finding raises concern for disease spread and can be considered indeterminate.

Colon Cancer⁽⁶⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - For potentially surgically curable metastatic disease **OR**
 - When image-guided liver-directed therapies are being considered

NOTE: When there are known or suspected liver metastases, Abdomen MRI is indicated in addition to PET

- Restaging
 - With prior indeterminate imaging (including discordance between tumor markers (CEA) and imaging) **OR**
 - For potentially surgically curable metastatic disease **OR**
 - When image-guided liver-directed therapies are being considered

NOTE: When there are known or suspected liver metastases, Abdomen MRI is indicated in addition to PET

Esophageal & EJ Junction Cancers⁽⁷⁾

- Initial Staging
 - Indicated after initial workup with CT/MRI if no evidence of metastatic disease on imaging
- Restaging
 - Stages I-III: Indicated
 - **NOTE:** Following chemoradiation PET is indicated 5-8 weeks after completion of therapy
 - Stage IV: With prior indeterminate imaging

Gastric Cancer⁽⁸⁾

- Initial Staging
 - Indicated after initial workup with CT/MRI if no evidence of metastatic disease on imaging
- Restaging

- Localized Disease:
 - Indicated when PET was used for initial staging **OR**
 - With prior indeterminate imaging
- Metastatic Disease:
 - With prior indeterminate imaging

Gastrointestinal Stromal Tumors ⁽⁹⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging **OR**
 - 2-4 weeks after initiation of TKI (tyrosine kinase inhibitor) therapy

Rectal Cancer ⁽¹⁰⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - For potentially surgically curable metastatic disease **OR**
 - When image-guided liver-directed therapies are being considered

NOTE: When there are known or suspected liver metastases, Abdomen MRI is indicated in addition to PET
- Restaging
 - With prior indeterminate imaging (including discordance between tumor markers (CEA) and imaging) **OR**
 - For potentially surgically curable metastatic disease **OR**
 - When image-guided liver-directed therapies are being considered

NOTE: When there are known or suspected liver metastases, Abdomen MRI is indicated in addition to PET

Small Bowel Adenocarcinoma ⁽¹¹⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging

- With prior indeterminate imaging

Genitourinary Cancers

Bladder Cancer⁽¹²⁾

- Initial Staging
 - Non-muscle invasive bladder cancer (NMIBC):
 - **NOT** indicated
 - Muscle-invasive bladder cancer (MIBC):
 - Indicated when prior imaging is suggestive of disease outside of the urinary tract (imaging does not need to be inconclusive)
- Restaging
 - Non-muscle invasive bladder cancer (NMIBC):
 - **NOT** indicated
 - Muscle-invasive bladder cancer (MIBC):
 - With prior indeterminate imaging **OR**
 - Prior to surgical intervention (including cystectomy and potentially surgically curable metastatic disease)

Kidney Cancer⁽¹³⁾

- Initial Staging
 - **NOT** indicated
- Restaging
 - **NOT** Indicated

Prostate Cancer⁽¹⁴⁾

- **FDG PET**
 - Initial Staging:
 - **NOT** indicated unless small cell variant is present on biopsy
 - Restaging:
 - **NOT** indicated unless small cell variant is present on biopsy
- **Special Tracer (PSMA) PET**
 - Initial Staging (PSMA is the **ONLY** tracer appropriate for initial staging)

- Indicated for **ANY** of the following:
 - Patients with very high risk, high risk, or unfavorable intermediate risk prostate cancer (see **NOTE** below) **OR**
 - With prior imaging that is indeterminate for either lymph node involvement or metastatic disease **AND** clarification of that finding will change treatment
 - ◆ Pelvis MRI (for surgical planning) is indicated in addition to PET for any above indication

NOTE: Any of the following criteria make PSMA PET indicated for initial staging:

- Gleason score 8, 9 or 10
- Primary pattern 4 (Gleason 4+3=7)
- PSA > 20 **AND** Gleason score 3+3=6 or higher
- PSA > 10 **AND** Gleason score 3+4=7
- PSA > 10 **AND** Gleason score 3+3=6 **AND** clinical stage ≥ T2b
- Clinical stage ≥ T3a **AND** Gleason score 3+3=6 or higher
- Clinical stage ≥ T2b **AND** Gleason score 3+4=7 or higher
- ≥ 50% of cores positive for cancer in a random, non-targeted prostate biopsy
- Grade group 3, 4 or 5 disease

NOTE: When **active surveillance** was selected as the initial plan of care, PSMA PET is indicated when the disease progresses to very high risk, high risk or unfavorable intermediate risk using the most recent Gleason score/biopsy result, clinical stage and PSA level.

NOTE: A biopsy typically confirms the diagnosis of prostate cancer prior to PSMA PET. If the PSA is > 50, there is no clinical concern for infection **AND** there is an intent to treat the patient for prostate cancer without biopsy confirmation, PSMA PET can be approved.

- Restaging (PSMA):
 - Post Radical Prostatectomy
 - Indicated for **ANY** of the following:
 - ◆ PSA persistence defined as detectable PSA (0.1ng/mL or greater) at 3 months post-operatively (only one level required) **OR**
 - ◆ Rising PSA on two or more occasions **OR**
 - ◆ PSA rise to > 0.1ng/mL if PSA was previously undetectable
 - ◇ **NOTE:** PSMA PET is indicated at biochemical recurrence but not to monitor rising PSA if that PET is negative
 - Post Radiation
 - Indicated with rising PSA above the nadir on two or more occasions (two separate levels above nadir required)

◆ **NOTE:** PSMA PET is indicated at biochemical recurrence but not to monitor rising PSA if that PET is negative

- Known Metastatic Disease
 - With prior indeterminate imaging **OR**
 - Discordance between imaging and PSA (i.e. rising PSA with stable imaging or stable PSA with progression on imaging)
- Radioligand therapy (Lu-177/Pluvicto)
 - Indicated for **ANY** of the following:
 - ◆ When under consideration for radioligand therapy **OR**
 - ◆ Following completion of treatment with radioligand therapy **OR**
 - ◆ Discordance between imaging and PSA
- **Special Tracer (Axumin or Choline) PET**
 - Initial Staging
 - Not indicated
 - Restaging
 - When the restaging criteria above are met (depending on the clinical scenario/prior treatment) **AND**
 - Prior indeterminate imaging is provided

NOTE: PET with Axumin or Choline can be considered on a case-by-case basis when a medical reason is given why that tracer would be used instead of PSMA

Penile Cancer⁽¹⁵⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - With suspected inguinal lymph node positive disease (based on imaging or exam)
- Restaging
 - With prior indeterminate imaging **OR**
 - With suspected inguinal lymph node positive disease (based on imaging or exam)

Testicular Cancer⁽¹⁶⁾

- Initial Staging

- With prior indeterminate imaging when retroperitoneal dissection is under consideration and extent of disease needs clarification
- Restaging
 - Non-seminoma:
 - **NOT** indicated
 - Pure seminoma:
 - With prior indeterminate imaging **OR**
 - With a residual mass > 3cm with a normal AFP and b-hcg **AND** it has been at least 6 weeks since completion of chemotherapy

NOTE: If this PET is equivocal or borderline for residual disease, an additional repeat PET >6 weeks later is appropriate to identify patients that can be safely observed without additional surgery. If a persistently FDG-avid mass is present on the second PET, resection or biopsy is recommended.

Gynecological Cancers

Cervical Cancer (including small cell neuroendocrine carcinoma of the cervix (NECC))⁽¹⁷⁾

- Initial Staging
 - Indicated
 - Pelvis MRI is indicated in addition to PET
- Restaging
 - Indicated
- Surveillance
 - Indicated for stage III or higher in the first 2 years following treatment

Uterine Sarcoma⁽¹⁸⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

Endometrial Cancer⁽¹⁸⁾

- Initial Staging

- With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

Gestational Trophoblastic Neoplasia ⁽¹⁹⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - Potentially surgically curable metastatic disease
- Restaging
 - With prior indeterminate imaging **OR**
 - Potentially surgically curable metastatic disease **OR**
 - At completion of chemotherapy when hCG is not a reliable marker
- Surveillance
 - Every 6-12 months for up to 3 years post completion of treatment when hCG is not a reliable marker

Ovarian, Fallopian Tube, and Primary Peritoneal Cancer ⁽²⁰⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging (including discordance between tumor markers and imaging)

Vulvar Cancer ⁽²¹⁾

- Initial Staging
 - Prior indeterminate imaging **OR**
 - If \geq T2 tumor (extension beyond vulva/perineum) **OR**
 - When sentinel lymph node biopsy is positive **OR**
 - When metastases are suspected
- Restaging
 - Prior indeterminate imaging **OR**
 - Once 3-6 months after completion of primary therapy **OR**

