



**2020 MAGELLAN CLINICAL GUIDELINES
FOR
MEDICAL NECESSITY REVIEW

ULTRASOUND GUIDELINES**

Effective: January 2020

Guidelines for Clinical Review Determination

Preamble

Magellan 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 Magellan Healthcare 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. *Magellan's guidelines are reviewed yearly and modified when necessary following a literature search of pertinent and established clinical guidelines and accepted diagnostic imaging practices.*

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All guidelines were reviewed between January 1, 2019 and September 15, 2019.

Prepared September 27, 2019

ULTRASOUND GUIDELINES

76536 – Head and Neck Ultrasound

CPT Codes: 76536

Note: NIA does not review neonatal cranial ultrasounds (Echoencephalogram).

INDICATIONS:

Thyroid Gland:

- To assist in diagnosing thyroid autoimmune disease when the patient has a large goiter or lumpy thyroid (Endocrine Society, 2017).
- For thyrotoxicosis as an adjunct to radioiodine uptake (ACR, 2018; Kravets, 2016)
- Thyroid nodules identified via palpation or prior imaging (CT, MRI or non-thyroid US), approve for (ACR, 2017):
 - High risk patients
 - With suspicious prior imaging feature (see follow up below)
 - Normal risk patients when:
 - < 35 years of age with normal life expectancy and nodule \geq 1 cm.
 - \geq 35 years of age with normal life expectancy and nodule \geq 1.5 cm.
- Follow up of thyroid nodules(s) (Durante, 2015; Gharib, 2015; Haugen/ATA, 2015; Nou, 2014):
 - After prior negative biopsy to confirm stability in nodule size.
 - When active surveillance of known tumor or nodule is selected (e.g. patient initially refuses biopsy, or high surgical risk).
 - For TR5 (TI-RADS) every year for up to 5 years.
 - For TR4 scans at 1, 2, 3 and 5 years.
 - For TR3 scans at 1, 3 and 5 years.
 - If a nodule grows at follow up, the next follow up should be in 1 year (Tessler, 2017)
 - For nodules smaller than 1 cm that are highly suspicious.
- Past history of radiation in the cervical region in adult survivors of childhood cancer (Initial US 5 years after radiation, then every three years) (Briqnardello, 2016)
- Staging tumors of the thyroid (preoperative evaluation of cervical lymph nodes prior to thyroidectomy) (Haugen/ATA, 2015).
- Monitoring the thyroid bed and cervical nodal compartments after thyroidectomy (Haugen/ATA, 2015).

Parathyroid Gland:

- To localize adenomas in preparation for surgery (Wilhelm, 2016; Levy, 2011; Patel, 2010) (combined ultrasound and Technetium 99m sestamibi scintigraphy can be performed to increase sensitivity and accuracy of preoperative localization).

Salivary Glands:

To localize and identify lesions within the parotid gland to determine if the location is inside or outside of the gland (ACR, 2018; Bhatia, 2018)

May be used for suspected sialadenitis, especially as first diagnostic tool in pediatric patients (Bhatia, 2018; Razek, 2017).

- Early diagnosis and staging of primary Sjogren's syndrome (Baldini, 2015).
- For unilateral salivary gland enlargement.

Cervical Lymph Nodes:

(Ahuja, 2008; Chandak, 2011; Hwang, 2011)

- To identify the size and complexity of palpable cervical lymph nodes
- To differentiate benign vs. malignant nodes, although additional cytology may be needed to identify histological origin

Other Indication/mass:

- Mass seen on prior imaging or detected on physical exam (e.g. congenital masses such as cystic hygroma, branchial cleft cysts; carotid body or nerve sheath tumors, large head and neck primary or metastatic tumors).
- Initial or follow up evaluation of superficial abscess (CT more sensitive and specific for deep abscess) (Kalmovich, 2012).
- Initial imaging for a neck mass in the pediatric population (Brown, 2016)
- To assess a discrete cystic lesion of the neck.

BACKGROUND:

The thyroid, parathyroid and lymph nodes are the most commonly imaged areas of the head and neck region and ultrasound is the most appropriated imaging modality. Ultrasound may also be utilized to evaluate the salivary glands, abscesses, benign and malignant masses outside the thyroid, and congenital lesions. Along with imaging, minimally invasive procedures are performed on thyroid nodules, as well as, non-thyroid abnormalities.

OVERVIEW:

Thyroid Gland

Thyroid nodules are common in the general population with a 3 – 7% prevalence on inspection and palpation. By ultrasound, nodules can be detected in 20% to as many as 76% of the population. Furthermore, screening and autopsy studies indicate that asymptomatic papillary microcarcinomas (PMCs) are present in at least 5–10% of the U.S adult population (Brito, 2016). Ultrasound (US) of the thyroid gland is indicated to decipher between a benign versus malignant nodule present in or around the gland and monitor disease progression or response to treatment. In addition to sonographic appearance, nodule location is associated with malignancy risk. Nodules in the superior pole have a four-fold higher risk of cancer than nodules in other regions (Zhang, 2018).

TI-RADS Reporting and Data System for thyroid nodule follow-up

TR1- Benign; No FNA

TR2-Not suspicious; No FNA

TR3-Mildly Suspicious; FNA \geq 2.5 cm; follow if \geq 1.5 cm.

TR4-Moderately suspicious; FNA ≥ 1.5 cm; follow if ≥ 1.0 cm

TR5-Highly suspicious; FNA ≥ 1.0 cm; follow if ≥ 0.5 cm

“The ACR TI-RADS is concordant with other guidelines in recommending against routine biopsy of nodules smaller than 1 cm, even if they are highly suspicious. However, because some thyroid specialists advocate active surveillance, ablation, or lobectomy for papillary microcarcinomas, biopsy of 5- to 9-mm TR5 nodules may be appropriate under certain circumstances” (Tessler, 2018).

Follow up US may be undertaken without prior biopsy or for known tumors. This includes patients who initially refuse biopsy, or for nodules detected on US that do not meet criteria for FNA (e.g. small size) or when there is known malignancy and “very low-risk tumors (e.g., no clinical or radiographic evidence of invasion or metastases), patients at high surgical risk, or those with a relatively short life span expectancy in whom the benefits of intervention may be unrealized” (Haugen, 2015). Surveillance intervals for known low risk cancers usually involves US every 6 months over the first two years then every 1-2 years thereafter.

According to the ACR/ Choosing Wisely* Clinical risk factors: Patients with history of head, neck or chest radiation, family history of thyroid cancer, or diseases that increase the risk of thyroid cancer should be further evaluated regardless of nodule size. **Suspicious [nodule] features** on CT, MRI or US include signs of local invasion, and the presence of abnormal lymph nodes (enlarged nodes, nodes with cystic change, calcification, or increased enhancement). Size criteria for enlarged lymph nodes:

- ≥ 1.5 cm in short axis for jugulodigastric nodes
- ≥ 1 cm for other nodes

“Thyrotoxic patients with nodules may also benefit from imaging. For these patients, a thyroid scan, not an ultrasound, can be used to assess the possibility of focal autonomy in a thyroid nodule” (Endocrine Society, 2017).

According to the Endocrine Society, thyroid ultrasound in patients with abnormal thyroid function tests and no palpable abnormality of the thyroid gland should not be performed unless “the patient also has a large goiter or a lumpy thyroid” (Endocrine Society, 2017).

Parathyroid Gland

When hyperparathyroidism is identified clinically, US of the parathyroid gland is used to localize adenomas in preparation for surgery. US appears to be the test of choice for this preoperative procedure, due in part to the fact that US is relatively inexpensive and does not emit radiating ions, but also because there is fair evidence that US is as effective at locating the lesion as the other standard imaging technique, nuclear scintigraphy.

“Crucial considerations when selecting an imaging study include availability, cost, radiation exposure, local expertise, and accuracy” (Kunstman, 2013). In a series of 29 patients undergoing preoperative localization of parathyroid adenomas, ultrasound identified the side of the adenoma in 90% of the cases versus 71% by scintigraphy (Gurney, 2008). In a study of 440, Levy et al found sensitivities for correct localization of a single parathyroid adenoma for sestamibi versus ultrasound were: 83% versus 72%. Patel, et al found the combined use of preoperative ultrasound and Technetium-99m sestamibi scintigraphy was superior to ultrasound or scintigraphy alone and had a sensitivity of 95% and accuracy of 91%.

Salivary Glands

Uses of US in imaging of the salivary glands are similar to those of the thyroid and parathyroid glands: to identify and/or localize masses or lesions and to assess for pathology. Benign and malignant tumors, intra-gland lymph node enlargement, acute viral infections such as mumps, acute and chronic bacterial infections, granulomatous inflammation (e.g. cat scratch disease caused by *Bartonella henselae*), autoimmune disease (Sjogren's syndrome) and sialosis (aka sialadenosis) can affect the salivary glands. Some conditions, such as mumps, do not require imaging evaluation. Sialosis is non-inflammatory enlargement of predominantly the parotid glands associated with a variety of unrelated conditions or the use of certain medications (Orlandi, 2013).

Because of the anatomical location of the salivary glands, only the most superficial regions can be visualized by US, namely the submandibular gland, the sublingual gland, and the superficial lobes of the parotid gland. The deep lobe of the parotid, as well as the minor salivary glands, are not adequately visualized by US. MRI or CT is recommended by some sources as first line diagnostic modalities in evaluation of these regions. As an example, the ACR appropriateness criteria lists CT, MRI and ultrasound as usually appropriate in the initial evaluation of a parotid region mass. (ACR, 2018).

Ultrasound is often used as a first line examination for evaluation of salivary calculi. The technique however does not allow the reliable exclusion of small calculi (<3mm) and therefore other techniques for assessment may be utilized (Terraz, 2013).

US is also used to diagnose and stage Sjogren's disease (Baldini, 2015).

Features of a neck mass highly suspicious for malignancy:

- Absence of infectious etiology
- Mass present ≥ 2 weeks or of uncertain duration
- Firm texture
- Neck mass size > 1.5 cm.
- Ulceration or skin overlying mass
- Additional characteristics include: Age > 40 , tobacco or alcohol use, dysphagia, otalgia ipsilateral to neck mass, oral cavity ulcer, recent voice change, non-tender neck mass, tonsil asymmetry, history of treatment for head and neck malignancy (Pyonnen, 2017)

Masses of unknown origin

In diagnosing head and neck masses or swellings of unknown origin, US can assist in making the initial diagnosis, however if deemed highly suspicious for malignancy should go right to CT or MRI. If a mass is cystic, continue evaluation until a diagnosis is obtained and do NOT assume it is not malignant.

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Removed indication: 'to help determine benign vs malignant tumors of the salivary gland
- Added TI-RADs (thyroid imaging reporting and data system) with guidelines for follow up imaging

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CPT Codes: 76700, 76705, 76770, 76775

INDICATIONS FOR AN ABDOMEN ULTRASOUND:

Suspected appendicitis:

(Gale, 2016; Smith, 2013; Toorenvliet, 2010)

- Suspected acute appendicitis with abdominal pain and tenderness to palpation **AND at LEAST one** of the following:
 - Fever
 - Elevated WBC
 - Nausea and/or vomiting
 - Anorexia
 - Guarding and/or rebound

Mass Lesions:

(Yaghmai, 2014)

- To determine if a lesion identified on other imaging is cystic, solid or vascular
- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study (ACR, 2019)
- Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the abdomen. No further surveillance ultrasound unless tumor(s) are specified as highly suspicious or a change was found on the last follow-up ultrasound, new/changing sign/symptoms or abnormal lab values.
- To evaluate for liver metastases with elevated liver function tests and known primary tumor

Gallbladder Disease:

(Kiewiet, 2012; Yarmish, 2014, ACR, 2018)

- Acute right upper quadrant pain, suspected biliary disease

Hepatic Disease:

(Aghoram, 2012; Chalasani, 2012; Rotman, 2009)

- Clinical concern for hepatic steatosis based on (Gerstenmaier, 2014):
 - Long term alcohol intake
 - Obesity
 - Hepatomegaly on exam
- Clinical concern for chronic liver disease (Kelly, 2018):
 - Physical findings suggestive of cirrhosis
 - Hepatitis B or C, done every 6 months
 - Initial screening of hemochromatosis
 - Suspected ascites
 - For Liver Ultrasound Elastography (Dietrich, 2017)
- Abnormal Liver function test or bilirubin, includes new onset of clinical jaundice (Vagvala, 2018; ACR, 2018)
- Evaluation of incidental finding of common bile duct stone or ductal dilatation seen on other imaging (Almadi, 2012)

- Suspected inflammatory or infectious process involving the liver
- Follow-up of infectious lesion(s) or fluid collections in the liver to assess resolution

Hematuria (Greater than 3 RBC per high-power field on urinalysis):

(Davis, 2016; Sharp, 2013; Smith-Bindman, 2014; ACR-AIUM-SPR-SRU, 2017)

- Hematuria (non-infectious)
- Hematuria (infectious) persisting (6) six weeks after the completion of antibiotic therapy
- Known or suspected kidney stones
- Flank pain and/or back pain
- Evaluation of urinary tract infection and hydronephrosis

Genitourinary conditions:

- Suspected kidney, ureteral or bladder stones (ACR, 2014; Davis, 2012; Smith-Bindman, 2014) with any of the following:
 - Pelvic or flank pain
 - Gross hematuria
 - Microhematuria (documented by greater than 3 red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick)
- Urinary incontinence (includes neurogenic bladder) (Dorsher, 2012; Santoro, 2010)
- Bladder function abnormality (Pannu, 2014)
- Urinary tract obstruction
- Congenital genitourinary anomalies (Caiulo, 2012)

Acute Pyelonephritis and any of the following:

(Colgan, 2011; Grabe, 2011; Nikolaidis, 2018)

- Failure to respond to antibiotics
- Signs of obstruction
- Suspected renal or perinephric abscess
- Immunocompromised patient
- History of renal stones

Abnormal Kidney function (Remer, 2014; O'Neill, 2014):

- Chronic Kidney Disease:
 - Baseline evaluation for renal insufficiency
 - Repeat evaluation of worsening chronic kidney disease
 - Symptoms of urinary tract obstruction
- New kidney dysfunction
- Renal insufficiency with symptoms of urinary tract obstruction

Family History of Polycystic Kidney Disease:

(Pei, 2010; Srivastava, 2014)

- Screening ultrasound after age 18

Kidney Transplant:

(Kolofousi, 2013; Granata, 2015; ACR, 2017)

- Increase in the serum creatinine levels
- Acute signs, symptoms of inflammatory process or infection in transplanted organ.
- Pretransplantation evaluation
- Post-operative/procedural

Pancreatic Disease:

(Barry, 2018; Quinlan, 2014; Tenner, 2013)

- Suspected acute or chronic pancreatitis
- Suspected pancreatic necrosis
- Suspected pancreatic abscess
- Suspected pancreatic pseudocysts

Splenic Disease:

(Benter, 2011; Kaza, 2010)

- Diagnosis of cysts, tumors, abscess or calcifications
- Measurement of splenic size: to confirm splenomegaly or/and to document changes in spleen volume in patients with:
 - A known disease/condition (e.g., myeloproliferative diseases, storage diseases, inflammatory diseases, infections, portal hypertension); **OR**
 - Palpable spleen; **OR**
 - Pain on the upper left side of the abdomen
- Suspected splenic infarction.
- Splenic and renal echogenicity comparison when examining left native or transplanted kidney.

Other Indications for Abdominal Ultrasound:

- Follow up of an abnormality seen on prior imaging.
- Evaluation of abdominal trauma
- Evaluation of unexplained abdominal pain after appropriate examination, laboratory tests, and trial of medical therapy
- Evaluation of unexplained weight loss
- Planning for or guiding an invasive procedure (ACR-AIUM-SPR-SRU, 2017)
- Evaluation of suspected congenital anomalies
- Search for the presence of free or loculated fluid collections
- Search for metastatic disease or occult primary tumor
- Prior to bariatric surgery (Schlottman, 2018)
- Ascites or anasarca; other causes besides liver (Surya, 2018)
- Hernia evaluation (Beck, 2012)

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.

(USPSTF, 2014)

- One-time screening for abdominal aortic aneurysm (AAA) in men ages 65 to 75 years.
- One-time screening for abdominal aortic aneurysm (AAA) in women ages 65 to 75 years who have ever smoked.

Non-screening studies for Abdominal Aortic Aneurysm:

(Mohler, 2012)

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria			
ACCF et al. Criteria #	Indications A _ appropriate; I _ inappropriate; U _ uncertain	Appropriate Use Score (1-9)	
Aortic and Aortoiliac Duplex			
Abdominal Aortic Disease - Signs and/or Symptoms			
59.	• Lower extremity claudication	A (7)	
60.	• Nonspecific lower extremity discomfort	I (3)	
61.	• New onset abdominal or back pain	U (6)	
62.	• Aneurysmal femoral or popliteal pulse	A (8)	
63.	• Pulsatile abdominal mass	A (9)	
64.	• Decreased or absent femoral pulse	A (7)	
65.	• Abdominal or femoral bruit	A (7)	
66.	• Fever of unknown origin	I (3)	
67.	• Lower extremity swelling	I (2)	
68.	• Evidence of atheroemboli in the lower extremities, including ischemic toes	A (8)	
69.	• Erectile dysfunction	U (4)	
70.	• Abnormal physiologic testing indicating aortoiliac occlusive disease	A (8)	
71.	• Hypertension	I (3)	
72.	• Abnormal abdominal x-ray suggestive of aneurysm	A (8)	
73.	• Presence of a lower extremity arterial aneurysm (e.g., femoral or popliteal)	A (8)	
74.	• Presence of a thoracic aortic aneurysm	A (8)	
New or Worsening Symptoms			
82	• Known abdominal aortic aneurysm (any size)	A (9)	
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months
83.	• Men, aneurysm 3.0 to 3.9 cm in diameter	I (1)	U (4)
			A (7)

84.	• Women, aneurysm 3.0 to 3.9 cm in diameter	I (1)	U (4)	A (7)
85.	• Aneurysm 4.0 to 5.4 cm in diameter	U (4)	A (7)	A (7)
86.	• Aneurysm \geq 5.5 cm in diameter	A (7)	A (7)	U (6)
Asymptomatic or Stable Symptoms, No or Slow Progression During First Year, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
87.	• Men, aneurysm 3.0 to 3.9 cm in diameter	I (2)	A (7)	A (7)
88.	• Women, aneurysm 3.0 to 3.9 cm in diameter	I (2)	A (7)	A (7)
89.	• Aneurysm 4.0 to 5.4 cm in diameter	U (5)	A (7)	U (6)
90.	• Aneurysm \geq 5.5 cm in diameter	A (8)	A (7)	U (5)
Asymptomatic or Stable Symptoms, Rapid Progression During First Year, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
91.	• Men, aneurysm 3.0 to 3.9 cm in diameter	A (7)	A (7)	U (4)
92.	• Women, aneurysm 3.0 to 3.9 cm in diameter	A (8)	A (7)	U (4)
93.	• Aneurysm 4.0 to 5.4 cm in diameter	A (8)	A (7)	U (4)
94.	• Aneurysm \geq 5.5 cm in diameter	A (9)	U (5)	I (3)

Surveillance After Aortic Endograft or Aortoiliac Stenting				
Baseline (Within 1 Month After the Intervention)				
95.	• Aortic or iliac endograft			A (8)
96.	• Aortic and iliac artery stents			A (7)
New or Worsening Lower Extremity Symptoms After Baseline Exam				
97.	• Aortic or iliac endograft			A (8)
98.	• Aortic and iliac artery stents			A (8)
Asymptomatic or Stable Symptom After Baseline Study, Surveillance Frequency During First Year.		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
99.	• Aortic endograft without endoleak stable and/or decreasing residual aneurysm sac size	I (3)	U (5)	U (6)

100	<ul style="list-style-type: none"> Aortic endograft with endoleak and/or increasing residual aneurysm sac size 	U (6)	A (8)	A (7)
101.	<ul style="list-style-type: none"> Aortic or iliac artery stents 	I (2)	U (5)	U (6)
Asymptomatic or Stable Symptom After Baseline Study, Surveillance Frequency After the First Year.		Every 6 months	Every 12 months	Every 24 months or greater
102.	<ul style="list-style-type: none"> Aortic endograft without endoleak stable and/or decreasing residual aneurysm sac size 	I (3)	A (7)*	U (5)
103.	<ul style="list-style-type: none"> Aortic endograft with endoleak and/or increasing residual aneurysm sac size 	A (8)	A (7)	U (5)
104.	<ul style="list-style-type: none"> Aortic or iliac artery stents 	I (2)	U (5)	U (5)

*If the surveillance CT scan at 12 months shows no endoleak or sac enlargement; can consider follow up with ultrasound at yearly intervals, with CT for abnormal or equivocal findings (Chaikof, 2018; Brazelli, M 2018; Mazzaccaro 2018).

INDICATIONS FOR AN ABDOMEN ULTRASOUND IN CHILDREN:

Renal Disease:

(Roberts, 2011)

- **Urinary Tract Infection – age < 2 months:**
 - Signs/symptoms of UTI with fever
- **Urinary Tract Infection – age > 2 months:**
 - Signs/symptoms of UTI with fever and poor response to treatment
- **Urinary Tract Infection with atypical presentation – any age:**
 - Any of the following signs/symptoms:
 - Poor response to antibiotics within 48 hours
 - Sepsis
 - Urinary retention
 - Poor urine stream
 - Increased serum creatinine
 - Non-E. Coli organism
 - Recurrent UTI
- **Urinary Tract – Other**
 - Persistent dysuria
 - Enuresis
 - Urinary frequency
 - Anuria, decreased urinary output, or urinary retention

- Follow up of congenital anomalies of the urinary tract
- Failure to thrive

Other Indications for Abdominal Ultrasound in Children:

- Suspicion of hypertrophic pyloric stenosis (Costa Dias, 2012; Hwang, 2017)
- Suspicion of intussusception (Sanchez, 2016)
- Mesenteric lymphadenitis
- Meckel diverticulitis
- May be considered as alternative to an upper GI study for intestinal malrotation or midgut volvulus (Hwang, 2017)

BACKGROUND:

An abdominal ultrasound uses reflected sound waves to produce a picture of the organs and other structures in the upper abdomen. Sometimes a specialized ultrasound is ordered for a detailed evaluation of a specific organ or section of the abdomen (e.g., upper quadrant, retroperitoneal), or as a complete study. An abdominal ultrasound can evaluate the abdominal aorta, the gallbladder, the liver, the spleen, the pancreas, the kidneys and the spine.

The Choosing Wisely Guidelines (2014) from the American College of Emergency Physicians: Avoid ordering CT of the abdomen and pelvis in young otherwise healthy emergency department (ED) patients (age <50) with known histories of kidney stones, or ureterolithiasis, presenting with symptoms consistent with uncomplicated renal colic. Kidney stones can cause severe pain (called renal colic) and nausea, which can usually be relieved with medication. Most stones pass spontaneously in the urine in a few days, though kidney stones often do recur. CT scans may be needed to diagnose kidney stones, and rule out other problems that may mimic the pain of kidney stones. Many patients in the ED who are less than 50 years old and who have symptoms of recurrent kidney stones do not need a CT scan unless these symptoms persist or worsen, or if there is a fever or a history of severe obstruction with previous stones. CT scans of patients in the ED with symptoms of recurrent kidney stones usually do not change treatment decisions, and the cost and radiation exposure can often be avoided in these cases. Close follow-up by a primary care physician or specialist is necessary.

<http://www.choosingwisely.org/societies/american-college-of-emergency-physicians/>.

The Choosing Wisely Guidelines (2017) from the American Urological Association: Don't routinely use computed tomography (CT) to screen pediatric patients with suspected nephrolithiasis. Given the link between radiation exposure from computed tomography (CT) in children and increased cancer risk, imaging test selection should adhere to the principle of ALARA (as low as reasonably achievable) to minimize radiation exposure. Ultrasonography is sufficiently sensitive and specific as an initial imaging test in pediatric patients with suspected urolithiasis. When ultrasound results are negative or indeterminate despite strong clinical suspicion or when proceeding with perioperative planning, CT using a low-dose protocol is an appropriate next step.

<http://www.choosingwisely.org/clinician-lists/american-urological-association-ct-to-screen-pediatric-patients-with-suspected-nephrolithiasis/>.

The Choosing Wisely Guidelines (2015) from the American Urogynecologic Society: Don't perform cystoscopy, urodynamics or diagnostic renal and bladder ultrasound in the initial work-up of an uncomplicated overactive bladder (OAB) patient. The initial evaluation of an uncomplicated patient presenting with symptoms should include history, physical examination and urinalysis. In some cases, urine culture, post-void residual urine assessment and bladder diaries may be helpful. More invasive testing should be reserved for complex patients, patients who have failed initial therapies (i.e., behavioral therapies and medications), or patients who have abnormal findings on their initial evaluation.

<http://www.choosingwisely.org/clinician-lists/augs-uncomplicated-overactive-bladder-work-up/>.

The Choosing Wisely Guidelines (2014) from American Medical Society for Sports Medicine: Avoid ordering an abdominal ultrasound examination routinely in athletes with infectious mononucleosis. Splenic enlargement is common in patients with infectious mononucleosis. The spleen is at increased risk for splenic rupture in the first 3–4 weeks of infection. This has led many clinicians to utilize ultrasound to determine if splenic enlargement is present. However, because individual splenic diameters vary greatly, comparing splenic size to population norms is not a valid method to assess splenic enlargement.

<http://www.choosingwisely.org/clinician-lists/american-medical-society-sports-medicine-abdominal-ultrasound-for-infectious-mononucleosis/>.

POLICY HISTORY:

Review Date: May 2019

Review Summary:

- Removed Spine indications – NIA does not manage this CPT code
- Added indication for Suspected Biliary Disease
- Modified language for consistency among guidelines, including:
 - Changed f/u interval of diagnosed masses under surveillance from intervals ≥ 6 months to as follows: "Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the abdomen. No further surveillance ultrasound unless tumor(s) are specified as highly suspicious or a change was found on the last follow-up ultrasound, new/changing sign/symptoms or abnormal lab values"
- Simplified Gallbladder Disease by removing 'including at least one of the following: fever, nausea/vomiting/diarrhea, elevated WBC, Murphy's sign, jaundice. New indication: Right Upper Quadrant Pain
- Added indication for incidental finding of common bile duct stone or ductal dilatation seen on other imaging
- Added inclusion of every 6 months for chronic liver disease with infection of hepatitis B or C
- For Hematuria, added urinary tract infection and hydronephrosis
- Added genitourinary conditions
- Removed 'prior renal surgery' for Acute Pyelonephritis
- For 'abnormal kidney function, removed 'eGFR (estimated glomerular filtration rate) decline >5 ml/min/1.73 m² within one year or >10 ml/min/1.73 m² within 5 years', as too specific
- For 'Splenic Disease', added: 'cysts, tumors, abscess or calcifications'
- Added 'Other Indications', including: planning for or guiding an invasive procedure; evaluation of suspected congenital anomalies; location of presence of free or loculated fluid collection, metastatic disease or primary tumor; prior to bariatric surgery; ascites or anasarca; and hernia evaluation

- Added and updated references

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CPT Codes: 76856, 76857

INDICATIONS FOR AN ULTRASOUND OF THE PELVIS:

The following guideline covers evaluation of the soft tissues and organs of the pelvis. In assessing the major arteries and veins of the pelvis please refer to the guideline for **AORTA, INFERIOR VENA CAVA, ILIAC DUPLEX SCAN (US) (CPT codes 93978 and 93979)**.