- When recurrence or metastatic disease is suspected

Head & Neck Cancer ⁽²²⁾

- Initial Staging
 - Indicated
 - Neck CT (or MRI) **AND** CT (or MRI) of the primary site of disease are indicated in addition to PET
- Restaging
 - Indicated
 - Neck CT (or MRI) **AND** CT (or MRI) of the primary site of disease are indicated in addition to PET
 - If the end of therapy PET demonstrates possible residual disease, one additional PET is appropriate ≥ 6 weeks after end-of-therapy PET as it may help identify those patients who can be safely observed without additional cancer-directed treatment

Leukemias & Lymphomas

Acute Lymphoblastic Leukemia (ALL) (Pediatric and Adult) ^(23,24)

- Initial Staging
 - For lymphomatous extramedullary disease (on exam or prior conventional imaging)
- Restaging
 - For lymphomatous extramedullary disease (on exam or prior conventional imaging)

Acute Myeloid Leukemia (AML) (Pediatric and Adult) ⁽²⁵⁾

- Initial Staging
 - If suspected extramedullary involvement (myeloid sarcoma) (on exam or prior conventional imaging)
- Restaging
 - If suspected extramedullary involvement (myeloid sarcoma) (on exam or prior conventional imaging)

B-Lymphoblastic Lymphoma (Adult) ⁽²⁶⁾

- Initial Staging
 - Indicated
 - Brain MRI is indicated in addition to PET
- Restaging
 - Indicated

B-Lymphoblastic Lymphoma (Pediatric) ⁽²⁷⁾

- Initial Staging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET
- Restaging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET

NOTE: This portion of the guideline should be applied to patients treated at a pediatric institution on a pediatric protocol which can include young adults into their 20's.

Burkitt Lymphoma (Adult) ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Burkitt Lymphoma (Pediatric) ⁽²⁷⁾

- Initial Staging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET
- Restaging
 - Indicated

- Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET

NOTE: This portion of the guideline should be applied to patients treated at a pediatric institution on a pediatric protocol which can include young adults into their 20's.

Castleman's Disease ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Chronic Lymphocytic Leukemia (CLL) and Small Lymphocytic Lymphoma (SLL) ⁽²⁸⁾

- Initial Staging
 - For suspected high-grade transformation **OR**
 - To guide biopsy with prior indeterminate imaging
- Restaging
 - With accelerated CLL **OR**
 - To guide biopsy with prior indeterminate imaging

Chronic Myeloid Leukemia (CML) ⁽²⁹⁾

- Initial Staging
 - **NOT** Indicated
- Restaging
 - **NOT** Indicated

Diffuse Large B Cell Lymphoma (Adult) ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

- Surveillance
 - When a site of disease was previously visualized on a PET Scan but not conventional imaging, PET is indicated every 6 months for 2 years

Diffuse Large B Cell Lymphoma (Pediatric) ⁽²⁷⁾

- Initial Staging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET
- Restaging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET

NOTE: This portion of the guideline should be applied to patients treated at a pediatric institution on a pediatric protocol which can include young adults into their 20's.

Follicular lymphoma ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated
- Surveillance
 - When a site of disease was previously visualized on a PET Scan but not conventional imaging, PET is indicated every 6 months for 2 years

Mantle cell lymphoma ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Hodgkin Lymphoma (Pediatric and Adult) ^(30,31)

- Initial Staging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET
- Restaging
 - Indicated
 - Dedicated CT scans of the original sites of disease are indicated in addition to PET
 - One repeat PET is appropriate if the end of treatment PET was positive (Deauville Score 4-5)

Kaposi Sarcoma ⁽³²⁾

- Initial Staging
 - If concerns for coexisting Kaposi sarcoma-associated herpesvirus (KSHV) associated inflammatory cytokine syndrome (KICS), multicentric Castleman disease, or KSHV+ lymphoma
- Restaging
 - Not Indicated

Post-Transplant Lymphoproliferative Disease ⁽²⁶⁾

- Initial Staging
 - Indicated
 - Brain MRI is indicated in addition to PET
- Restaging
 - Indicated

Primary Mediastinal Large B-Cell Lymphoma (Pediatric) ⁽²⁷⁾

- Initial Staging
 - Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET
- Restaging

- Indicated
 - Neck CT, Chest CT **AND** Abdomen and Pelvis CT are indicated in addition to PET

NOTE: This portion of the guideline should be applied to patients treated at a pediatric institution on a pediatric protocol which can include young adults into their 20's.

T Cell Lymphomas ⁽³³⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

NOTE: This includes the following types of T-cell lymphoma: PTCL-NOS, Enteropathy-associated T-cell lymphoma (EATL), monomorphic epitheliotropic intestinal T-cell lymphoma (MEITL), ALCL ALK positive, ALCL ALK negative, Angioimmunoblastic T-cell lymphoma (AITL), follicular helper T-cell lymphoma, angioimmunoblastic type nodal TFH cell lymphoma, Follicular T-cell lymphoma, Breast Implant-Associated ALCL, T Cell Prolymphocytic Leukemia, T-Lymphoblastic lymphoma, Hepatosplenic T cell lymphoma, Extranodal NK/T-cell lymphoma

Waldenstrom Macroglobulinemia/Lymphoplasmacytic Lymphoma ⁽³⁴⁾

- Initial Staging
 - **NOT** Indicated
- Restaging
 - **NOT** Indicated

Liver & Hepatobiliary Cancers

Ampullary Adenocarcinoma ⁽³⁵⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - If high-risk features are present (markedly elevated CA 19-9 or CEA, large primary tumors, large regional lymph nodes, excessive weight loss and/or extreme pain)
- Restaging

- With prior indeterminate imaging **OR**
- For pre-surgical evaluation

Biliary Tract Cancers ⁽³⁶⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

Hepatocellular Carcinoma ⁽³⁷⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

YTTRIUM-90 (Y90)

Y90 PET SCAN: Indicated when performed immediately after treatment of liver malignancy (primary or metastatic). The Y90 treatment is also the tracer for this and PET is performed within 24 hours of treatment (while Y90 is still detectable) to confirm the final distribution of the Y90. PET.

Lung Cancers

Non-Small Cell Lung Cancer ⁽³⁸⁾

- Initial Staging
 - Indicated
 - Brain MRI is indicated in addition to PET
- Restaging
 - Indicated for **ANY** of the following:
 - Pre-surgical evaluation **OR**
 - Chest CT is indicated in addition to PET
 - Suspected or confirmed recurrence/progression **OR**

- Brain MRI is indicated in addition to PET
- Indeterminate findings on conventional imaging **OR**
- End of treatment evaluation

***Small Cell Lung Cancer*⁽³⁹⁾**

- Initial staging (all patients)
 - Indicated if needed to clarify extent of disease
- Restaging
 - With prior indeterminate imaging **OR**
 - For radiation planning

Lung Nodules

When a lung nodule is seen on low dose CT or standard Chest CT without known malignancy), PET is indicated for **ANY** of the following:

- If the solid component of the dominant nodule (either solitary or clearly dominant) is \geq 8mm **OR**
- If there is a part solid/mixed nodule with the solid component 6 mm or larger **OR**
- If there is a mixed nodule (i.e., ground glass and solid nodule) with the solid component of the nodule \geq 4mm on LDCT when there has been **EITHER**
 - Interval growth of the solid component of at least 1.5mm **OR**
 - Interval development of a new mixed nodule with the solid nodule component \geq 4mm

Neuroendocrine & Adrenal Tumors⁽⁴⁰⁾

Adrenocortical Carcinoma

- FDG PET
 - Adrenal (other than pheochromocytoma/paraganglioma)
 - Initial Staging:
 - Indicated when conventional imaging and biochemical evaluation are highly suggestive of adrenocortical carcinoma
 - Restaging:
 - With prior indeterminate imaging

NOTE: Features of an adrenal mass on conventional imaging that are suspicious for adrenocortical carcinoma (ACC) include: size > 4 cm, homogenous mass with irregular margins and/or local invasion. If there is no history of another primary malignancy and these features are present on imaging, then PET is reasonable. If there is a history of another primary tumor and a metastasis is suspected, biopsy should be done first to determine tissue type. A biochemical evaluation is also done to evaluate for other tumor types (such as pheochromocytoma) for which a different tracer (such as dotatate) may be more appropriate.