Genitourinary conditions:

- Suspected kidney, ureteral or bladder stones (ACR, 2014; Davis, 2012; Smith-Bindman, 2014) with any of the following:
 - Pelvic or flank pain
 - Gross hematuria
 - Microhematuria (documented by greater than 3 red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick)
- Urinary incontinence (includes neurogenic bladder) (Santoro, 2010; Dorsher, 2012)
- Bladder function abnormality (Pannu, 2014)
- Urinary tract obstruction
- Congenital genitourinary anomalies (Caiulo, 2012)

Evaluation of suspicious mass/tumor:

- Initial evaluation of suspicious masses/tumors found by physical exam or imaging study.
- Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the pelvis. No further surveillance ultrasound unless tumor(s) are specified as highly suspicious or a change was found on the last follow-up ultrasound, new/changing sign/symptoms or abnormal lab values.

Pelvic Pain:

- Acute Pelvic Pain in reproductive age group (ACR, 2015)
- Evaluation of unexplained pelvic pain after physical examination and laboratory testing (Ackerman, 2011; Bhosale, 2015; Hammond, 2010; Armstrong; 2011)
- Subacute or chronic pain in a postmenopausal female lasting for at least 6 months (ACR, 2018)
- Suspected Endometriosis (Benacerraf, 2012)

Abnormal uterine bleeding (ACR, 2014)

- Heavy menstrual bleeding or intermenstrual bleeding (ACOG, 2013)
- Amenorrhea (includes polycystic ovarian syndrome) (ACR, 2014; ACOG, 2018)
- Dysmenorrhea (Osaynade, 2014)
- Delayed menses
- Vaginal bleeding in a prepubertal child
- Postmenopausal bleeding
- Imperforate hymen (Kitami, 2017)

- Adenomyosis (may also present with chronic pelvic pain) (Sakhel, 2012)

Known or suspected infection or inflammation of the pelvis:

(AIUM, 2014)

- Signs or symptoms of pelvic infection, inflammation, or abscess.
- Suspected appendicitis (Gale, 2016; Smith, 2013; Toorenvliet, 2010)
 - Abdominal pain and tenderness to palpation, **AND at LEAST one** of the following:
 - Fever
 - Elevated WBC
 - Nausea and/or vomiting
 - Anorexia
 - Guarding and/or rebound

Renal transplant dysfunction (ACR, 2016)

Pre-operative/procedural evaluation:

- For diagnostic purposes prior to pre-operative evaluation for a planned surgery or procedure.

Post-operative/procedural evaluation:

- When imaging, physical, or laboratory findings indicate surgical or procedural complications within 6 months.

Other Indications:

(AIUM, 2014)

- Clinically suspected adnexal mass (ACR, 2018)
- Precocious puberty-when a pelvic neoplasm (e.g. granulosa cell tumor) is suspected as the cause of peripheral precocious puberty (Hashemipour, 2010) after normal laboratory testing for central precocious puberty (e.g. gonadotropin-releasing hormone stimulation test, luteinizing hormone or follicle stimulating hormone etc.).
- With central precocious puberty and high index of suspicion for pelvic mass (Calcaterra, 2013).
- Localization of an intrauterine contraceptive device (Nowitzki, 2015)
- Screening for pelvic malignancy in patients at increased risk (BRCA1 and BRCA2; Lynch syndrome aka hereditary nonpolyposis colorectal cancer syndrome (HNPCC) (Brown, 2010; NCCN, 2019); or with personal or family history or elevated CA-125 (ACR, 2017)
- Pelvic organ prolapse (ACR, 2014; Pannu, 2014; Santoro, 2010)
- Pelvic floor dysfunction with any of the following (ACR, 2014; Pannu, 2014):
 - Chronic pelvic pressure/discomfort
 - Fecal or urinary involuntary leaking; incomplete or straining to void urine
 - Recurrent symptoms (above) after pelvic floor repair.
- Evaluation, monitoring, and/or treatment of infertility patients (Torre, 2010)
- Foreign body localization
- Evaluation of a hernia (LeBlanc, 2013; Robinson, 2013; Simons, 2018)
 - Uncertain diagnosis, surgical complication, sports hernia, recurrent hernia versus hydrocele, or unexplained chronic pain (LeBlanc, 2013).
- Follow up of a pelvic abnormality found on physical exam or seen on prior imaging

- Known or suspected pelvic tumor or mass based on physical exam or prior imaging (Brown, 2010; Givens, 2009)
- Evaluation of soft tissue pelvic trauma

Pregnancy (e.g. bleeding, to assess the cervix, suspicion of ectopic pregnancy with a positive B-hCG)

BACKGROUND:

A pelvic ultrasound uses reflected sound waves to produce a picture of the organs and other structures in the pelvis. Pelvic abnormalities may be the result of disease, injury, or a physiologic anomaly. A pelvic ultrasound can evaluate the bladder, ureters, uterus, and ovaries. Pelvic ultrasound can also be useful for evaluation of trauma or pelvic hernias.

OVERVIEW:

The Choosing Wisely Guidelines (2014) from the American College of Emergency Physicians: Avoid ordering CT of the abdomen and pelvis in young otherwise healthy emergency department (ED) patients (age <50) with known histories of kidney stones, or ureterolithiasis, presenting with symptoms consistent with uncomplicated renal colic. Kidney stones can cause severe pain (called renal colic) and nausea, which can usually be relieved with medication. Most stones pass spontaneously in the urine in a few days, though kidney stones often do recur. CT scans may be needed to diagnose kidney stones, and rule out other problems that may mimic the pain of kidney stones. Many patients in the ED who are less than 50 years old and who have symptoms of recurrent kidney stones do not need a CT scan unless these symptoms persist or worsen, or if there is a fever or a history of severe obstruction with previous stones. CT scans of patients in the ED with symptoms of recurrent kidney stones usually do not change treatment decisions, and the cost and radiation exposure can often be avoided in these cases. Close follow-up by a primary care physician or specialist is necessary.

<http://www.choosingwisely.org/societies/american-college-of-emergency-physicians/>.

The Choosing Wisely Guidelines (2017) from the American Urological Association: Don't routinely use computed tomography (CT) to screen pediatric patients with suspected nephrolithiasis. Given the link between radiation exposure from computed tomography (CT) in children and increased cancer risk, imaging test selection should adhere to the principle of ALARA (as low as reasonably achievable) to minimize radiation exposure. Ultrasonography is sufficiently sensitive and specific as an initial imaging test in pediatric patients with suspected urolithiasis. When ultrasound results are negative or indeterminate despite strong clinical suspicion or when proceeding with perioperative planning, CT using a low-dose protocol is an appropriate next step.

<http://www.choosingwisely.org/clinician-lists/american-urological-association-ct-to-screen-pediatric-patients-with-suspected-nephrolithiasis/>.

The Choosing Wisely Guidelines (2015) from the American Urogynecologic Society: Don't perform cystoscopy, urodynamics or diagnostic renal and bladder ultrasound in the initial work-up of an uncomplicated overactive bladder (OAB) patient. The initial evaluation of an uncomplicated patient presenting with symptoms should include history, physical examination and urinalysis. In some cases, urine culture, post-void residual urine assessment and bladder diaries may be helpful. More invasive testing should be reserved for complex patients, patients who have failed initial therapies (i.e., behavioral therapies and medications), or patients who have abnormal findings on their initial evaluation.

<http://www.choosingwisely.org/clinician-lists/augs-uncomplicated-overactive-bladder-work-up/>.

The Choosing Wisely Guidelines (2013) from the Society of Gynecologic Oncology (2013): Don't screen low risk women with CA-125 or ultrasound for ovarian cancer. CA-125 and ultrasound in low risk, asymptomatic women have not led to diagnosis of ovarian cancer in earlier stages of disease or reduced ovarian cancer mortality. False positive results of either test can lead to unnecessary procedures, which have risks of complication.

<http://www.choosingwisely.org/clinician-lists/society-gynecologic-oncology-ovarian-cancer-screening-or-ultrasound-low-risk-women-ca-125/>.

Ultrasound of the pelvis should be performed only when there is a valid medical reason, and the lowest possible ultrasonic exposure settings should be used to gain the necessary diagnostic information. In some cases, additional or specialized examinations may be necessary.

Doppler ultrasound – Doppler ultrasound is a special ultrasound technique that evaluates blood flow through a blood vessel, including the body's major arteries and veins in the abdomen, arms, legs and neck. A Doppler ultrasound study may be part of a pelvic ultrasound examination and can help the physician to see and evaluate:

- blockages to blood flow (such as clots)
- narrowing of vessels (which may be caused by plaque)
- tumors and congenital malformation

Limitations of pelvic ultrasound imaging - Ultrasound waves are disrupted by air or gas; therefore ultrasound is not an ideal imaging technique for the bowel or organs obscured by the bowel. In most cases, barium exams, CT scanning, and MRI are the methods of choice in this setting. Large patients are more difficult to image by ultrasound because tissue attenuates (weakens) the sound waves as they pass deeper into the body.

The following ultrasounds are NOT reviewed by NIA:

Transvaginal ultrasound - A transvaginal ultrasound is usually performed to view the endometrium or the lining of the uterus, including its thickness, and the ovaries. Transvaginal ultrasound also affords a good way to evaluate the muscular walls of the uterus, called the myometrium.

Transrectal ultrasound - Transrectal ultrasound, a special study usually done to view the prostate gland, involves inserting a specialized ultrasound transducer into the rectum.

Lower uterine segment (LUS) muscular thickness assessed by transvaginal ultrasound is more reliable than entire LUS thickness measured by the transabdominal approach. The use of three-dimensional ultrasound should be considered for better reliability.

Ultrasound of the uterus during pregnancy (addressed under OB US and/or Biophysical Profile US).

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Added information clarifying what this guideline covers and directing reader to appropriate guideline for vascular indications
- Added ureteral or bladder stones with clinical symptoms including 'pelvic or flank pain, gross hematuria, microhematuria
- Added congenital genitourinary anomalies and removed 'ureteral displacement or obstruction'
- Added 'evaluation of suspicious mass or tumor for consistency with other guidelines
- For Pelvic pain, added 'acute pelvic pain in reproductive age group; subacute or chronic pain in postmenopausal female lasting ≥ 6 months; suspected endometriosis
- Added polycystic ovarian syndrome and adenomyosis
- Modified language to exclude indications such as guidance for surgery (ie 'For diagnostic purposes prior to' ...pre-operative evaluation for a planned surgery or procedure
- Added pregnancy complications ie, bleeding, to assess the cervix, suspicion of ectopic pregnancy with a positive B-hCG

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76870 – Scrotum and Contents Ultrasound

CPT Codes: 76870

INDICATIONS FOR A SCROTUM AND CONTENTS ULTRASOUND:

(AIUM, 2015; Kitami, 2017, ACR, 2014)

- Abnormality noted on other imaging studies (e.g., computed tomography, magnetic resonance imaging, positron emission tomography)
- Acute scrotal pain (Yusuf, 2017; Hartman, 2014)
- Suspected testicular torsion (Bandarkar, 2018)
- Trauma
- Acute epididymitis
- Intersex conditions*
- Infertility (Mittal, 2017; Abdulwahed, 2013; Ammar, 2012)
- Potential scrotal or inguinal hernia
- Follow up of previous indeterminate scrotal ultrasound
- Scrotal asymmetry, swelling, or enlargement
- Varicocele (Pauroso, 2011)
- Endocrine conditions such as precocious puberty, gynecomastia, feminization, AND abnormal endocrine lab tests (Faizah, 2012; Tyloch, 2016)

CRYPTORCHIDISM (UNDESCENDED TESTES):

(Choosing Wisely, 2017; Mau, 2017)

Testes that remain undescended by six months of age or bilateral nonpalpable testes in an infant with suspected intersexuality after referral to appropriate surgical specialist (Kolon, 2014)

- Inconclusive physical exam secondary to obesity

KNOWN OR SUSPECTED MASS:

(Dagur, 2017; Bieniek, 2018; Toren, 2010)

- Palpable inguinal, spermatic cord, or scrotal mass
- For follow up of patients with known testicular microlithiasis associated with other risk factors (eg. Prior testicular cancer, history of maldescent or testicular atrophy) (Winter, 2016)
- Surveillance of prior primary testicular neoplasms, leukemia, or lymphoma.

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.

INDICATIONS FOR SCROTAL DUPLEX: CPT CODES 93975/93976

- Testicular trauma
- Acute testicular pain

- Suspected testicular torsion
 - Varicocele
 - Epididymitis
 - To determine if a mass is cystic or solid
 - Spermatic cord assessment
-

BACKGROUND:

Scrotal ultrasound (US) may be useful in the identification and evaluation of structures within the scrotum. Scrotal abnormalities may be the result of disease, injury, or a physiologic anomaly.

OVERVIEW:

The Choosing Wisely Guidelines (2017) from the American Urological Association: Don't routinely perform ultrasound on boys with cryptorchidism. Ultrasound has been found to have poor diagnostic performance in the localization of testes that cannot be felt through physical examination. Studies have shown that the probability of locating testes was small when using ultrasound, and there was still a significant chance that testes were present even after a negative ultrasound result. Additionally, ultrasound results are complicated by the presence of surrounding tissue and bowel gas present in the abdomen.

<http://www.choosingwisely.org/clinician-lists/american-urological-association-ultrasounds-on-boys-with-cryptorchidism/>.

***Intersex condition:**

According to the Intersex Society of North America an intersex condition is defined as "...a general term used for a variety of conditions in which a person is born with a reproductive or sexual anatomy that doesn't seem to fit the typical definitions of female or male". Approximately 20-30% of all patients with cryptorchidism have bilateral undescended testicles. In this situation, it is critical to determine if the gonads are palpable or nonpalpable. A newborn with a male phallus and bilateral nonpalpable gonads is potentially a genetic female (46 XX) with congenital adrenal hyperplasia until proven otherwise. Failure to diagnose congenital adrenal hyperplasia can result in serious harm. (Kolon, 2014)

Testicular Microlithiasis- "Testicular microlithiasis is present without intratesticular mass or other worrisome findings. In the absence of any other risk factors for testicular cancer (e.g., personal history of testicular cancer, a father or brother with testicular cancer, history of cryptorchidism or maldescent, testicular atrophy, or other risk factors), no further imaging or biochemical follow-up is necessary; all that is recommended is routine monthly testicular self-examination. However, if the patient has risk factors for testicular cancer, referral to a urologist for evaluation and determination of an optimal follow-up strategy is recommended." (Winter, 2016)

Read More: <https://www.ajronline.org/doi/full/10.2214/AJR.15.15226>

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Added indications for testes that remain undescended by six months or age; spermatic cord; and for follow up of patients with known testicular microlithiasis associated with other risk factors (eg. Prior testicular cancer, history of maldescent or testicular atrophy); scrotal duplex

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93880 – Carotid Duplex Scan Ultrasound

CPT Codes:

93880 – Bilateral

93882 - Unilateral or Limited

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part I: Arterial Ultrasound and Physiological Testing (Mohler, 2012).

Section 1. Extracranial Cerebrovascular Ultrasound

ACCF et al. Criteria #	INDICATIONS A _ appropriate; I _ inappropriate; U _ uncertain <i>(Refer to the “Additional Consideration” section for any clinical indication below that is followed by the letters a - e)</i>	Appropriate Use Score (1-9)
Evaluation for Cerebrovascular Disease – Potential Signs and/or Symptoms		
1.	<ul style="list-style-type: none"> • New or worsening hemispheric neurological symptoms (e.g., unilateral motor or sensory deficit, speech impairment, or amaurosis fugax) • Evaluation of transient ischemic attack or stroke 	A (9)
2.	<ul style="list-style-type: none"> • Hollenhorst plaque visualized on retinal examination 	A (8)
3.	<ul style="list-style-type: none"> • Lightheadedness or impaired vision in the setting of upper extremity exertion • Evaluation for subclavian–vertebral steal phenomenon 	A (7)
4.	<ul style="list-style-type: none"> • Syncope of uncertain cause after initial cardiovascular evaluation¹ 	U (5)
5.	<ul style="list-style-type: none"> • Suspected symptomatic vertebrobasilar occlusive disease in the symptomatic patient (e.g., vertigo, ataxia, diplopia, dysphagia, dysarthria) 	A (7)
6.	<ul style="list-style-type: none"> • Evaluation for suspected carotid artery dissection 	A (8)
7.	<ul style="list-style-type: none"> • Pulsatile neck mass 	A (8)
8.	<ul style="list-style-type: none"> • Cervical bruit • No prior carotid artery assessment 	A (7)
Evaluation for Cerebrovascular Disease—Asymptomatic With Comorbidities or Risk Factors for Carotid Artery Stenosis		
9.	<ul style="list-style-type: none"> • No cervical bruit 	A (7)

	<ul style="list-style-type: none"> Atherosclerotic disease in other vascular beds (e.g., lower extremity PAD, coronary artery disease, abdominal aortic aneurysm) 			
10.	<ul style="list-style-type: none"> No cervical bruit History of neck irradiation ≥ 10 years ago 			U (5)
11.	<ul style="list-style-type: none"> Known renal fibromuscular dysplasia 			U (5)
Prior to Open Heart Surgery²				
12.	<ul style="list-style-type: none"> Planned coronary artery bypass grafting (CABG) 			U (6)
13.	<ul style="list-style-type: none"> Atherosclerotic disease in other vascular beds (e.g., lower extremity PAD, coronary artery disease, abdominal aortic aneurysm), or history of neck irradiation ≥ 10 years ago Planned valve repair/replacement surgery (without CABG) 			U (6)
14.	<ul style="list-style-type: none"> Atherosclerotic risk factors present Planned valve repair/replacement surgery (without CABG) 			U (6)
15.	<ul style="list-style-type: none"> No atherosclerotic risk factors Planned valve repair/replacement surgery (without CABG) 			U (4)
Follow-Up or Surveillance for Carotid Artery Stenosis – Asymptomatic**				
16.	<ul style="list-style-type: none"> Normal prior examination (no plaque, no stenosis) 			I (1)
Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
17.	<ul style="list-style-type: none"> Plaque without significant stenosis of the ICA (plaque, normal ICA velocity) (e) 	I (1)	I (1)	I (1)
18.	<ul style="list-style-type: none"> Mild ICA stenosis (e.g., $< 50\%$) (e) 	I (1)	I (1)	I (1)
19.	<ul style="list-style-type: none"> Moderate ICA stenosis (e.g., 50% to 69%) (e) 	I (2)	U (6)	U (6)
20.	<ul style="list-style-type: none"> Severe ICA stenosis (e.g., 70% to 99%) (e) 	U (5)	A (7)	U (6)
Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 24 months or greater
21.	<ul style="list-style-type: none"> Plaque without significant stenosis of the ICA (plaque, normal ICA velocity) 	I (1)	I (3)	I (1)
22.	<ul style="list-style-type: none"> Mild ICA stenosis (e.g., $< 50\%$) 	I (2)	U (5)	U (6)
23.	<ul style="list-style-type: none"> Moderate ICA stenosis (e.g., 50% to 69%) (e) 	I (3)	A (7)	U (6)
24.	<ul style="list-style-type: none"> Severe ICA stenosis (e.g., 70% to 99%) 	A (7)	A (7)	U (6)
Surveillance After Carotid Artery Intervention				
25.	<ul style="list-style-type: none"> Baseline (within 1 month) after carotid intervention 		A (8)	

Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year.		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
26.	<ul style="list-style-type: none"> Following normal ipsilateral ICA baseline study. 	I (2)	A (7)	A (7)
27.	<ul style="list-style-type: none"> Following abnormal ipsilateral ICA baseline study 	U (4)	A (7)	U (5)
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 24 months or greater
28.	<ul style="list-style-type: none"> Following normal ipsilateral ICA baseline study. 	I (2)	A (7)	U (5)
29.	<ul style="list-style-type: none"> Following abnormal ipsilateral ICA baseline study 	U (4)	A (7)	U (5)

Limited Screening Study for Carotid Artery Plaque—Asymptomatic

Indication		Appropriate Use Score (1–9)
30.	<ul style="list-style-type: none"> Low Framingham risk score No prior risk assessment imaging study, such as coronary calcium scoring or carotid IMT measurement 	I (2)
31.	<ul style="list-style-type: none"> Intermediate Framingham risk score No prior risk assessment imaging study, such as coronary calcium scoring or carotid IMT measurement 	U (4)
32.	<ul style="list-style-type: none"> Low or intermediate Framingham risk score Normal prior risk assessment imaging study, such as coronary calcium scoring or carotid IMT measurement 	I (3)
33.	<ul style="list-style-type: none"> High Framingham risk score 	U (5)

*In the setting of interval development of clinical symptoms in a previously asymptomatic patient or for rapid progression of stenosis during subsequent follow-up (e.g., stenosis category change during a limited period of time), more intensive surveillance may be indicated.

*Periodic surveillance duplex ultrasound should be performed according to the severity of stenosis of the contralateral side.

LIMITED STUDY INDICATIONS (CPT code: 93882)

A limited study (unilateral) is indicated under the following circumstances:

- Post intervention surveillance where the contralateral carotid is free of disease.
- Post intervention where the contralateral carotid has less than 70% stenosis and the surveillance period on the contralateral carotid has been less than 6 month (Ballota, 2007).
- Emergent or urgent requests in the immediate postoperative or postprocedural period.

OTHER INDICATIONS:

(Mohler, 2012)

- May be considered in blunt neck trauma (Liang, 2013)
- Vasculitis when concern for neck involvement (Schmidt, 2014, 2018)
- Yearly surveillance for patients with FMD (fibromuscular dysplasia) (Brott, 2011)

¹ **Carotid artery imaging is not recommended in the routine evaluation of patients with syncope in the absence of focal neurological signs or symptoms that support further evaluation.** Syncope is due to global cerebral hypoperfusion and therefore not to unilateral ischemia. A review of 5 studies of carotid artery ultrasound and Doppler use in patients with syncope found that these modalities were used in 58% of 551 patients and established a diagnosis in 0.5%. Carotid artery ultrasound should not be routinely used in the assessment of syncope (Shen, 2017, Kadian-Dodov, 2014).

²Prior to open heart surgery: In patients with risk factors associated with significant carotid artery stenosis such as prior hemispheric stroke or TIA, history of cigarette smoking, with left main coronary stenosis, peripheral vascular disease, age > 65, or carotid bruit on exam, carotid duplex would be Appropriate (Masabni, 2016; Brott, 2011).

BACKGROUND:

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images.

While cerebrovascular ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

Complete Cerebrovascular Ultrasound studies are bilateral unless there is a specific clinical indication that warrants a limited study and investigate the common, external and internal carotid arteries as well as the vertebral arteries. 2D (Grayscale) and Doppler velocities are included.

Clinical scenarios where cerebrovascular ultrasound are scored for appropriate use on a scale of 1-9. "A median Score 7 to 9 indicates an Appropriate test for specific indication (test is generally acceptable and is a reasonable approach for the indication). Median Score 4 to 6 Uncertain for specific indication (test may be generally acceptable and may be a reasonable approach for the indication).

Uncertainty also implies that more research and/or patient information is needed to classify the indication definitively. Median Score 1 to 3 Inappropriate test for that indication (test is not generally acceptable and is not a reasonable approach for the indication)" (Mohler, 2012)

OVERVIEW:

(Mohler, 2012)

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or observed on physical examination by physician.

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or Doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Resistant hypertension: The failure to normalize blood pressure on 3 or more drug regimen with medications at maximum doses and at least 1 of the medications being a diuretic agent.

Abbreviations:

ABI - ankle-brachial index

ACE - angiotensin-converting enzyme inhibitor

ARB - angiotensin II receptor blocker

CABG - coronary artery bypass graft

CT - computed tomography

GI - gastrointestinal

ICA - internal carotid artery

ICAVL - Intersocietal Commission for the Accreditation of Vascular Laboratories

IMT - intima-media thickness

PAD - peripheral artery disease

PVR - pulse volume recording

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Added blunt neck trauma; vasculitis when concern for neck involvement; yearly surveillance for patients with fibromuscular dysplasia (FMD)

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93886 – Transcranial Doppler Ultrasound

CPT Codes:

93886 – Bilateral or Complete

93888 – Unilateral or Limited

INDICATIONS FOR TRANSCRANIAL DOPPLER (TCD) OR TRANSCRANIAL DOPPLER ULTRASONOGRAPHY (TDU)

- The assessment of stroke risk of children 2-16 years of age with sickle cell anemia (rescreening at 6 month intervals) (NIH, 2014; Yawn, 2015).
- Management of infants of less than 32 weeks gestation and very low birth weight (<1500 g) preterm infants (Buckley, 2017; Gabriel, 2010).
- For screening of cerebral vasospasm after aneurysmal subarachnoid hemorrhage prior to other imaging (MRA, CTA, Cerebral angiography) (ACR, 2016).
- Detecting right-to-left shunt in cryptogenic stroke patients (D'Andrea, 2016; Palazzo, 2019; Schlick, 2016).

BACKGROUND:

Transcranial doppler ultrasonography (TDU) is a non-invasive technology that uses a handheld pulsed low-frequency doppler transducer that enables recording of blood velocities from intra-cranial arteries through selected cranial foramina and thin regions of the skull. Analysis of the doppler spectra allows display and calculation of peak systolic, peak diastolic and mean velocities and pulse indices. Mapping of the sampled velocities as a color display of spectra in lateral, coronal and horizontal views locates the major brain arteries in three dimensions.

A complete transcranial study includes the investigation of the middle cerebral, anterior cerebral, posterior cerebral, terminal ICA, ICA siphon, ophthalmic artery, vertebral artery and basilar artery bilaterally where applicable. A study could be limited because of the limitations of the technique which have to do with obtaining adequate ultrasound windows. Patient factors that influence skull thickness such as race, age and gender influence the success of the technique.

Resistance, velocity and pulse all vary with changes in blood viscosity and variations in respiration. With hypoventilation vasodilatation occurs reducing resistance and increasing velocity. Anemia lowers viscosity and increases velocity. In a sickle cell patient a mean velocity in the MCA of greater than 200 cm/sec is abnormally high and is accompanied by a 40% stroke risk within 3 years.

OVERVIEW:

The 2014 Expert Panel Report from the NIH titled *Evidence-Based Management Of Sickle Cell Disease* recommends that children with sickle cell disease be screened with annual transcranial doppler starting at two years and continuing until adolescence to assess the risk of stroke (NIH, 2016). In children with elevated middle cerebral artery peak systolic velocities (> 200cm/sec) prophylactic transfusion therapy to decrease hemoglobin S (HbS) below 30% is associated with a significant reduction in the risk of stroke.

In premature and low birth weight infants cerebral hemodynamic changes related to impaired vascular autoregulation of the immature vasculature assessed by transcranial doppler, particularly abnormalities in the resistive index, are associated with the development of intraventricular hemorrhage and hypoxic ischemic encephalopathy. According to Eisenhut et al “arterial development is completed initially in [the] brainstem and cerebellum (20–24 weeks) followed by the basal ganglia and diencephalon by 24–28 weeks and finally the cortex and germinal matrix”. The fragility of the germinal matrix capillaries and “immature vasoregulation coupled with rises in arterial pressure due to the stresses of postnatal adaption coupled with the extreme premature delivery contributes to the pathogenesis of IVH” (Eisenhut, 2017).