Paraganglioma and Pheochromocytoma

- **Special Tracer SSTR (Dotatate) PET**
 - Initial Staging
 - Indicated when there is a high clinical suspicion based on imaging and biochemical evaluation prior to biopsy **OR**
 - For biopsy proven disease
 - Restaging
 - Indicated when progression or recurrence is known or suspected (based on labs and/or conventional imaging) **OR**
 - SSRT directed therapy is being considered **OR**
 - With prior indeterminate imaging
- **FDG PET**
 - Initial Staging
 - If negative initial staging SSTR PET
 - Restaging
 - Prior indeterminate imaging **OR**
 - With bone-dominant disease **OR**
 - If FDG PET positive at diagnosis **AND** progression or recurrence is known or suspected (based on labs and/or conventional imaging)

Well-Differentiated Neuroendocrine Tumors (NET)

Special Tracer SSTR (Dotatate) PET

- Initial Staging:
 - Indicated
 - Abdomen MRI (liver) is indicated in addition to PET
- Restaging:
 - With prior indeterminate imaging **OR**

- With symptoms, laboratory or imaging findings of progression **OR**
- When considering SSTR-directed therapy
 - Abdomen MRI (liver) is indicated in addition to PET for all restaging indications

FDG PET

- Initial Staging:
 - Indicated for high-grade well-differentiated NET **AND**
 - With a high Ki67 ($\geq 55\%$) **AND**
 - Negative initial staging SSTR PET
 - Abdomen MRI (liver) is indicated in addition to PET
- Restaging:
 - Indicated when there is prior indeterminate imaging **OR** progression (see above) **AND** either of the following:
 - Recent negative SSTR PET **OR**
 - Prior positive FDG PET
 - Abdomen MRI (liver) is indicated in addition to PET for all restaging indications

Poorly Differentiated Neuroendocrine Tumors

- **FDG PET**
 - Initial Staging
 - Indicated
 - Abdomen MRI (liver) is indicated in addition to PET
 - Restaging
 - With prior indeterminate imaging **OR**
 - With symptoms, laboratory or imaging findings of progression
 - Abdomen MRI (liver) is indicated in addition to PET for both restaging indications
- **Special Tracer SSTR (Dotatate) PET**
 - Initial Staging
 - **NOT** Indicated
 - Restaging
 - **NOT** Indicated

NOTE: This includes large cell neuroendocrine carcinoma of the lung, mixed neuroendocrine tumors, extra-pulmonary small cell carcinoma (i.e. primary site of disease is not in the lung). See **small cell lung cancer** for primary site of disease in the lung. See **cervical cancer** for primary site of disease in the cervix.

Non-Malignant Disease

Dementia ^(41,42,43)

- Special Tracer PET
 - Amyloid PET for evaluation for mild cognitive impairment or dementia in the following situations:
 - Detection of early Alzheimer's disease **OR**
 - Differentiation between Alzheimer's, dementia with Lewy body disease (DLB) and frontotemporal lobar degeneration (FTD) **OR**
 - Assessment for the presence of beta amyloid plaque in Alzheimer's disease when being considered for treatments that target beta-amyloid plaque

AND ALL the following criteria are met (criteria apply to **ANY** of the above 3 indications):

- Brain MRI is insufficient or indeterminant **AND**
- Objective measures demonstrate objective impairment (MMSE/MoCA < 26 or mild cognitive impairment on neuropsychological testing) **AND**
- Full lab evaluation (thyroid function tests, CBC, CMP including LFTs and B12) has been completed and if abnormal, have been treated and cognitive difficulty persists **AND**
- Medication side effects⁽⁴⁴⁾ and medical causes, such as vascular or traumatic or inflammatory etiologies have been excluded

NOTE: Brain CT is an alternative to brain MRI when MRI is contraindicated or cannot be performed for detection and differentiation but **NOT** for treatment planning as MRI is a prerequisite to beta-amyloid targeted treatment

Sarcoidosis

- Known sarcoidosis:
 - **ONLY** if conventional testing (CXR, CT and inflammatory serology) are indeterminate for known sarcoid to determine:
 - If treatment might be helpful **OR**
 - Extent of disease, if it will potentially change management **OR**
 - Response to treatment

- Suspected sarcoidosis:
 - To determine most suitable site to biopsy

Vasculitis

- In limited circumstances for patients with known vasculitis, PET is indicated after conventional imaging (MRA/CTA/MR/CT) is insufficient to determine treatment

Other Malignancies

Castleman's Disease ⁽²⁶⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Histiocytic Neoplasms ⁽⁴⁵⁾

- Langerhan's cell histiocytosis, Erdheim Chester disease, Rosai-Dorfman disease
 - Initial Staging
 - Indicated
 - Restaging
 - Indicated
 - Surveillance
 - Every 3-6 months for 2 years then annually

Melanoma: Uveal ⁽⁴⁶⁾

- Initial Staging
 - **NOT** indicated
- Restaging
 - **NOT** indicated

Merkel Cell Carcinoma ⁽⁴⁷⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Mesothelioma: Peritoneal ⁽⁴⁸⁾

- Initial Staging
 - Indicated
- Restaging
 - Indicated

Mesothelioma: Pleural ⁽⁴⁹⁾

- Initial Staging
 - Indicated
 - Chest CT is indicated in addition to PET
- Restaging
 - Indicated
 - Chest CT is indicated in addition to PET

NOTE: The evaluation of recurrent pleural effusion and/or pleural thickening includes CT chest, thoracentesis and pleural biopsy. The diagnostic sensitivity of this investigation is 70-75%. If the first biopsy is non-diagnostic, there is a higher chance that subsequent biopsies will be non-diagnostic, thus a PET to guide subsequent biopsy is reasonable in this situation.

Neuroblastoma ⁽⁵⁰⁾

- Initial Staging
 - Indicated when tumors are not avid on MIBG or there are discordant findings between MIBG and anatomic imaging
 - Due to the complexity of these tumors and the young age of patients, multiple overlapping imaging studies and modalities are often necessary in addition to PET.

- Neuroblastoma tumors often encase vasculature, vascular imaging is appropriate if requested in addition to standard cross-sectional imaging and PET.
- Restaging
 - Indicated when FDG PET was used for initial staging or if MIBG has become indeterminate or discordant
 - Due to the complexity of these tumors and the young age of patients, multiple overlapping imaging studies and modalities are often necessary in addition to PET.
 - Neuroblastoma tumors often encase vasculature, vascular imaging is appropriate if requested in addition to standard cross-sectional imaging and PET.
- Surveillance
 - If PET is used for functional imaging evaluation in place of MIBG during treatment, surveillance PET is appropriate every 3-6 months for 1 year, then every 6 months for 1 year, then annually
 - Due to the complexity of these tumors and the young age of patients, multiple overlapping imaging studies and modalities are often necessary in addition to PET.

NOTE: Functional imaging with Iodine 123 (^{123}I -MIBG) is routinely used as the standard functional imaging modality in this disease given the high specificity and sensitivity to identify metastatic disease.

Occult Primary⁽⁵¹⁾

- Initial Staging
 - With prior indeterminate imaging
- Restaging
 - With prior indeterminate imaging

NOTE: The typical evaluation for a suspected metastatic malignancy with an unknown primary includes CT of the Chest, Abdomen and Pelvis **AND** a biopsy of the site of disease.

Post Transplant Lymphoproliferative Disorder (PTLD)⁽²⁶⁾

- Initial Staging
 - Indicated when the diagnosis is made **OR**
 - If suspected based on abnormal physical exam, abnormal imaging or abnormal labs (i.e., significantly elevated or rising viral titers)

- Restaging
 - Indicated

Thymomas & Thymic Carcinomas ⁽⁵²⁾

- Initial Staging:
 - Indicated
- Restaging:
 - Indicated

Thyroid Carcinoma ⁽⁵³⁾

Papillary, Follicular, Oncocytic and Poorly Differentiated:

- Initial Staging:
 - **NOT** Indicated
- Restaging Following Total/Completion Thyroidectomy and/or Radioiodine Ablation (RAI) for **ANY** of the following:
 - With known or suspected metastases (based on laboratory or imaging findings) **AND** I-123/131 is negative **OR**
 - With rising or new Tg Antibody **OR**
 - **Oncocytic** thyroid cancer following thyroidectomy if **ANY** of the following are present:
 - Tumor > 2 cm
 - ≥ 1 focus of vascular invasion
 - Any positive lymph node (≥ cN1)
 - Gross extension outside thyroid
 - Positive margin
 - Postop Tg ≥ 1 ng/mL
- Recurrence:
 - Indicated when recurrence is suspected based on laboratory or imaging findings **AND**
 - I-123/131 is negative (or was previously negative in the setting of known disease)

Anaplastic or De-Differentiated:

- Initial Staging:

- Indicated
- Restaging:
 - Indicated

Medullary:

- **Special Tracer SSTR (dotatate) PET:**
 - Initial Staging:
 - Indicated
 - Restaging:
 - Indicated when tumor markers (calcitonin and/or CEA) are rising **AND** conventional imaging is negative
 - Recurrence:
 - Indicated when tumor markers (calcitonin and/or CEA) are rising **AND** conventional imaging is negative
- **FDG PET**
 - Initial Staging:
 - **NOT** indicated
 - Restaging:
 - **NOT** indicated

***Wilms Tumor*⁽⁵⁴⁾**

- Initial Staging:
 - With prior indeterminate imaging
- Restaging:
 - With prior indeterminate imaging

YTTRIUM-90 (Y90)

Y90 PET SCAN: Indicated when performed immediately after treatment of liver malignancy (primary or metastatic). The Y90 treatment is also the tracer for this and PET is performed within 24 hours of treatment (while Y90 is still detectable) to confirm the final distribution of the Y90 PET.