In the evaluation of cryptogenic strokes related to right-to-left shunts (RLS), TCD with agitated saline bubbles as a contrast agent (C-TCD) has a higher sensitivity in detecting RLS than contrast enhanced transesophageal echo (C-TEE) (D’Andrea, 2016; Palazzo, 2019; Schlick, 2016). The improved sensitivity is related to the ability to perform a valsalva maneuver during TCD. Since the study is better tolerated and more sensitive than C-TEE it is considered the preferred first line test. Subsequent anatomic confirmation with C-TEE can be obtained particularly when patent foramen ovale closure is contemplated.

Transcranial doppler is useful in the assessment of many additional cerebral vascular conditions but in general other modalities are regarded as superior and indications are reserved for inpatient settings. Extracranial ICA stenosis is better depicted by ultrasound or MRA and intracranial steno-occlusive disease is better evaluated by MRA and CTA. Although TCD has demonstrated a high degree of sensitivity and specificity in assessing acute intracranial ICA (internal carotid artery) and MCA (middle cerebral artery) occlusions, the study is operator dependent and has a poor accuracy in evaluating the posterior circulation (D’Andrea, 2016). Thus, for this indication it is a complimentary study to traditional first line MRA and CTA imaging. In the acute inpatient and intensive care setting TCD can help guide management and decision making in acute stroke and evaluate re-occlusion after thrombolytic therapy. These applications are facilitated by the ability to assess dynamic changes through serial studies at the bedside. Although TCD evidence of vasospasm following aneurysmal subarachnoid hemorrhage is highly predictive of delayed cerebral ischemia it is not a mandated standard of care due to a paucity of evidence on clinically relevant outcomes (Kumar, 2016).

POLICY HISTORY:

Review Date: June 2019

Review Summary:

- Added indication: detecting right to left shunt in cryptogenic stroke patients
- Updated background information and references

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93925 – Lower Extremity Arterial Duplex Scan

CPT Codes:

- 93925 - Bilateral or Complete
- 93926 - Unilateral or Limited

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 APPROPRIATE USE CRITERIA FOR PERIPHERAL VASCULAR ULTRASOUND AND PHYSIOLOGICAL TESTING PART I: ARTERIAL ULTRASOUND AND PHYSIOLOGICAL TESTING (MOHLER, 2012).

Section 5. Lower Extremity Artery Testing Using Multilevel Physiological Testing Alone or Duplex. Ultrasound with Single-Level ABI and PVR.

ACCF et al. Criteria #	Indications A _ appropriate; I _ inappropriate; U _ uncertain	Appropriate Use Score (1-9)		
Evaluation for Lower Extremity Atherosclerotic Disease – Potential Signs and/or Symptoms				
105.	<ul style="list-style-type: none"> • Lower Extremity claudication 	A (9)		
106.	<ul style="list-style-type: none"> • Leg/foot/toe pain at rest 	A (9)		
107.	<ul style="list-style-type: none"> • Foot or toe ulcer or gangrene 	A (9)		
108.	<ul style="list-style-type: none"> • Infection of leg/foot without palpable pulses 	A (9)		
109.	<ul style="list-style-type: none"> • Suspected acute limb ischemia (e.g., cold, painful limb with pallor, pulselessness, paresthesia) 	A (9)		
110.	<ul style="list-style-type: none"> • Nocturnal leg cramps • Normal pulses 	I (2)		
111.	<ul style="list-style-type: none"> • Lack of hair growth on dorsum of foot or toes • Normal pulses 	I (2)		
112.	<ul style="list-style-type: none"> • Evidence of atheroemboli in the lower extremities 	A (8)		
113.	<ul style="list-style-type: none"> • Lower Extremity Swelling • Normal pulses 	I (2)		
114.	<ul style="list-style-type: none"> • Diabetes with peripheral neuropathy • Normal pulses 	I (3)		
Surveillance of Known Lower Extremity PAD				
New or Worsening Symptoms				
115.	<ul style="list-style-type: none"> • Normal Baseline Study 	A (7)		
116.	<ul style="list-style-type: none"> • Abnormal baseline ABI (i.e., ABI ≤ 0.90) 	A (8)		
No Change in Symptom Status (No revascularization)				
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
117.	<ul style="list-style-type: none"> • Normal baseline ABI (no stenosis) 	I (1)	I (1)	I (1)

118.	• Mild or moderate disease (e.g., ABI >0.4)	I (2)	I (2)	U (4)
119.	• Severe (e.g., ABI <0.4)	I (3)	U (5)	U (5)
Symptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 24 months or greater
120.	• Normal baseline ABI (no stenosis)	I (1)	I (1)	I (2)
121.	• Mild or moderate disease (e.g., ABI >0.4)	I (2)	I (2)	U (4)
122.	• Severe (e.g., ABI <0.4)	U (4)	U (4)	I (3)
Surveillance of Lower Extremity PAD After Revascularization (Duplex/ABI)				
123.	• Baseline surveillance (within 1 month)	A (8)		
New or Worsening Symptoms				
124.	• After revascularization (angioplasty ± stent or bypass)	A (9)		
Asymptomatic or Stable Symptoms				
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
125.	• After angioplasty ± stent placement	I (2)	U (6)	U (6)
126.	• After vein bypass graft ¹	U (6)*	A (8)	U (6)
127.	• After prosthetic bypass graft ²	U (5)	A (7)	U (5)
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 24 months or greater
128.	• After angioplasty ± stent placement	I (3)	A (7)	U (5)
129.	• After vein bypass graft ³	U (5)	A (7)	U (5)
130.	• After prosthetic bypass graft ⁴	I (3)	A (7)	U (5)
Lower Extremity Artery Testing With Duplex Ultrasound Only				
Evaluation for Groin Complication After Femoral Access				
137.	• Pulsatile groin mass			A (9)
138.	• Bruit or thrill over the groin			A (8)
139.	• Ecchymosis			U (4)
140.	• Significant hematoma			A (7)
141.	• Severe pain within groin post procedure			A (&)

- Routine surveillance after femoral-popliteal or femoral-tibial-pedal bypass with a:
 - Venous conduit: Minimal surveillance intervals are, in addition to within 1 month baseline (Conte, 2015; Mohler, 2012), at 3, 6 and 12 months then yearly (Conte, 2015)^{1, 3}
 - Prosthetic bypass graft: Surveillance, in addition to within 1 month baseline (Mohler, 2012), at 6 month then yearly after the first year (Mohler, 2012) when other imaging has not been performed (Hirsch, 2006)^{2, 4}.
- Initial imaging of suspected vascular malformation: pain or soft-tissue mass, diffuse or focal extremity enlargement, discoloration, or ulceration (ACR, 2019).
- Initial imaging of vascular bruit or thrill not limited to the groin (ACR, 2019)
- Popliteal artery entrapment syndrome (calf claudication, paresthesia, and swelling during exercise) (ACR, 2018).

BACKGROUND:

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable, and meaningful results.

Scanning protocols may be developed by the vascular laboratory but are based upon technical recommendations from appropriate societies (Intersocietal Commission for the Accreditation of Vascular Laboratories (ICVL) or American College of Radiology (ACR)). Interpretation of studies are performed by a physician according to standard diagnostic criteria adapted from the Ultrasound literature and are validated internally for accuracy as part of an ongoing quality assurance program. Testing should be performed by a credentialed Technologist (RVT or RVS) and interpreted by a credentialed physician (RVPI, ACR, or RVT). Documentation of the use of optimal angle correction techniques and appropriate sample volume placement are necessary.

A complete lower extremity arterial study is comprised of imaging of the common femoral, deep femoral (profunda), proximal mid and distal superficial femoral artery popliteal and trifurcation vessels (anterior, posterior tibial and peroneal arteries) in both legs. Duplex with spectral waveforms are included. Bypass grafts or interventional sites are investigated. The Ankle -Brachial index is included. Performance of ABI studies alone do not fall under this guideline.

Duplex ultrasound of the lower extremities is used in the diagnosis of arterial occlusive disease. It should only be utilized in patients with significant clinical evidence of peripheral vascular disease as determined by physical exam findings such as abnormal Ankle-Brachial Index or non-invasive testing.

Although duplex ultrasound produces images in either shades of black and white (2D or Greyscale) or color (Color Doppler), the majority of the important clinical information is gained through analysis of the velocity of blood flow. Quantitative criteria are used based on flow velocity (peak systolic velocity, peak systolic velocity ratios) before, within, and beyond a stenosis are compared. The presence of turbulence, pulsatility and plaque morphology are more qualitative observations.

Peak systolic velocity ratios are the most accurate method for diagnosing stenosis greater than 50%. A ratio of 2 is commonly used to diagnose a stenosis greater than 50%. Measurement of peak systolic velocity is operator dependent. The probe must be correctly oriented and the Doppler gate must be correctly aligned. Calcifications, stents and tortuous vessels can confound the measurement. The sensitivity and specificity for the diagnosis of a stenosis greater than 50% from the Iliac to the popliteal arteries is approximately 90-95%.

Duplex ultrasound has been used for postrevascularization surveillance of graft patency with mixed results. Vein grafts fail either from the development of stenosis at the anastomoses, in the body of the graft or from proximal or distal disease progression.

These may occur and be detectable by ultrasound even if the patient is asymptomatic and the ABI is unchanged. It has been shown that revision of these threatened grafts results in better outcomes. Duplex surveillance of vein grafts is widely accepted and necessary.

Duplex surveillance of synthetic grafts has not been as well defined. However, the multisociety (Mohler, 2012) guideline provides an appropriateness rating of “7” within one month of revascularization, then at six month and yearly. Several studies have failed to show an improved outcome where duplex guided the clinical decision making. Other studies have found some improvement in patency where duplex was used for graft surveillance. The lack of consistency of these studies represents not only the marginal utility of duplex in the surveillance of synthetic grafts but also technical factors inherent when a synthetic conduit is used.

Duplex surveillance of angioplasty procedures is of questionable value. Several studies have shown that increased velocities exist after a PTA procedure and that this does not influence patency. There are contradictory studies that suggest patency is influenced adversely by these increased velocities and predict early failure. Although it seems logical to assume that early detection of restenosis could improve outcomes this is unsupported by the literature at this point.

Clinical scenarios where cerebrovascular ultrasound is used are scored for appropriate use on a scale of 1-9. “A median Score 7 to 9 indicates an Appropriate test for specific indication (test is generally acceptable and is a reasonable approach for the indication). Median Score 4 to 6 Uncertain for specific indication (test may be generally acceptable and may be a reasonable approach for the indication).

Uncertainty also implies that more research and/or patient information is needed to classify the indication definitively. Median Score 1 to 3 Inappropriate test for that indication (test is not generally acceptable and is not a reasonable approach for the indication)” (Mohler, 2012).

OVERVIEW:

(Mohler, 2012)

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or observed on physical examination by physician.

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or Doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Resistant hypertension: The failure to normalize blood pressure on 3 or more drug regimen with medications at maximum doses and at least 1 of the medications being a diuretic agent.

Abbreviations:

ABI - ankle-brachial index

ACE - angiotensin-converting enzyme inhibitor

ARB - angiotensin II receptor blocker

CABG - coronary artery bypass graft

CT - computed tomography

GI - gastrointestinal

ICA - internal carotid artery

ICAVL - Intersocietal Commission for the Accreditation of Vascular Laboratories

IMT - intima-media thickness

POLICY HISTORY:

Review Date: June 2019

Review Summary:

- Added paresthesia and swelling
- Updated background information and references

REFERENCES:

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93930 – Upper Extremity Arterial Duplex Scan

CPT Codes:

93930 – Bilateral or Complete

93931 – Unilateral or Limited

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria

ACCF et al. Criteria #	Indications A _ appropriate; I _ inappropriate; U _ uncertain	Appropriate Use Score (1-9)		
Section 8. Upper Extremity Arterial Testing – Physiological Testing or Duplex Ultrasound Study				
Evaluation for Upper Extremity PAD – Potential Signs and/or Symptoms				
142.	• Arm or hand claudication	A (8)		
143.	• Finger discoloration or ulcer	A (8)		
144.	• Unilateral cold painful hand	A (8)		
145.	• Raynaud’s phenomenon ³	U (5)		
146.	• Suspected positional arterial obstruction (e.g., thoracic outlet syndrome).	A (7)		
147.	• Upper extremity trauma with suspicion of vascular injury	A (8)		
148.	• Discrepancy in arm pulses or blood pressure discrepancy of >20mm Hg between arms. ²	U (6)		
149.	• Periclavicular bruit ¹	U (5)		
150.	• Pre-op radial artery harvest (e.g., for CABG)	A (7)		
151.	• Presence of pulsatile mass or hand ischemia after upper extremity vascular access.	A (8)		
152.	• Presence of bruit after upper extremity access for intervention.	A (8)		
Table 8.2 Surveillance of Upper Extremity PAD After Revascularization				
153.	• Baseline (within 1 month)	A (8)		
New or Worsening Symptoms				
154	• After revascularization (stent or bypass)	A (8)		
155.	• Post trauma	A (8)		
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
156.	• After vein bypass graft	U (6)	A (7)	U (5)
157.	• After prosthetic bypass graft	I (3)	U (6)	U (4)
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
158.	• After vein bypass graft	U (4)	A (7)	U (5)
159.	• After prosthetic bypass graft	U (4)	A (7)	U (4)

OTHER INDICATIONS:

- Initial imaging of suspected vascular malformation: pain or soft-tissue mass, diffuse or focal extremity enlargement, discoloration, or ulceration. (ACR, 2019)
- Initial imaging of suspected pathologic vascular bruit or thrill¹ (ACR, 2019).
- Arm blood pressure discrepancy of >20mm Hg between arms in asymptomatic patients about to undergo carotid revascularization when there is suspicion of bilateral subclavian artery stenosis² (Bouri, 2011; Deser, 2019; Huibers, 2017).
- Differentiating primary from secondary Raynaud's phenomena or evaluate response to therapy³ (Toprak, 2011, 2017).

BACKGROUND:

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

A complete upper extremity arterial study is comprised of imaging of the subclavian, axillary, brachial, ulnar and radial arteries. Duplex with spectral waveforms are included. Bypass grafts or interventional sites are investigated. The ankle -brachial index is usually not included.

Periclavicular or supraclavicular bruits/murmurs are a common normal finding in most young children and many young adults. The bruits are usually abrupt, heard during systole, and diminish or resolve when the shoulders are hyperextended (Kurtz, 1990). In older patients murmurs in this location may suggest significant vertebral or subclavian stenosis.

Raynauds phenomena (RP) represents episodes of vasoconstriction with discoloration, pain and numbness of the fingers or toes in response to cold exposure or emotional upset. It may be primary/idiopathic or secondary to an underlying connective tissue disorders and vasculitis. Necrosis of the digits may occur as a complication when RP is a manifestation of these conditions. In primary RP there is no underlying laboratory markers, the condition is usually reversible when the extremity is warmed, and digital necrosis is rarely seen. Because the condition is paroxysmal it may be asymptomatic at the time of clinical evaluation. Thus, objective methods are sought to assess response to therapy. Many laboratory and imaging tools are used in the assessment of RP, but none of the imaging modalities (color Doppler ultrasound, MR angiography, perfusion scintigraphy, laser Doppler perfusion imaging, laser speckle contrast imaging, thermography, and nailfold video capillaroscopy) are considered a gold standard. Doppler ultrasound is a readily available, non-invasive technique that does not require intravenous contrast or involve ionizing radiation that may help differentiate primary from secondary RP and assess response to therapy (Toprak, 2011; Toprak, 2017).

Cerebral hyperperfusion syndrome after carotid revascularization presents as raised intracranial pressure with headaches, seizures, hemiparesis, hemorrhage, coma, or death. Blood pressure control post operatively is a factor in decreasing the risk of this syndrome and thus accurate measurement of preoperative blood pressure is important (Bouri, 2011). Since bilateral subclavian artery stenosis is rare (1% in Huibers and 2.5% in Deser)

the highest blood pressure is generally regarded as accurate (Huibers, 2016). In patients with severe vascular disease where there is a blood pressure discrepancy and bilateral subclavian stenosis the higher pressure may be erroneously low. In this setting preoperative vascular imaging may be considered. A ≥ 20 mm Hg blood pressure difference was associated with a 23% sensitivity for detecting significant subclavian stenosis (Huibers, 2016). Furthermore, subclavian artery stenosis is correlated with vertebral artery stenosis and thus increased postoperative risk of stroke.

Clinical scenarios where cerebrovascular ultrasound is used are scored for appropriate use on a scale of 1-9. "A median Score 7 to 9 indicates an Appropriate test for specific indication (test is generally acceptable and is a reasonable approach for the indication). Median Score 4 to 6 Uncertain for specific indication (test may be generally acceptable and may be a reasonable approach for the indication).

Uncertainty also implies that more research and/or patient information is needed to classify the indication definitively. Median Score 1 to 3 Inappropriate test for that indication (test is not generally acceptable and is not a reasonable approach for the indication)" (Mohler, 2012).

OVERVIEW:

(Mohler, 2012)

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or observed on physical examination by physician.

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or Doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Resistant hypertension: The failure to normalize blood pressure on 3 or more drug regimen with medications at maximum doses and at least 1 of the medications being a diuretic agent.

Abbreviations:

ABI = ankle-brachial index

ACE = angiotensin-converting enzyme inhibitor

ARB = angiotensin II receptor blocker

CABG = coronary artery bypass graft

CT = computed tomography

GI = gastrointestinal

ICA = internal carotid artery

ICAVL = Intersocietal Commission for the Accreditation of Vascular Laboratories

IMT = intima-media thickness

PAD = peripheral artery disease

PVR = pulse volume recording

POLICY HISTORY:**Review Date:** June 2019**Review Summary:**

- Added indications:
 - Initial imaging of suspected vascular malformation: pain or soft-tissue mass, diffuse or focal extremity enlargement, discoloration, or ulceration.
 - Initial imaging of suspected pathologic vascular bruit or thrill
 - Arm blood pressure discrepancy of >20mm Hg between arms in asymptomatic patients about to undergo carotid revascularization when there is suspicion of bilateral subclavian artery stenosis
 - Differentiating primary from secondary Raynaud's phenomena or evaluate response to therapy
- Updated background information and references

REFERENCES:

American College of Radiology (ACR). ACR Appropriateness Criteria® - Clinically Suspected Vascular Malformation of the Extremities, Variant 1. 2019.

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doi: 10.21470/1678-9741-2018-0257.

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93970 – Extremity Venous Duplex Scan

CPT Codes:

93970 – Bilateral or Complete

93971 – Unilateral or Limited

ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II: Testing for Venous Disease and Evaluation of Hemodialysis Access (Gornik, 2013).

Section 1: Upper Extremity Venous Duplex Ultrasound

ACCF et al. Criteria #	INDICATIONS A = appropriate; M = maybe appropriate; R = rarely appropriate	Appropriate Use Score (1-9)
Venous Duplex of the Upper extremities for Patency and Thrombosis		
Limb Swelling		
1.	<ul style="list-style-type: none"> • Unilateral – Acute 	A (9)
2.	<ul style="list-style-type: none"> • Unilateral – chronic, persistent 	A (7)
3.	<ul style="list-style-type: none"> • Bilateral – acute • Suspected central venous obstruction 	A (8)
4.	<ul style="list-style-type: none"> • Bilateral—chronic, persistent • No alternative diagnosis identified (e.g., no CHF or anasarca from hypoalbuminemia) • Suspected central venous obstruction 	A (7)
Limb Pain (without swelling)		
5.	<ul style="list-style-type: none"> • Nonarticular pain in the upper extremity (no indwelling upper extremity venous catheter) 	M (5)
6.	<ul style="list-style-type: none"> • Nonarticular pain in the upper extremity with indwelling upper extremity venous catheter 	A (7)
7.	<ul style="list-style-type: none"> • Tender, palpable cord in the upper extremity 	A (8)
Shortness of Breath		
8	<ul style="list-style-type: none"> • Suspected pulmonary embolus (no indwelling upper extremity venous catheter) 	M (4)
9.	<ul style="list-style-type: none"> • Suspected pulmonary embolus with indwelling upper extremity venous catheter 	M (6)
10.	<ul style="list-style-type: none"> • Diagnosed pulmonary embolus (no indwelling upper extremity venous catheter) 	M (4)
11.	<ul style="list-style-type: none"> • Diagnosed pulmonary embolus with indwelling upper extremity venous catheter 	M (6)

Fever		
12.	<ul style="list-style-type: none"> Fever of unknown origin (no indwelling upper extremity venous catheter) 	R (2)
13.	<ul style="list-style-type: none"> Fever with indwelling upper extremity venous catheter 	R (4)
Known Upper Extremity Venous Thrombosis		
14.	<ul style="list-style-type: none"> New upper extremity pain or swelling while on anticoagulation. 	A (7)
15.	<ul style="list-style-type: none"> New upper extremity pain or swelling not on anticoagulation (i.e., contraindication to anticoagulation) 	A (7)
16.	<ul style="list-style-type: none"> Before anticipated discontinuation of anticoagulation treatment 	M (5)
17.	<ul style="list-style-type: none"> Shortness of breath in a patient with known upper extremity DVT 	R (3)
18.	<ul style="list-style-type: none"> Surveillance after diagnosis of upper extremity superficial phlebitis. Not on anticoagulation, phlebitis location \leq 5 cm from deep vein junction. 	M (6)
19.	<ul style="list-style-type: none"> Surveillance after diagnosis of upper extremity superficial phlebitis. Not on anticoagulation, phlebitis location \geq5 cm from deep vein junction. 	M (4)

SECTION 2: VENOUS DUPLEX FOR LOWER EXTREMITIES

Venous Duplex of the Lower Extremities for Patency and Thrombosis		
Limb Swelling		
28.	<ul style="list-style-type: none"> Unilateral – Acute 	A (9)
29.	<ul style="list-style-type: none"> Unilateral – chronic, persistent 	A (7)
30.	<ul style="list-style-type: none"> Bilateral – acute 	A (8)
31.	<ul style="list-style-type: none"> Bilateral—chronic, persistent No alternative diagnosis identified (e.g., no CHF or anasarca from hypoalbuminemia) 	M (6)
Limb Pain (without swelling)		
32.	<ul style="list-style-type: none"> Nonarticular pain in the lower extremity (e.g., calf or thigh) 	A (7)
33.	<ul style="list-style-type: none"> Knee pain 	M (4)
34.	<ul style="list-style-type: none"> Tender, palpable cord in the lower extremity 	A (8)
Shortness of Breath		
35.	<ul style="list-style-type: none"> Suspected pulmonary embolus 	A (8)
36.	<ul style="list-style-type: none"> Diagnosed pulmonary embolus 	A (7)
Fever		
37.	<ul style="list-style-type: none"> Fever of unknown origin (no indwelling lower extremity venous catheter) 	M (5)

38.	<ul style="list-style-type: none"> Fever with indwelling lower extremity venous catheter 	M (5)
Known Lower Extremity Venous Thrombosis		
39.	<ul style="list-style-type: none"> Surveillance of calf vein thrombosis for proximal propagation in patient with contraindication to anticoagulation (within 2 weeks of diagnosis) 	A (7)
40.	<ul style="list-style-type: none"> New lower extremity pain or swelling while on anticoagulation 	A (7)
41.	<ul style="list-style-type: none"> New lower extremity pain or swelling, not on anticoagulation (i.e., contraindication to anticoagulation) 	A (8)
42.	<ul style="list-style-type: none"> Before anticipated discontinuation of anticoagulation treatment 	M (5)
43.	<ul style="list-style-type: none"> Shortness of breath in a patient with known lower extremity DVT 	M (5)
44.	<ul style="list-style-type: none"> Surveillance after diagnosis of lower extremity superficial phlebitis 	A (7)
45.	<ul style="list-style-type: none"> Not on anticoagulation, phlebitis location ≤ 5 cm from deep vein junction 	
	<ul style="list-style-type: none"> Surveillance after diagnosis of lower extremity superficial phlebitis 	
	<ul style="list-style-type: none"> Not on anticoagulation, phlebitis location ≥ 5 cm from deep vein junction 	M (5)
Post-Endovenous (Great or Small) Saphenous Ablation		
52.	<ul style="list-style-type: none"> Lower extremity swelling or pain 	A (8)
53.	<ul style="list-style-type: none"> Routine post-procedural follow-up, no lower extremity pain or swelling Within 10 days post-procedure 	A (7)
Other Symptoms or Signs of Vascular Disease		
54.	<ul style="list-style-type: none"> Physiological testing positive for venous obstruction 	A (7)
55.	<ul style="list-style-type: none"> Patent foramen ovale with suspected paradoxical embolism for patient without lower extremity pain or swelling obstruction 	A (7)
Duplex Evaluation for Venous Incompetency		
Venous Insufficiency (Venous Duplex with Provocative Maneuvers for Incompetency)		
56.	<ul style="list-style-type: none"> Active venous ulcer 	A (9)
57.	<ul style="list-style-type: none"> Healed venous ulcer 	A (7)
58.	<ul style="list-style-type: none"> Spider veins (telangiectasias) 	R (3)
59.	<ul style="list-style-type: none"> Varicose veins, entirely asymptomatic 	M (5)
60.	<ul style="list-style-type: none"> Varicose veins with lower extremity pain or heaviness 	A (7)
61.	<ul style="list-style-type: none"> Visible varicose veins with chronic lower extremity swelling or skin changes of chronic venous insufficiency (e.g., hyperpigmentation, lipodermatosclerosis) 	A (7)
62.	<ul style="list-style-type: none"> Skin changes of chronic venous insufficiency without visible varicose veins (e.g., hyperpigmentation, lipodermatosclerosis) 	A (7)
63.	<ul style="list-style-type: none"> Lower extremity pain or heaviness without signs of venous disease 	M (5)

64.	<ul style="list-style-type: none"> Mapping prior to venous ablation procedure 	A (8)
65.	<ul style="list-style-type: none"> Prior endovenous (great or small) saphenous ablation procedure with new or worsening varicose veins in the ipsilateral limb 	A (8)
66.	<ul style="list-style-type: none"> Prior endovenous (great or small) saphenous ablation procedure with no residual symptoms 	R (3)

BACKGROUND:

A duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high-quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

Interpretation of venous duplex examinations must use validated criteria to assess the presence and extent of venous thrombosis, vessel patency, valvular competence, and /or calf muscle pump function. Duplex ultrasonography for venous evaluation includes transverse gray scale imaging with transducer compressions and long axis spectral doppler evaluation, with or without color imaging.

The interpretation and report must state the presence or absence of abnormalities in the vessels that were investigated. Disease if present, must be characterized according to its location, extent, severity, and in the case of venous thrombosis, age when possible.

Clinical scenarios where ultrasound is used in the evaluation of the IVC and iliac veins are scored for appropriate use on a scale of 1-9. A median score of 7-9 indicates that this is an appropriate test for the specific indication (“A” or “appropriate”). A median score of 4-6 indicates that there is unclear evidence as to the appropriateness of the test (“M” or “maybe appropriate”). A median score of 1-3 (“R” or “rarely appropriate”) indicates that the test is not generally acceptable for the indication.

Scanning for upper and lower extremity vein mapping prior to coronary or peripheral bypass surgery is considered appropriate in the intersociety appropriate use criteria (indications number 20, 46 and 47). However, these indications are not included in the NIA guideline which is limited to diagnostic studies. Furthermore, upper extremity vein mapping in the presence of adequate leg vein for harvest (indication 21) is also not included due to its appropriateness rating of “4” (maybe appropriate). Indications 48-51 and 22-27 in the intersociety appropriate use criteria, “screening for lower extremity DVT” and “screening examination for upper extremity DVT”, respectively are not included in the NIA guideline document as they are rated “rarely appropriate (3)” in addition to not being diagnostic exams.