Pancreatic Cancer ⁽⁵⁵⁾

- Initial Staging
 - With prior indeterminate imaging **OR**
 - Prior to neoadjuvant therapy and surgical resection is being considered **OR**
 - With any of the following high-risk features:
 - Borderline resectable disease
 - Markedly elevated CA19-9 (>180 U/ml)
 - Largely primary tumor/lymph nodes
 - Very symptomatic (jaundice, symptomatic gastric outlet obstruction, venous thromboembolism, extreme pain and excessive weight loss)
- Restaging
 - With prior indeterminate imaging **OR**
 - For pre-surgical evaluation

Plasma Cell Dyscrasias

MGUS ⁽⁵⁶⁾

- Initial Staging
 - **NOT** Indicated
- Restaging
 - **NOT** Indicated

NOTE: Whole Body Low Dose CT is used rather than PET - see CG_063 (Unlisted Study) under Unlisted CT

Multiple Myeloma ⁽⁵⁶⁾

- Initial Staging:
 - Indicated
- Restaging on Active Treatment (including following Bone Marrow Transplant (BMT) or CAR-T treatment):
 - Indicated

NOTE: For individuals receiving Bone Marrow Transplant (BMT) or CAR-T treatment PET is indicated prior to treatment and at 1 month, 3 months **AND** 6 months post-treatment

- Surveillance: Indicated annually (indefinitely)

Smoldering Myeloma ⁽⁵⁶⁾

- Initial Staging:
 - Indicated
- Restaging:
 - Indicated when there are symptoms and/or laboratory findings to suggest progression

Solitary Plasmacytoma ⁽⁵⁶⁾

- Initial Staging:
 - Indicated
- Restaging:
 - Indicated
- Surveillance:
 - When initial staging or restaging on treatment was with PET, PET is indicated during surveillance at the following intervals:
 - 3 months after completion of treatment then
 - Annually up to 5 years

Systemic Light Chain Amyloidosis ⁽⁵⁷⁾

- Initial Staging:
 - Indicated
- Restaging:
 - Indicated

Skin Cancers

Basal Cell Skin Cancer ⁽⁵⁸⁾

- Initial Staging
 - **NOT** Indicated
- Restaging
 - **NOT** Indicated

Melanoma: Cutaneous ⁽⁵⁹⁾

- Initial Staging
 - Indicated if considering systemic treatment with immunotherapy (typically stage IIB or higher)
- Restaging
 - Indicated for patients receiving systemic treatment with immunotherapy **OR**
 - For workup of local satellite/in-transit and/or nodal recurrences
- Surveillance
 - For select patients with primary disease in the extremities **OR** previous disease only able to be seen on PET, surveillance imaging is indicated in place of CT scans every 3-12 months for 2 years, then every 6-12 months for 3 years

Squamous Cell Skin Cancer ⁽⁶⁰⁾

- Initial Staging
 - Indicated when lymph node or metastatic site has been biopsied and shows disease spread
- Restaging
 - Indicated when lymph node or metastatic site has been biopsied and shows disease spread

LEGISLATIVE REQUIREMENTS

State of Washington ⁽⁶¹⁾

- Washington State
 - Washington State Health Care Authority Health Technology Assessment 20181116B Positron Emission Tomography (PET) scans for lymphoma
 - PET scans (i.e., PET with computed tomography or PET/CT) for lymphoma is a covered benefit with conditions.
 - An initial staging scan is covered followed by up to three (3) scans per active occurrence of lymphoma:
 - When used to assess a response to chemotherapy, scans should not be done any sooner than three (3) weeks after completion of any chemotherapy cycle, except for advanced stage Hodgkin's lymphoma, after four (4) cycles of ABVD chemotherapy.



- When used to assess response to radiation therapy, scans should not be done any sooner than eight (8) weeks after completion of radiation or combined chemotherapy and radiation therapy.
- Relapse: Covered when relapse is suspected in the presence of clinical symptoms or other imaging findings suggestive of recurrence
- Surveillance: Not covered

Washington State Health Care Authority oversees the Apple Health (Medicaid) program and the Public Employees Benefits Board (PEBB) Program

State of Arkansas⁽⁶²⁾

ONLY APPLICABLE TO COMMERCIAL AND EXCHANGE LINES OF BUSINESS

- Arkansas State
 - State of Arkansas 93rd General Assembly Regular Session 2021 House Bill 1357 an act to continue care for the protection of cancer survivors; concerning coverage for Positron Emission Tomography under a health benefit plan to screen for or diagnose cancer in certain patients; and for other purposes. Arkansas Code Title 23, Chapter 79, Subchapter 1, is amended to add an additional section to read as follows: 25 23-79-164. Coverage for positron emission tomography:
 - A healthcare insurer that offers a health benefit plan in this state shall provide coverage for positron emission tomography to screen for or to diagnose cancer in a patient upon the recommendation of the patient's physician when the patient has a prior history of cancer (subsection (b))
 - Benefits under subsection (b) of this section are subject to any health benefit plan provisions that apply to other services covered by the health benefit plan

CODING AND STANDARDS

Coding

CPT Codes

78811, 78812, 78813, 78814, 78815, 78816

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace

<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

BACKGROUND

Definitions

- **INITIAL STAGING** refers to imaging that is performed after the diagnosis of cancer is made, and generally before any treatment.
- **RESTAGING** refers to imaging that is performed during treatment to determine response to treatment/monitor treatment, a single end of treatment study done within 6 months of completion of treatment, or when there is clinical concern for recurrence (i.e., new imaging, new signs, rising labs/tumor markers or symptoms relative to type of cancer and entire clinical picture). Recurrence is not required to be biopsy proven.
 - Imaging is typically performed 6-12 weeks after surgery
 - Imaging is typically performed 12 weeks after radiation (to avoid false positive findings that can be caused by treatment changes or healing).
 - PET/CT can be performed 1 - 3 weeks after neoadjuvant chemotherapy or neoadjuvant chemoradiation if done for presurgical planning to evaluate for distant metastatic disease or to evaluate known metastatic disease located in areas separate from the site(s) being radiated.
 - When an end of treatment PET scan performed at an appropriate post-treatment interval (see above) shows indeterminate findings, one additional repeat PET in 3 months is indicated.
 - Common exceptions are noted in the guideline. If not noted in the guideline, a valid clinical reason explaining why the interval needs to be shorter is needed.
- **TREATMENT** includes chemotherapy, immunotherapy, radiation, as well as patients on “maintenance therapy” who have known, or existing, metastatic disease being controlled by this treatment. Allogenic bone marrow transplant and CART T-cell therapy should be considered ‘active’ treatment for at least 6 months after infusion/transplant and as such can be approved at 30 days, 100 days, and 6 months after the most recent infusion.
- **INDETERMINATE IMAGING:**
 - When indeterminate imaging is required prior to PET, this typically means conventional imaging (CT, MRI, OR Nuclear Medicine Scan (i.e. bone scan)) shows a finding that is indeterminate **AND** clarification of that finding with PET will potentially change management.
 - The information provided should clearly explain why conventional imaging is insufficient to determine treatment or management.
 - Biopsy guidance:

- To determine the best location to biopsy either within a tumor that has necrosis on imaging **OR**
- To determine the best location to biopsy when there are findings on standard imaging that would require a significantly invasive procedure (such as laparoscopic or open surgical procedures) **AND** malignancy is highly suspected based on imaging.
- When previous conventional imaging has been shown to be negative, yet a concurrent PET scan was positive (i.e. conventional imaging was falsely negative/ missed lesions seen on PET), we do not require repeat conventional imaging prior to every subsequent PET because conventional imaging was already shown to be insufficient. Appropriate interval criteria should still be met.

Further Information

PET with CONTRAINDICATIONS to contrasted CT AND MRI: The inability to image with contrasted conventional imaging includes contraindications to both CT (such as chronic renal failure with GFR < 30 **OR** significant iodinated contrast allergy) **AND** to MRI (such as gadolinium allergy, implanted device that is not MRI compatible, or GFR <40). When requested for surveillance due to the above reasons, PET can be considered during the time that the highest risk of recurrence for that cancer (typically the first two years after completion of treatment).

PET/MR: When PET/MR can be considered per the guideline, if the criteria are met for PET for that cancer and the plan is to do a PET/MR rather than a PET/CT, the PET scan can be approved. In the same way a separate approval for total body CT is not needed when a PET/CT is requested, a separate approval for the total body MR is not typically needed. However, until a PET/MR CPT code is implemented, unlisted MR in addition to PET can be considered on a case-to-case basis.