OVERVIEW:

(Gornik, 2013)

Definitions:

Physiological testing: Evaluation of the peripheral venous circulation based on measurement of limb blood flow using plethysmographic sensors (e.g., air strain gauge, or photoplethysmography) with physiological

maneuvers (e.g., limb positioning, limb exercise, tourniquet application), or other parameters, without utilizing data from direct imaging of the blood vessels.

Screening examination: Testing conducted to determine the presence or absence of disease in an asymptomatic patient.

Surveillance examination: Testing conducted to monitor disease progression based solely on the passage of time since initial diagnosis or revascularization (e.g., calf vein thrombosis with contraindication to anticoagulation). It is assumed that baseline testing has already been conducted

Abbreviations:

ACR = American College of Radiology

AVF = autogenous arteriovenous fistula (including venous transpositions)

AVG = prosthetic arteriovenous graft

CHF = congestive heart failure

DVT = deep vein thrombosis

IAC = Intersocietal Accreditation Commission

ICU = intensive care unit

IVC = inferior vena cava

RPVI = registered physician in vascular interpretation

RVT = registered vascular technologist

RVS = registered vascular sonographer

TIPS = transjugular intrahepatic portosystemic shunt

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Removed inpatient studies and non diagnostic indications, as not covered by NIA: vein mapping prior to bypass surgery; screening exam for upper extremity DVT
- Removed additional considerations sections due to redundancy
- Added Post Op indications for Post Endovenous Saphenous Ablation and Other Symptoms or Signs of Vascular Disease
- Updated background information and references

REFERENCES:

Gornik HL, Gerhard-Herman M, Misra S, et al. Appropriate Use Criteria Task Force. ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II. Testing for Venous Disease and Evaluation of Hemodialysis Access. *J Am Coll Cardiol*. 2013; 62(7):649-665. doi: 10.1016/j.jacc.2013.05.001. <http://www.onlinejacc.org/content/62/7/649>. Retrieved May 22, 2018.

93975 – Abdominal, Pelvis, Scrotal, Retroperitoneal Organ Duplex Scan

CPT Codes:

93975 – Bilateral or Complete

93976 – Unilateral or Limited

For evaluation of the aorta (CPT codes 93978 & 93979) refer to guideline for AORTA, INFERIOR VENA CAVA, ILIAC DUPLEX SCAN (US)

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria (Mohler, 2012)		
ACCF et al. Criteria #	Indications A _ appropriate; I _ inappropriate; U _ uncertain	Appropriate Use Score (1-9)
Renal and Mesenteric Artery Duplex		
Evaluation of Renal Artery Stenosis – Potential Signs and/or Symptoms		
Creatinine Evaluation and/or Hypertension		
34.	<ul style="list-style-type: none"> Malignant Hypertension 	A (8)
35.	<ul style="list-style-type: none"> Resistant Hypertension 	A (8)
36.	<ul style="list-style-type: none"> Worsening blood pressure control in long standing hypertensive patient. 	A (8)
37.	<ul style="list-style-type: none"> Hypertension in younger patient (age <35 years) 	A (8)
38.	<ul style="list-style-type: none"> Unexplained size discrepancy between kidneys (>1.5 cm; in longest dimension) 	A (7)
39.	<ul style="list-style-type: none"> Unknown cause of azotemia (e.g., unexplained increase in creatinine) 	A (7)
40.	<ul style="list-style-type: none"> Increased creatinine (>50% baseline or above normal levels) after the administration of ACE/ARBs. 	A (8)
41.	<ul style="list-style-type: none"> Acute renal failure with aortic dissection 	A (8)
42.	<ul style="list-style-type: none"> Epigastric bruit 	A (7)
Heart Failure of Unknown Origin		
43.	<ul style="list-style-type: none"> Refractory CHF 	A (7)
44.	<ul style="list-style-type: none"> “Flash” pulmonary edema 	A (8)
Screening for Renal Artery Stenosis - Asymptomatic		
45.	<ul style="list-style-type: none"> Atherosclerotic vascular disease in other beds (e.g., peripheral artery disease) and well-controlled hypertension 	I (3)
46.	<ul style="list-style-type: none"> Unexplained size discrepancy between kidneys (>1.5 cm; in longest dimension) as discovered by CT or ultrasound 	U (4)
Evaluation for Mesenteric Artery Stenosis – Potential Signs and/or Symptoms		
Symptomatic		

47.	<ul style="list-style-type: none"> Evaluation for acute abdominal pain “out of proportion to exam” Leukocytosis, “thumbprinting” pneumatosis or hemoconcentration, and acidosis with or without elevated amylase, alkaline phosphatase, or CPK 	I (3)		
48.	<ul style="list-style-type: none"> Postprandial pain or weight loss not otherwise explained GI evaluation previously completed 	A (8)		
49.	<ul style="list-style-type: none"> Postprandial pain or discomfort GI evaluation not yet undertaken 	U (5)		
50.	<ul style="list-style-type: none"> Chronic constipation or diarrhea GI evaluation not yet undertaken 	I (3)		
51.	<ul style="list-style-type: none"> Unexplained or unintended weight loss 	U (5)		
52.	<ul style="list-style-type: none"> Abdominal or epigastric bruit 	U (4)		
Follow-Up Testing for Renal Artery Stenosis - Asymptomatic				
53.	<ul style="list-style-type: none"> Prior imaging indicates renal artery stenosis Determine hemodynamic significance 	A (7)		
54.	<ul style="list-style-type: none"> Surveillance of known renal artery stenosis 	U (6)		
Surveillance After Renal or Mesenteric Artery Revascularization				
Asymptomatic				
55.	<ul style="list-style-type: none"> Baseline surveillance (within 1 month) after revascularization 	A (8)		
New or Worsening Symptoms After Baseline				
56.	<ul style="list-style-type: none"> After renal or mesenteric artery revascularization 	A (8)		
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
57.	<ul style="list-style-type: none"> During first 12 months after endovascular revascularization 	I (3)	U (6)	U (6)
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
58.	<ul style="list-style-type: none"> After first 12 months after endovascular revascularization 	I (3)	A (7)	U (5)

ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria (Gornik, 2013)

ACCF et al. Criteria #	Indications A _ appropriate; M _ maybe inappropriate; R _ rarely appropriate	Appropriate Use Score (1-9)
Duplex of the Hepatoportal System (Portal Vein, Hepatic Veins, Splenic Vein, Superior Mesenteric Vein, Inferior Cava) for Patency, Thrombosis, and Flow Direction		
Evaluation of Hepatic Dysfunction or Portal Hypertension		
86.	<ul style="list-style-type: none"> Abnormal liver function tests. No alternative diagnosis identified (e.g., medication related or infectious hepatitis) 	M (6)
87.	<ul style="list-style-type: none"> Cirrhosis with or without ascites 	A (7)
88.	<ul style="list-style-type: none"> Jaundice As an initial diagnostic test 	R (3)
89.	<ul style="list-style-type: none"> Jaundice No alternative diagnosis identified after initial evaluation (e.g., no biliary obstruction) 	M (6)
90.	<ul style="list-style-type: none"> Hepatomegaly and/or splenomegaly 	A (7)
91.	<ul style="list-style-type: none"> Portal hypertension 	A (7)
Surveillance Following Portal Decompression Procedure		
92.	<ul style="list-style-type: none"> Follow-up of a TIPS 	A (8)
Evaluation of other Symptoms or Signs of Abdominal Vascular Disease		
93.	<ul style="list-style-type: none"> Abdominal pain 	M (4)
94.	<ul style="list-style-type: none"> Fever of unknown origin 	R (3)
Evaluation of Other Symptoms or Signs of Abdominal Vascular Disease		
95.	<ul style="list-style-type: none"> Pulmonary symptoms (suspected pulmonary embolus) 	R (3)
96.	<ul style="list-style-type: none"> Cor Pulmonale 	R (3)
Duplex of the Renal Veins for Patency and Thrombosis*		
97.	<ul style="list-style-type: none"> Gross hematuria 	R (3)
98.	<ul style="list-style-type: none"> Acute renal failure 	M (5)
99.	<ul style="list-style-type: none"> Acute flank pain 	M (5)
Evaluation of Cardiac and/or Pulmonary Symptoms		
100.	<ul style="list-style-type: none"> Pulmonary symptoms (suspected pulmonary embolus) 	R (3)
Evaluation of Other Symptoms or Signs of Abdominal Vascular Disease		
101.	<ul style="list-style-type: none"> Drug-resistant hypertension (suspected renal artery stenosis) 	R (3)
102.	<ul style="list-style-type: none"> Microscopic hematuria (prior to urological evaluation) 	R (2)
103.	<ul style="list-style-type: none"> Fever of unknown origin 	R (2)
104.	<ul style="list-style-type: none"> Epigastric bruit 	R (2)

*Testing indications refer to evaluation of native renal veins only for patency (i.e., renal transplant sites and renal arteries excluded)

Scrotal Duplex (Tyloch, 2016)

- Testicular trauma
 - Acute testicular pain
 - Suspected testicular torsion
 - Varicocele
 - Epididymitis
 - To determine if a mass is cystic or solid
 - Spermatic cord assessment
-

BACKGROUND:

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images.

While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

A review of common clinical scenarios where doppler ultrasound is used follows. These scenarios are scored for appropriate use on a scale of 1-9. A median score of 7-9 indicates that this is an appropriate test for the specific indication. A median score of 4-6 indicates that there is unclear evidence as to the appropriateness of the test. A median score of 1-3 indicates that the test is not generally acceptable for the indication.

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or observed on physical examination by physician.

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Resistant hypertension: The failure to normalize blood pressure on 3 or more drug regimen with medications at maximum doses and at least 1 of the medications being a diuretic agent.

Abbreviations:

ABI = ankle-brachial index

ACE = angiotensin-converting enzyme inhibitor

ACR = American College of Radiology

ARB = angiotensin II receptor blocker

AVF = autogenous arteriovenous fistula (including venous transpositions)

AVG = prosthetic arteriovenous graft

CABG = coronary artery bypass graft

CHF = congestive heart failure
CT = computed tomography
DVT = deep vein thrombosis
GI =gastrointestinal
ICA = internal carotid artery
ICAVL = Intersocietal Commission for the Accreditation of Vascular Laboratories
IMT = intima-media thickness
IVC = inferior vena cava
PAD = peripheral artery disease
PVR = pulse volume recording
RPVI = registered physician in vascular interpretation
RVT = registered vascular technologist
RVS = registered vascular sonographer
TIPS = transjugular intrahepatic portosystemic shunt

OVERVIEW:

Renal artery

Duplex ultrasound is **Appropriate** in the evaluation of hypertension, increasing or elevated serum creatinine, and heart failure as described in the tables above. It is **Inappropriate** for screening in an asymptomatic patient. Duplex ultrasound is also **Inappropriate** in the surveillance of known stenotic lesions in the absence of changing symptoms or laboratory findings.

Mesenteric/Celiac artery

The only **Appropriate** indication for evaluation of the mesenteric and celiac arteries for stenosis is postprandial pain and weight loss in patients who have undergone a gastrointestinal evaluation.

Surveillance after Renal, Mesenteric or Celiac artery revascularization

Surveillance after renal, mesenteric or celiac revascularization (surgical or endovascular) is **Appropriate** at 1 month following the procedure to establish a baseline and any time there are new signs or symptoms. Yearly surveillance is **Appropriate** after 12 months from the procedure.

Duplex evaluation of the Hepatoportal System

Duplex ultrasound evaluation is **Appropriate** for the evaluation of cirrhosis with or without ascites, hepatomegaly and/or splenomegaly, and portal hypertension. Duplex scanning is **Appropriate** in the surveillance after a transjugular intrahepatic portosystemic shunt (TIPS) procedure.

Duplex ultrasound is **Not Appropriate** in the initial evaluation of jaundice, but **May Be Appropriate** in cases where there are elevated liver enzymes and jaundice without a diagnosis identified after other evaluations. Hepatoportal duplex scanning is **Rarely Appropriate** in the initial evaluation of fever of unknown origin, cor pulmonale or pulmonary symptoms.

Duplex Ultrasound evaluation of the renal venous system

Isolated renal vein pathology is uncommon as a cause of genitourinary symptoms or signs. There are **no** clinical indications rated as **Appropriate** for assessment of the native renal veins with duplex ultrasound. For indications of acute renal failure, acute flank pain and symptoms compatible with renal vein thrombosis, renal venous duplex scanning is **Maybe Appropriate**.

Renal venous duplex is **Rarely Appropriate** for the evaluation of microscopic hematuria, fever of unknown origin and pulmonary symptoms. Renal venous duplex is **Rarely Appropriate** for evaluation of abdominal bruits and hypertension where an arterial study would be more appropriate.

POLICY HISTORY:

Review Date: May 2019

Review Summary:

- Removed Evaluation of Cardiac and/or Pulmonary symptoms; and Evaluation of other symptoms or signs of abdominal vascular disease
- Added to Scrotal Duplex: epididymitis; to determine if mass is cystic or solid; spermatic cord assessment
- Updated references

REFERENCES:

- Gornik HL, Gerhard-Herman M, Misra S, et al. Appropriate Use Criteria Task Force. ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II. Testing for Venous Disease and Evaluation of Hemodialysis Access. *J Am Coll Cardiol*. 2013; 62(7):649-665. doi: 10.1016/j.jacc.2013.05.001.
- Mohler ER, Gornik HL, Gerhard-Herman, et al. ACCF / ACR / AIUM / ASE / ASN / ICAVL / SCAI / SCCT / SIR / SVM / SVS Appropriate Use Criteria® for Peripheral Vascular Ultrasound and Physiological Testing Part I: Alexandrov AV. Ultrasound and angiography in the selection of patients for carotid endarterectomy. *Curr Cardiol Rep*. 2012; 5:141-147. doi: 10.1016/j.jacc.2012.02.009.
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93978 – Aorta, Inferior Vena Cava, Iliac Duplex Scan

CPT Codes:

93978 – Bilateral or Complete

93979 – Unilateral or Limited

ACCF/ACR/AIUM/ASE/ASN/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part I: Arterial Ultrasound and Physiological Testing (Mohler, 2012).