POLICY HISTORY

Summary

Date	Summary
August 2024	<ul style="list-style-type: none"> ● Reorganized: <ul style="list-style-type: none"> ○ Grouped similar cancer types together (e.g. leukemias and lymphomas, gynecological cancers) ● Revised indeterminate imaging and contraindications to conventional imaging sections ● Addition of the use of Amyloid PET for early Alzheimer's ● Updated: <ul style="list-style-type: none"> ○ Surveillance PET section added to disease type where appropriate ○ Combination imaging added to disease type where appropriate

	<ul style="list-style-type: none"> ○ Following Cancers to be consistent with updated version of NCCN <ul style="list-style-type: none"> ■ Adrenal: added indications in limited circumstances ■ Ampullary adenocarcinoma: added section ■ Anal carcinoma: added indications for radiation planning ■ Bone tumors: added combination imaging recommendations, removed age restrictions on PET ■ Cervical cancer: added neuroendocrine small cell carcinoma of the cervix, added surveillance indication ■ Gastrointestinal stromal tumor: added indication for 2-4 weeks after initiation of TKI (tyrosine kinase inhibitor) therapy ■ Gestational trophoblastic neoplasia: added indication for potentially surgically curable metastatic disease ■ Lymphoma: added clarification by sub-type of lymphoma, added indications for combination imaging in pediatric patients, added surveillance indications ■ Melanoma: added indication for patients considering or receiving systemic treatment with immunotherapy ■ Neuroblastoma: added surveillance indications ■ Neuroendocrine: added detail regarding what is needed for restaging in SSTR section ■ Non-malignant disease: added dementia section, ■ Non-small cell lung cancer: added qualifiers to restaging indications (Indicated for any of the following: pre-surgical evaluation, suspected or confirmed progression/recurrence, indeterminate findings on conventional imaging, end of treatment evaluation) ■ Penile cancer: added indication for suspected inguinal lymph node positive disease (based on imaging or exam) ■ Pheochromocytoma/Paraganglioma: separated from general neuroendocrine tumors, added clarification to indications for FDG tracer vs. SSTR tracer ■ Prostate cancer: Reorganized section to include all tracers, updated restaging indications ■ Rectal cancer: separated from colon cancer ■ Small cell lung cancer: clarified initial staging indication to indicated if needed to clarify extent of disease ■ Soft tissue sarcomas: added specific indications for sub-categories of soft tissue sarcoma (angiosarcoma, clear cell sarcoma, epithelioid sarcoma, malignant peripheral nerve sheath sarcoma (MPNST), myxoid/round cell liposarcoma), added combination
--	--

	<p>imaging recommendations, removed age restrictions on PET</p> <ul style="list-style-type: none"> ■ Systemic light chain amyloidosis: added section ■ Testicular cancer: added initial staging indication for all histologies for prior indeterminate imaging when retroperitoneal dissection is under consideration and extent of disease needs clarification ■ Vulvar cancer: added indications for when sentinel lymph node biopsy is positive and when metastases are suspected
May 2023	<ul style="list-style-type: none"> ● Reorganized: <ul style="list-style-type: none"> ○ Cancers where the guidance is straightforward into a list for ICRs and non-PET PCRs can approve/deny ○ Definitions to background ● Revised indeterminate imaging and contraindications to conventional imaging sections ● Updated: <ul style="list-style-type: none"> ○ Surveillance PET section with additional guidance ○ Following Cancers to be consistent with updated version of NCCN <ul style="list-style-type: none"> ■ Adrenal: added indications in limited circumstances ■ Breast: changed to requiring inconclusive imaging and added a restaging indication for FES PET in special tracer section ■ Colorectal: added liver directed therapy and potentially curable M1 disease to restaging ■ Esophageal: initial staging clarified as indicated for non-metastatic, restaging changed from indicated to following chemoradiation or with indeterminate imaging ■ Small cell lung cancer: clarified staging in background section, limited stage: changed restaging to prior to radiation or with indeterminate imaging; for extensive stage: added indication for indeterminate imaging in initial staging, added indication when radiation is planned for restaging ■ Melanoma: added indication for satellite/in-transit and dermal melanomas that lack epidermal involvement ■ Neuroendocrine: separated types of NET, changed wording for poorly differentiated and well differentiated high grade in FDG section; added detail re what is needed for restaging in SSTR section ■ Renal: changed to not indicated ■ Skin squamous cell: added indication for biopsy proven lymph node positive and metastatic disease ■ Sarcoma: separated rhabdomyosarcoma as indicated (remainder require inconclusive imaging if > 30 yo)

	<ul style="list-style-type: none"> ■ Thyroid: moved most of detail into background section, made indications consistent with current NCCN guidance ■ MPNST: Added indication in section for NF1 ■ Prostate cancer: Moved detail for initial staging and non-PSMA tracers into background; updated restaging indications ● Regrouped the following Cancers in the table to coincide with grouping in NCCN: <ul style="list-style-type: none"> ○ Biliary Tract ○ Bone Cancers ○ Uterine Cancers ● Added TNM explanation and cancer-specific background sections when needed for additional ● General information moved to the beginning of the guideline with added statement on clinical indications not addressed in this guideline
--	---

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Soft Tissue Sarcoma Version 1.2024. National Comprehensive Cancer Network®. 2024.
2. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Bone Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024.
3. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Breast Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024.
4. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers Version 1.2023. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Central Nervous System Cancers Version 1.2023. 2023.
5. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Anal Carcinoma Version 1.2024. National Comprehensive Cancer Network®. 2023.
6. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colon Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024.
7. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Esophageal and Esophagogastric Junction Cancers Version 3.2024. National Comprehensive Cancer Network®. 2024.
8. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Gastric Cancer Version 1.2024. National Comprehensive Cancer Network®. 2024.
9. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Gastrointestinal Stromal Tumors Version 1.2024. National Comprehensive Cancer Network®. 2024.
10. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Rectal Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024.
11. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Small Bowel Adenocarcinoma Version 3.2024. National Comprehensive Cancer Network®. 2024.
12. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Bladder Cancer Version 4.2024. National Comprehensive Cancer Network®. 2024.
13. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer Version 3.2024. National Comprehensive Cancer Network®. 2024.
14. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Prostate Cancer Version 4.2024. National Comprehensive Cancer Network®. 2024.
15. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Penile Cancer Version 1.2024. National Comprehensive Cancer Network®. 2023.
16. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Testicular Cancer Version 1.2024. National Comprehensive Cancer Network®. 2024.
17. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Cervical Cancer Version 3.2024. National Comprehensive Cancer Network®. 2024.
18. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Uterine Neoplasms Version 2.2024. National Comprehensive Cancer Network®. 2024.
19. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Gestational Trophoblastic Neoplasia Version 1.2024. National Comprehensive Cancer Network®. 2023.

20. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Ovarian Cancer Continue Including Fallopian Tube Cancer and Primary Peritoneal Cancer Version 2.2024. National Comprehensive Cancer Network®. 2024.
21. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Continue NCCN.org Vulvar Cancer Version 4.2024. National Comprehensive Cancer Network®. 2024.
22. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Head and Neck Cancers Version 4.2024. National Comprehensive Cancer Network®. 2024.
23. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Acute Lymphoblastic Leukemia Version 4.2023. National Comprehensive Cancer Network®. 2024.
24. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Pediatric Acute Lymphoblastic Leukemia Version 5.2024. National Comprehensive Cancer Network®. 2024.
25. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Acute Myeloid Leukemia Version 3.2024. National Comprehensive Cancer Network®. 2024.
26. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) B-Cell Lymphomas Version 2.2024. National Comprehensive Cancer Network®. 2024.
27. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Pediatric Aggressive Mature B-Cell Lymphomas Version 1.2024. National Comprehensive Cancer Network®. 2024.
28. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Continue Chronic Lymphocytic Leukemia/ Small Lymphocytic Lymphoma Version 3.2024. National Comprehensive Cancer Network®. 2024.
29. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Chronic Myeloid Leukemia Version 2.2024. National Comprehensive Cancer Network®. 2023.
30. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Hodgkin Lymphoma Version 3.2024. National Comprehensive Cancer Network®. 2024.
31. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Pediatric Hodgkin Lymphoma Version 1.2024. National Comprehensive Cancer Network®. 2024.
32. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kaposi Sarcoma Version 1.2024. National Comprehensive Cancer Network®. 2023.
33. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) T-Cell Lymphomas Version 3.2024. National Comprehensive Cancer Network®. 2024.
34. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Waldenström Macroglobulinemia/ Lymphoplasmacytic Lymphoma Version 2.2024. National Comprehensive Cancer Network®. 2023.
35. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Ampullary Adenocarcinoma Version 1.2024. National Comprehensive Cancer Network®. 2023.
36. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Biliary Tract Cancers Version 2.2024. National Comprehensive Cancer Network®. 2024.
37. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Hepatocellular Carcinoma Version 1.2024. National Comprehensive Cancer Network®. 2024.
38. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Non-Small Cell Lung Cancer Version 5.2024. National Comprehensive Cancer Network®. 2024.
39. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Small Cell Lung Cancer Version 2.2024. National Comprehensive Cancer Network®. 2023.

40. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroendocrine and Adrenal Tumors Version 1.2023. National Comprehensive Cancer Network®. 2023.
41. Albert M S, DeKosky S T, Dickson D, Dubois B, Feldman H et al. The diagnosis of mild cognitive impairment due to Alzheimers disease: recommendations from the National Institute on Aging-Alzheimers Association workgroups on diagnostic guidelines for Alzheimers disease. *Alzheimers Dement*. 2011; 7: 270-9. 10.1016/j.jalz.2011.03.008.
42. Frey K A, Lodge M A, Meltzer C, Peller P J, Wong T Z et al. ACR-ASNR Practice Parameter for Brain PET/CT Imaging Dementia. *Clinical nuclear medicine*. 2016; 41: 118-25.
43. Oldan J, Jewells V, Pieper B, Wong T. Complete Evaluation of Dementia: PET and MRI Correlation and Diagnosis for the Neuroradiologist. *American Journal of Neuroradiology*. 2021; 42: true. 10.3174/ajnr.A7079.
44. Campbell N L, Boustani M A, Lane K A, Gao S, Hendrie H et al. Use of anticholinergics and the risk of cognitive impairment in an African American population. *Neurology*. 2010; 75: 152-9. 10.1212/WNL.0b013e3181e7f2ab.
45. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Histiocytic Neoplasms Version 1.2024. National Comprehensive Cancer Network®. 2024.
46. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Melanoma: Uveal Version 1.2024. National Comprehensive Cancer Network®. 2024.
47. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Merkel Cell Carcinoma Version 1.2024. National Comprehensive Cancer Network®. 2023.
48. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Mesothelioma: Peritoneal Version 1.2024. National Comprehensive Cancer Network®. 2023.
49. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Mesothelioma: Pleural Version 1.2024. National Comprehensive Cancer Network®. 2023.
50. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Neuroblastoma Version 1.2024. National Comprehensive Cancer Network®. 2024.
51. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Occult Primary (Cancer of Unknown Primary [CUP]) Version 2.2024. National Comprehensive Cancer Network®. 2024.
52. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Thymomas and Thymic Carcinomas Version 1.2024. National Comprehensive Cancer Network®. 2023.
53. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Thyroid Carcinoma Version 2.2024. National Comprehensive Cancer Network®. 2024.
54. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Wilms Tumor (Nephroblastoma) Version 1.2023. National Comprehensive Cancer Network®. 2023.
55. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Pancreatic Adenocarcinoma Version 2.2024. National Comprehensive Cancer Network®. 2024.
56. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Multiple Myeloma Version 4.2024. National Comprehensive Cancer Network®. 2024.
57. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Systemic Light Chain Amyloidosis Version 2.2024. National Comprehensive Cancer Network®. 2023.
58. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Basal Cell Skin Cancer Version 3.2024. National Comprehensive Cancer Network®. 2024.

59. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Melanoma: Cutaneous Version 2.2024. National Comprehensive Cancer Network®. 2024.
60. NCCN. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) —Squamous Cell Skin Cancer Version 1.2024. National Comprehensive Cancer Network®. 2023.
61. Washington State Health Care Authority. Health Technology Clinical Committee Findings and Decision for Positron Emission Tomography (PET) Scans for Lymphoma. Washington State Health Care Authority. 2019 [January 18].
62. State of Arkansas. HB1357 - TO CONTINUE CARE FOR THE PROTECTION OF CANCER SURVIVORS. Arkansas State Legislature 93rd General Assembly. 2021.

EVOLENT CLINICAL GUIDELINE 015 FOR CEREBRAL PERFUSION CT

Guideline or Policy Number: Evolent_CG_015	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © <i>Original date - year active All rights Reserved</i>		
Original Date: August 2008	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS	2
CODING AND STANDARDS	3
CODING	3
CPT Codes	3
APPLICABLE LINES OF BUSINESS	3
BACKGROUND	3
OVERVIEW	3
CONTRAINDICATIONS AND PREFERRED STUDIES	3
ACUTE CEREBRAL ISCHEMIA	4
CEREBRAL ISCHEMIA AND INFARCTION AND EVALUATION OF VASOSPASM AFTER SUBARACHNOID HEMORRHAGE (SAH)	4
CAROTID ARTERY STENT PLACEMENT/REVASCLARIZATION	4
TEMPORARY BALLOON OCCLUSION (TBO)	4
CEREBROVASCULAR RESERVE	5
INTRACRANIAL TUMORS	5
POLICY HISTORY	5
SUMMARY	5
LEGAL AND COMPLIANCE	5
GUIDELINE APPROVAL	5
Committee	5
DISCLAIMER	5
REFERENCES	7

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Cerebral perfusion computed tomography (CTP) is an imaging technique that provides quantitative evaluation of cerebral perfusion by generating maps of cerebral blood flow, cerebral blood volume, and mean transit time after passage of an IV contrast bolus through the region of interest.

INDICATIONS

In the following settings after initial CT and/or MRI has been performed or when MRI is contraindicated

- In the non-acute setting: ^(1,2)
 - Pre-operative evaluation of cerebral blood flow in patients at high risk for developing cerebral hyperperfusion after carotid revascularization ⁽³⁾
 - For assessment of cerebrovascular reserve by using acetazolamide challenge in individuals with intracranial vascular stenosis who are potential candidates for bypass surgery or neuroendovascular treatment ⁽⁴⁾
 - For the assessment of microvascular permeability in individuals with intracranial neoplasms⁽⁵⁾
 - A follow-up study may be needed to help evaluate an individual's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested
- In the acute setting: ^(1,2,6)
 - For early detection of acute cerebral ischemia and infarct to determine the appropriateness of an intervention or procedure ^(7,8)
 - Prediction of hemorrhagic transformation in acute ischemic stroke ^(7,8,9)

- Differentiating post-ictal paralysis or other stroke mimics from acute stroke after MRI has been completed or is contraindicated and will guide treatment⁽⁹⁾
- For noninvasive evaluation of suspected vasospasm related cerebral ischemia/infarction and/or delayed cerebral ischemia after subarachnoid hemorrhage when transcranial Doppler cannot be done or is indeterminate
- For the assessment of cerebral blood flow after carotid revascularization in individuals with severe carotid artery stenosis or signs/symptoms of cerebral hyperperfusion⁽¹⁰⁾

CODING AND STANDARDS

Coding

CPT Codes

0042T

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Overview

CTP is not widely used especially in outpatients. It is useful in specific scenarios after initial CT and/or MR imaging has been obtained for assessment of, patients with acute stroke, and also a wide range of patients with other cerebrovascular diseases. In evaluating acute stroke it may assist in differentiating the unsalvageable core infarct and salvageable ischemic regions of the brain that may benefit from thrombectomy or thrombolysis. ⁽²⁾

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).

- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

Acute Cerebral Ischemia

Cerebral perfusion CT can quantitatively distinguish the extent of irreversibly infarcted brain tissue (infarct core) from the severely ischemic but salvageable tissue (penumbra), providing a basis for the selection of acute stroke patients that are most likely to benefit from thrombolytic treatment⁽²⁾

Cerebral Ischemia and Infarction and Evaluation of Vasospasm after Subarachnoid Hemorrhage (SAH)

Cerebral perfusion CT can be useful in identifying patients at risk for cerebral ischemia or infarction and for evaluation of vasospasm after subarachnoid hemorrhage. Catheter angiography is the gold standard for detecting vasospasm. Screening for vasospasm can be performed with TCD US (transcranial doppler ultrasound) and has high sensitivity and negative predictive value. CTA, CT perfusion or MRA may be useful in the setting of indeterminate TCD. CT or MR perfusion can help differentiate patients with vascular narrowing but normal perfusion due to the presence of collateral circulation from those without adequate collaterals.

Carotid Artery Stent Placement/Revascularization

Cerebral perfusion CT helps in the assessment of the hemodynamic modifications in patients with severe carotid stenosis. Pre-operatively, CTP may help identify patients at high risk of developing hyperperfusion syndrome after carotid revascularization. The presence of internal carotid artery (ICA) stenosis $\geq 90\%$ is a main risk factor for the development of HPS. Other important risk factors include severe contralateral ICA disease, poor collateral flow, hypertension, and recent stroke or ischemia. Post-operatively CTP provides valuable information for a more thorough assessment in the follow-up of patients after they have undergone carotid revascularization, especially when there is concern for hyperperfusion syndrome.^(1,2)

Temporary Balloon Occlusion (TBO)

Ballon occlusion testing is used prior to a planned endovascular or surgical procedure that will disrupt blood flow to a part of the brain. CTP can be used to detect patients who may not tolerate a prolonged occlusion during a surgery/procedure. Given the length of testing and the need for transport other methods are generally preferred. ^(11,12)

Cerebrovascular Reserve

Cerebral perfusion CT, in conjunction with acetazolamide challenge in patients with intracranial vascular stenosis, can evaluate cerebrovascular reserve capacity and help in estimating the potential risk of stroke. It may help to identify candidates for bypass surgery and endovascular treatment to increase cerebral blood flow.^(13,14)

Intracranial Tumors

Cerebral perfusion CT generates permeability measurements in images of brain tumors depicting areas of different blood flow within tumors and the surrounding tissues. This may allow for diagnosis and grading of tumors and may help to monitor treatment.⁽⁵⁾

POLICY HISTORY

Summary

Date	Summary
May 2024	<ul style="list-style-type: none">• Updated background and references
May 2023	<ul style="list-style-type: none">• Updated references• Added - Prediction of hemorrhagic transformation in acute ischemic stroke• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered



service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Diseases- Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. 2021; 2023:
2. American College of Radiology , American Society of Neuroradiology , Society for Pediatric Radiology. ACR-ASNR-SPR practice parameter for the performance of computed tomography (CT) perfusion in neuroradiologic imaging. 2022; 2023:
3. Mo D, Luo G, Wang B, Ma N, Gao F et al. Staged carotid artery angioplasty and stenting for patients with high-grade carotid stenosis with high risk of developing hyperperfusion injury: a retrospective analysis of 44 cases. *Stroke Vasc Neurol*. 2016; 1: 147-153. 10.1136/svn-2016-000024.
4. Yoshie T, Ueda T, Takada T, Nogoshi S, Fukano T. Prediction of cerebral hyperperfusion syndrome after carotid artery stenting by . *Neuroradiology*. 2016; 58: 253-9.
5. Jain R. Perfusion CT imaging of brain tumors: an overview. *AJNR Am J Neuroradiol*. Oct 2011; 32: 1570-7. 10.3174/ajnr.A2263.
6. Salmela M B, Mortazavi S, Jagadeesan B D, Broderick D F, Burns J et al. ACR appropriateness criteria® cerebrovascular disease. *Journal of the American College of Radiology*. 2017; 14: S34-S61.
7. Simonsen C, Leslie-Mazwi T, Thomalla G. Which Imaging Approach Should Be Used for Stroke of Unknown Time of Onset? *Stroke*. Jan 2021; 52: 373-380. 10.1161/strokeaha.120.032020.
8. Wintermark M, Sanelli P C, Albers G W, Bello J, Derdeyn C et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. 2013; 34: E117-27. 10.3174/ajnr.A3690.
9. Guerrero W, Dababneh H, Eisenschenk S. The role of perfusion CT in identifying stroke mimics in the emergency room: a case of status epilepticus presenting with perfusion CT alterations. *International journal of emergency medicine*. 2012; 5: 4-4. 10.1186/1865-1380-5-4.
10. Vasquez R, Waters M, Skowlund C, Mocco J, Hoh B. Computed tomographic perfusion imaging of non-hemorrhagic cerebral hyperperfusion syndrome and reversal following medical treatment after carotid artery angioplasty and stenting. *J Neurointerv Surg*. May 2012; 4: e2. 10.1136/jnis.2010.003558.
11. Galego O, Nunes C, Morais R, Sargento-Freitas J, Sales F. Monitoring balloon test occlusion of the internal carotid artery with transcranial Doppler. A case report and literature review. *Neuroradiol J*. Feb 2014; 27: 115-9. 10.15274/nrj-2014-10014.
12. Sorteberg A. Balloon occlusion tests and therapeutic vessel occlusions revisited: when, when not, and how. *AJNR Am J Neuroradiol*. May 2014; 35: 862-5. 10.3174/ajnr.A3852.
13. Vagal A, Leach J, Fernandez-Ulloa M, Zuccarello M. The Acetazolamide Challenge: Techniques and Applications in the Evaluation of Chronic Cerebral Ischemia. *American Journal of Neuroradiology*. 2009; 30: true. 10.3174/ajnr.A1538.
14. You S, Jo S, Kim Y, Lee J, Jo K. Pre- and Post-Angioplasty Perfusion CT with Acetazolamide Challenge in Patients. *Journal of Korean Neurosurgical Society*. 2013; 54: 280-8.



EVOLENT CLINICAL GUIDELINE 070-4 FOR TUMOR IMAGING PET - MELANOMA (NON-COVERED INDICATIONS)

Guideline or Policy Number: Evolent_CG_070-4	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2007 - 2025 Evolent. All rights Reserved.</i>		
Original Date: June 2007	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
SPECIAL NOTE	2
PET Scan.....	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS	2
POLICY HISTORY	3
Summary	3
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL.....	3
Committee	3
DISCLAIMER.....	3
REFERENCES.....	4



STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

PET Scan

PET scan for whole body; melanoma for non-covered indications is considered to be not medically necessary and is therefore a non-covered study. ^(1,2)

CODING AND STANDARDS

Coding

CPT Codes

G0219

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage



POLICY HISTORY

Summary

Date	Summary
May 2024	No changes
May 2023	General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Frary E, Gad D, Bastholt L, Hess S. The role of FDG-PET/CT in preoperative staging of sentinel lymph node biopsy-positive melanoma patients. *EJNMMI Res.* 2016; 6: 73. 10.1186/s13550-016-0228-1.
2. Scheier B, Lao C, Kidwell K, Redman B. Use of Preoperative PET/CT Staging in Sentinel Lymph Node-Positive Melanoma. *JAMA Oncol.* 2016; 2: 136-7. 10.1001/jamaoncol.2015.3664.



EVOLENT CLINICAL GUIDELINE 070-2 FOR TUMOR IMAGING PET - ANY SITE (UNLISTED PET)

Guideline or Policy Number: Evolent_CG_070-2	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc.</i> © 2007 - 2025 Evolent. All rights Reserved.		
Original Date: June 2007	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
SPECIAL NOTE	2
PET Imaging	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS	2
POLICY HISTORY	2
SUMMARY	2
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER	3



STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

PET Imaging

PET imaging, any site, not otherwise specified, is a non-covered CPT code.

CODING AND STANDARDS

Coding

CPT Codes

G0235

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
May 2024	No changes

May 2023	General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline
----------	--

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.



EVOLENT CLINICAL GUIDELINE 070-3 FOR TUMOR IMAGING PET - BREAST CANCER (INITIAL DIAGNOSIS)

Guideline or Policy Number: Evolent_CG_070-3	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2007 - 2025 Evolent. All rights Reserved.</i>		
Original Date: June 2007	Last Revised Date: May 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
SPECIAL NOTE	2
PET Imaging	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS	2
POLICY HISTORY	3
Summary	3
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER	3
REFERENCES	4



STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

PET Imaging

PET scan imaging, full and partial-ring pet scanners only, for initial diagnosis of breast cancer and/or surgical planning for breast cancer (e.g., initial staging of axillary lymph nodes) is considered to be not medically necessary and is therefore a non-covered study.⁽¹⁾

CODING AND STANDARDS

Coding

CPT Codes

G0252

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input type="checkbox"/>	Medicare Advantage

POLICY HISTORY

Summary

Date	Summary
May 2024	No changes
May 2023	General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Sasada S, Masumoto N, Goda N, Kajitani K, Emi A et al. Which type of breast cancers is undetectable on ring-type dedicated breast PET? Clin Imaging. 2018; 51: 186-191. 10.1016/j.clinimag.2018.05.010.

EVOLENT CLINICAL GUIDELINE 064 FOR LOW FIELD MRI

Guideline or Policy Number: Evolent_CG_064	<u>Applicable Codes</u>	
<i>"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. © 2009 - 2025 Evolent. All rights Reserved.</i>		
Original Date: July 2009	Last Revised Date: March 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
SPECIAL NOTE	2
CODING AND STANDARDS	2
CODING	2
CPT Codes	2
APPLICABLE LINES OF BUSINESS	2
BACKGROUND	2
MRI Scanners	2
POLICY HISTORY	3
Summary	3
LEGAL AND COMPLIANCE	3
GUIDELINE APPROVAL	3
Committee	3
DISCLAIMER	3
REFERENCES	4



STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Special Note

Low Field MRI services are not considered to be medically necessary, are not approvable for payment, and cannot be approved.

CODING AND STANDARDS

Coding

CPT Codes

S8042

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

MRI Scanners

MRI scanners with a field strength of greater than 1.0 Tesla (T) are considered high field. The typical high field MRI units in clinical practice range between 1.0– 3.0 Tesla. In October 2017, the FDA cleared the first 7 T MRI units.⁽¹⁾The definition of mid and low field MRI is

more variable with mid field units having a lower field strength range of 0.3 to 0.5 and an upper limit under 1.0 T. Low field units have field strengths below 0.3 to 0.2 T. The major disadvantage of low field strength MRI relative to higher field scanners is lower signal to noise ratios, less homogeneity in the magnetic field, lower detection of calcification, hemorrhage, or gadolinium enhancement. Lee et al showed that low field (<0.5 T) units were effective in evaluating medial meniscal, anterior cruciate ligament, and rotator cuff tears but not effective for evaluating lateral meniscal tears, osteochondral defects, or shoulder superior labrum-anterior posterior (SLAP) ligament complex pathology.^(2,3)

POLICY HISTORY

Summary

Date	Summary
March 2024	<ul style="list-style-type: none">• No significant changes
March 2023	<ul style="list-style-type: none">• General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline• Removed additional sources

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. FDA. FDA News Release: FDA clears first 7T magnetic resonance imaging device. 2017; 2022:
2. Lee C, Davis S, McGroder C, Kouk S, Sung R et al. Analysis of Low-Field MRI Scanners for Evaluation of Shoulder Pathology Based on Arthroscopy. Orthopaedic journal of sports medicine. 2014; 2: 2325967114540407-2325967114540407. 10.1177/2325967114540407.
3. Lee C, Davis S, McGroder C, Stetson W, Powell S. Analysis of Low-Field Magnetic Resonance Imaging Scanners for Evaluation of Knee Pathology Based on Arthroscopy. Orthopaedic journal of sports medicine. 2013; 1: 2325967113513423-2325967113513423. 10.1177/2325967113513423.



EVOLENT CLINICAL GUIDELINE 2038 FOR MAGNETIC RESONANCE ELASTOGRAPHY (MRE)

Guideline or Policy Number: Evolut_CG_2038	<u>Applicable Codes</u>	
<i>"Evolut" refers to Evolut Health LLC and Evolut Specialty Services, Inc.</i> © 2024 - 2025 Evolut. All rights Reserved.		
Original Date: October 2024	Last Revised Date: October 2024	Implementation Date: January 2025

TABLE OF CONTENTS

STATEMENT	2
GENERAL INFORMATION	2
PURPOSE	2
INDICATIONS FOR ABDOMEN MRE	2
EVALUATION OF HEPATIC FIBROSIS.....	2
COMBINATION STUDIES	2
<i>MR Elastography and Abdomen MRI.....</i>	<i>2</i>
CODING AND STANDARDS	3
CODING	3
<i>CPT Codes</i>	<i>3</i>
APPLICABLE LINES OF BUSINESS.....	3
BACKGROUND	3
LIVER ELASTOGRAPHY	3
POLICY HISTORY	4
<i>Summary</i>	<i>4</i>
LEGAL AND COMPLIANCE	4
GUIDELINE APPROVAL	4
<i>Committee</i>	<i>4</i>
DISCLAIMER.....	4
REFERENCES.....	5

STATEMENT

General Information

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.

Purpose

Magnetic resonance elastography (MRE) combines magnetic resonance imaging (MRI) with low-frequency vibrations to map the stiffness of tissue (elastogram).

INDICATIONS FOR ABDOMEN MRE

Evaluation of Hepatic Fibrosis (1,2,3)

- Indicated after intermediate findings (between 8-12.5 pKa) on ultrasound elastography (such as VTCE or ELF)
- Indicated in an individual with (Non-Alcoholic Fatty Liver Disease) NAFLD ⁽⁴⁾ **AND** one or more of the following:
 - Central obesity (BMI > 35; see **Background**)
 - Diabetes Mellitus
 - Elevated liver enzymes
 - FIB-4 ≥ 2.67 ⁽⁵⁾ or NFS ≥ 0.676 when provided

Combination Studies

MR Elastography and Abdomen MRI

- MRI Abdomen can be used for HCC screening and MR Elastography can be used to stage hepatic fibrosis. While each indication requires an insufficient ultrasound, that ultrasound needs to be insufficient for only one of the two indications to meet medical necessity for both studies.

CODING AND STANDARDS

Coding

CPT Codes

76391

Applicable Lines of Business

<input checked="" type="checkbox"/>	CHIP (Children's Health Insurance Program)
<input checked="" type="checkbox"/>	Commercial
<input checked="" type="checkbox"/>	Exchange/Marketplace
<input checked="" type="checkbox"/>	Medicaid
<input checked="" type="checkbox"/>	Medicare Advantage

BACKGROUND

Liver Elastography

Patients with an increased risk for development of hepatic fibrosis (such as individuals with hepatic steatosis) are typically first assessed with non-invasive liver disease assessment (NILDA) tools which include blood work and imaging studies. FIB-4 and NAFLD Fibrosis Score (NFS) are indirect fibrosis markers that take into account metabolic abnormalities that may be associated with development of liver fibrosis. ^(6,7)

In most types of liver disease, non-advanced imaging elastography techniques such as vibration-controlled transient elastography (VCTE), point shear wave elastography (pSWE) and 2-dimensional shear wave elastography (2DSWE) are the starting point for diagnosis after risk assessment. If the VCTE is < 8 , there is low risk for development of fibrosis and that individual would have continued monitoring with risk tools such as the FIB-4 score. When the VTCE is > 12.5 ^(1,2,8), the diagnosis of cirrhosis/fibrosis can be made. Magnetic resonance elastography (MR Elastography) is indicated when the VTCE (or similar tool) shows an indeterminant value (between 8-12.5).

One possible exception to this is in patients with signs of metabolic dysfunction (central obesity (BMI > 35 ⁽⁹⁾ **OR** BMI ≥ 25 + waist circumference ≥ 90 cm in men or 80 cm in women) ⁽⁸⁾, diabetes and/or elevated liver enzymes) **AND** non-alcoholic fatty liver disease (NAFLD). ⁽¹⁾ NAFLD refers to hepatic steatosis on imaging in an individual who drinks little to no alcohol. When there is metabolic dysfunction present (such as obesity, diabetes and/or elevated LFTs) this may be referred to as MAFLD (metabolic associated fatty liver disease) or MASH (metabolic dysfunction associated steatohepatitis). When provided, an elevated FIB-4 (≥ 2.67) or NFS (≥ 0.676) can be used to determine if the patient has MAFLD rather than NAFLD. ⁽⁵⁾

POLICY HISTORY

Summary

Date	Summary
October 2024	<ul style="list-style-type: none">• New Evolent Clinical guideline

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

REFERENCES

1. Lim J K, Flamm S L, Singh S, Falck-Ytter Y T, Gerson L et al. American Gastroenterological Association Institute Guideline on the Role of Elastography in the Evaluation of Liver Fibrosis. *Gastroenterology*. 2017; 152: 1536 - 1543. 10.1053/j.gastro.2017.03.017.
2. Sterling R K, Duarte-Rojo A, Patel K, Asrani S K, Alsawas M et al. AASLD Practice Guideline on imaging-based noninvasive liver disease assessment of hepatic fibrosis and steatosis. *Hepatology*. 2024; https://journals.lww.com/hep/fulltext/9900/aasld_practice_guideline_on_imaging_based.807.aspx.
3. Hoodeshenas S, Yin M, Venkatesh S K. Magnetic Resonance Elastography of Liver: Current Update. *Topics in magnetic resonance imaging: TMRI*. 2018; 27: 319-333.
4. Zhang Y N, Fowler K J, Boehringer A S, Montes V, Schlein A N et al. Comparative diagnostic performance of ultrasound shear wave elastography and magnetic resonance elastography for classifying fibrosis stage in adults with biopsy-proven nonalcoholic fatty liver disease. *European radiology*. 2022; 32: 2457-2469.
5. Wang T, Xi Y, Raji A, Crutchlow M, Fernandes G et al. Overall and subgroup prevalence of non-alcoholic fatty liver disease and prevalence of advanced fibrosis in the United States: An updated national estimate in National Health and Nutrition Examination Survey (NHANES) 2011-2018. *Annals of hepatology*. 2024; 29: 101154.
6. Chalasani N, Younossi Z, Lavine J E, Charlton M, Cusi K et al. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. *Hepatology*. 2018; 67: https://journals.lww.com/hep/fulltext/2018/01000/the_diagnosis_and_management_of_nonalcoholic_fatty.31.aspx.
7. Tamaki N, Kurosaki M, Huang D Q, Loomba R. Noninvasive assessment of liver fibrosis and its clinical significance in nonalcoholic fatty liver disease. *Hepatology research: the official journal of the Japan Society of Hepatology*. 2022; 52: 497-507.
8. Tacke F, Horn P, Wai-Sun Wong V, Ratziu V, Bugianesi E et al. EASL–EASD–EASO Clinical Practice Guidelines on the management of metabolic dysfunction-associated steatotic liver disease (MASLD). *Journal of Hepatology*. 2024; 81: 492 - 542. 10.1016/j.jhep.2024.04.031.
9. Bosomworth N J. Normal-weight central obesity: Unique hazard of the toxic waist. *Canadian family physician Medecin de famille canadien*. 2019; 65: 399-408.