Section 4. Aortic and Aortoiliac Duplex

ACCF et al. Criteria #	Indications A _ appropriate; I _ inappropriate; U _ uncertain	Appropriate Use Score (1-9)
Aortic and Aortoiliac Duplex		
Abdominal Aortic Disease - Signs and/or Symptoms		
59.	• Lower extremity claudication	A (7)
60.	• Nonspecific lower extremity discomfort	I (3)
61.	• New onset abdominal or back pain	U (6)
62.	• Aneurysmal femoral or popliteal pulse	A (8)
63.	• Pulsatile abdominal mass	A (9)
64.	• Decreased or absent femoral pulse	A (7)
65.	• Abdominal or femoral bruit	A (7)
66.	• Fever of unknown origin	I (3)
67.	• Lower extremity swelling	I (2)
68.	• Evidence of atheroemboli in the lower extremities, including ischemic toes	A (8)
69.	• Erectile dysfunction	U (4)
70.	• Abnormal physiologic testing indicating aortoiliac occlusive disease	A (8)
71.	• Hypertension	I (3)
72.	• Abnormal abdominal x-ray suggestive of aneurysm	A (8)
73.	• Presence of a lower extremity arterial aneurysm (e.g., femoral or popliteal)	A (8)
74.	• Presence of a thoracic aortic aneurysm	A (8)
75.	• Men age >60 years • First degree relative with an abdominal aortic aneurysm	A (8)

76.	<ul style="list-style-type: none"> Women age >60 years First degree relative with an abdominal aortic aneurysm 	A (8)		
77.	<ul style="list-style-type: none"> Men age 65 to 75 years Current or former smoker 	A (8)		
78.	<ul style="list-style-type: none"> Women age 65 to 75 years Current or former smoker 	A (7)		
79.	<ul style="list-style-type: none"> Age >75 years Current or former smoker 	A (7)		
80.	<ul style="list-style-type: none"> Age ≥65 years No history of smoking 	U (5)		
81.	<ul style="list-style-type: none"> Age <65 years No history of smoking 	I (3)		
New or Worsening Symptoms				
82.	<ul style="list-style-type: none"> Known abdominal aortic aneurysm (any size) 	A (9)		
Asymptomatic or Stable Symptoms After Baseline Study, Surveillance Frequency During First Year		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
83.	<ul style="list-style-type: none"> Men, aneurysm 3.0 to 3.9 cm in diameter 	I (1)	U (4)	A (7)
84.	<ul style="list-style-type: none"> Women, aneurysm 3.0 to 3.9 cm in diameter 	I (1)	U (4)	A (7)
85.	<ul style="list-style-type: none"> Aneurysm 4.0 to 5.4 cm in diameter 	U (4)	A (7)	A (7)
86.	<ul style="list-style-type: none"> Aneurysm ≥ 5.5 cm in diameter 	A (7)	A (7)	U (6)
Asymptomatic or Stable Symptoms, No or Slow Progression During First Year, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
87.	<ul style="list-style-type: none"> Men, aneurysm 3.0 to 3.9 cm in diameter 	I (2)	A (7)	A (7)
88.	<ul style="list-style-type: none"> Women, aneurysm 3.0 to 3.9 cm in diameter 	I (2)	A (7)	A (7)
89.	<ul style="list-style-type: none"> Aneurysm 4.0 to 5.4 cm in diameter 	U (5)	A (7)	U (6)
90.	<ul style="list-style-type: none"> Aneurysm ≥ 5.5 cm in diameter 	A (8)	A (7)	U (5)
Asymptomatic or Stable Symptoms, Rapid Progression During First Year, Surveillance Frequency After First Year		Every 6 months	Every 12 months	Every 23 months or greater
91.	<ul style="list-style-type: none"> Men, aneurysm 3.0 to 3.9 cm in diameter 	A (7)	A (7)	U (4)
92.	<ul style="list-style-type: none"> Women, aneurysm 3.0 to 3.9 cm in diameter 	A (8)	A (7)	U (4)

93.	• Aneurysm 4.0 to 5.4 cm in diameter	A (8)	A (7)	U (4)
94.	• Aneurysm \geq 5.5 cm in diameter	A (9)	U (5)	I (3)
Surveillance After Aortic Endograft or Aortoiliac Stenting				
Baseline (Within 1 Month After the Intervention)				
95.	• Aortic or iliac endograft			A (8)
96.	• Aortic and iliac artery stents			A (7)
New or Worsening Lower Extremity Symptoms After Baseline Exam				
97.	• Aortic or iliac endograft			A (8)
98.	• Aortic and iliac artery stents			A (8)
Asymptomatic or Stable Symptom After Baseline Study, Surveillance Frequency During First Year.		At 3 to 5 months	At 6 to 8 months	At 9 to 12 months
99.	• Aortic endograft without endoleak stable and/or decreasing residual aneurysm sac size	I (3)	U (5)	U (6)
100.	• Aortic endograft with endoleak and/or increasing residual aneurysm sac size	U (6)	A (8)	A (7)
101.	• Aortic or iliac artery stents	I (2)	U (5)	U (6)
Asymptomatic or Stable Symptom After Baseline Study, Surveillance Frequency After the First Year.		Every 6 months	Every 12 months	Every 24 months or greater
102.	• Aortic endograft without endoleak stable and/or decreasing residual aneurysm sac size	I (3)	A (7)	U (5)
103.	• Aortic endograft with endoleak and/or increasing residual aneurysm sac size	A (8)	A (7)	U (5)
104.	• Aortic or iliac artery stents	I (2)	U (5)	U (5)

ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II: Testing for Venous Disease and Evaluation of Hemodialysis Access (Gornik, 2013).

Section 3: Duplex Evaluation of the Inferior Vena Cava and Iliac Veins

ACCF et al. Criteria #	Indications A _ appropriate; M _ maybe appropriate; R _ rarely appropriate	Appropriate Use Score (1-9)
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Duplex of the IVC and Iliac Veins for Patency and Thrombosis

Evaluation for Suspected Deep Vein Thrombosis

76.	<ul style="list-style-type: none"> Lower extremity swelling – unilateral or bilateral-as a “stand-alone test” without venous duplex of the lower extremities 	R (3)
77.	<ul style="list-style-type: none"> Lower extremity swelling – unilateral or bilateral-combined routinely with a venous duplex of the lower extremities 	M (4)
78.	<ul style="list-style-type: none"> Lower extremity swelling – unilateral or bilateral-performed selectively – when the lower extremity venous duplex is normal 	M (6)
79.	<ul style="list-style-type: none"> Lower extremity swelling – unilateral or bilateral-performed selectively – when the lower extremity venous duplex is positive for acute proximal DVT 	A (7)
80.	<ul style="list-style-type: none"> Selectively – when the flow pattern in 1 or both common femoral veins is abnormal 	A (8)
Evaluation for Suspected Pulmonary Embolus		
81.	<ul style="list-style-type: none"> Pulmonary symptoms (suspected pulmonary embolus) as a “stand-alone test” without a venous duplex of the lower extremities 	R (2)
82.	<ul style="list-style-type: none"> Pulmonary symptoms (suspected pulmonary embolus) – combined routinely with a venous duplex of the lower extremities 	M (4)
Evaluation of Other Symptoms or Signs of Abdominal Vascular Disease		
83.	<ul style="list-style-type: none"> Abdominal pain 	R (3)
84.	<ul style="list-style-type: none"> Abdominal bruit 	R (3)
85.	<ul style="list-style-type: none"> Fever of unknown origin 	R (3)

BACKGROUND:

(Gornik, 2013; Mohler, 2012)

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

A standard screening exam of the native aorta involves imaging with 2D ultrasound beginning at the diaphragm and documents the maximal transverse and AP diameter. Color may be used to assess patency and define the lumen. A gray scale image of the aorta should be recorded.

The indications for duplex of the IVC and iliac veins are limited. Duplex ultrasound is used for assessment of the Iliac Veins and Inferior Vena Cava most often in conjunction with an abnormal Lower extremity venous duplex. Scanning of the iliac veins is **Appropriate** when there is acute proximal femoral thrombus thought to extend superior to the inguinal ligament. An obstructive flow pattern, which is associated with lack of augmentation of femoral venous flow with expiration, suggests proximal obstruction. In patients with this finding during a lower extremity venous duplex study a scan of the iliac veins and IVC is warranted. Most often these are limited and/or unilateral studies as generally it is not necessary to fully evaluate the arterial system or scan the unaffected side. Duplex evaluation of the iliac veins and IVC is **Not Appropriate** as a stand alone test for shortness of breath, limb swelling, or abdominal pain.

Indication number 75 from the original intersociety guideline (Gornik, 2013) “prior to IVC filter placement” is not included in the NIA guideline which covers diagnostic indications. Furthermore, the appropriateness rating is “6’ or “maybe appropriate”.

Clinical scenarios where ultrasound is used in the evaluation of the IVC and iliac veins are scored for appropriate use on a scale of 1-9. (“A” or “appropriate”); (“M” or “maybe appropriate”); (“R” or “rarely appropriate”). A median score of 7-9 indicates that this is an appropriate test for the specific indication. A median score of 4-6 indicates that there is unclear evidence as to the appropriateness of the test. A median score of 1-3 indicates that the test is not generally acceptable for the indication.

The terminology according to Mohler, et al describing appropriateness of the indications for Aorta and Aortoiliac duplex is slightly different than for the IVC and iliac veins. “A median Score 7 to 9 indicates an Appropriate test for specific indication (test **is** generally acceptable and **is** a reasonable approach for the indication). Median Score 4 to 6 Uncertain for specific indication (test **may** be generally acceptable and **may** be a reasonable approach for the indication).

Uncertainty also implies that more research and/or patient information is needed to classify the indication definitively. Median Score 1 to 3 Inappropriate test for that indication (test **is not** generally acceptable and **is not** a reasonable approach for the indication)” (Mohler, 2012).

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or physical examination by physician.

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or Doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Abbreviations:

ABI = ankle-brachial index

ACE = angiotensin-converting enzyme inhibitor

ACR = American College of Radiology

ARB = angiotensin II receptor blocker

AVF = autogenous arteriovenous fistula (including venous transpositions)
AVG = prosthetic arteriovenous graft
CABG = coronary artery bypass graft
CHF = congestive heart failure
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GI =gastrointestinal
ICA = internal carotid artery
ICAVL = Intersocietal Commission for the Accreditation of Vascular Laboratories
IMT = intima-media thickness
IVC = inferior vena cava
PAD = peripheral artery disease
PVR = pulse volume recording
RPVI = registered physician in vascular interpretation
RVT = registered vascular technologist
RVS = registered vascular sonographer
TIPS = transjugular intrahepatic portosystemic shunt

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Removed 'prior to IVC filter placement' and updated background information

REFERENCES:

Gornik HL, Gerhard-Herman M, Misra S, et al. Appropriate Use Criteria Task Force. ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II. Testing for Venous Disease and Evaluation of Hemodialysis Access. *J Am Coll Cardiol*. 2013; 62(7):649-665. doi: 10.1016/j.jacc.2013.05.001.

Mohler ER, Gornik HL, Gerhard-Herman M, et al. ACCF / ACR / AIUM / ASE / ASN / ICAVL / SCAI / SCCT / SIR / SVM / SVS Appropriate Use Criteria® for Peripheral Vascular Ultrasound and Physiological Testing Part I: Alexandrov AV. Ultrasound and angiography in the selection of patients for carotid endarterectomy. *Curr Cardiol Rep*. 2012; 5:141-147. doi: 10.1016/j.jacc.2012.02.009.

93980 – Penile Vessel Duplex Scan

CPT Codes:

93980 – Bilateral or Complete

93981 - Unilateral or Limited

INDICATIONS FOR VENOUS DUPLEX ULTRASONOGRAPHY:

- Erectile dysfunction suspected, with impaired erection or complete impotence (Bella, 2015; Burnett, 2018; Jung, 2018; Patel, 2012)
- Blunt Penile trauma (Nicola, 2014; Fernandes, 2018; Pont, 2015)
- Dorsal vein thrombosis (Mondor’s disease) (Nazir, 2017)
- Priapism (Shigehara, 2016; Jung, 2018)
- Penile fibrosis and/or penile curvature (Peyronie’s disease) usually coupled with ICI (intracavernosal injection) test (Kalokairinou, 2012; Nehra, 2015)
- Penile tumors (Rocher, 2012)
- Urethral stricture, diverticulum, or paraurethral cyst (AUA, 2016; Kose, 2013)
- Penile urethral calculus or foreign body (Kim, 2012; Higa, 2017)

BACKGROUND:

A Duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

Penile color coded duplex sonography (CCDS) combined with the pharmaco-erection test represents an acceptable method of evaluating penile arterial and veno-occlusive function. Peak systolic velocity and a change in cavernous artery diameter are indicators of arterial inflow, while the pathologic end diastolic velocity and resistance index point out veno-occlusive dysfunction.

POLICY HISTORY:**REVIEW DATE:** June 2019**REVIEW SUMMARY:**

- Removed indication for penile color coded duplex sonography or dynamic penile color duplex ultrasound

REFERENCES:

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Shigehara K, Namiki M. Clinical management of priapism: A review. *World J Mens Health*. 2016; 34(1):1-8. <http://doi.org/10.5534/wjmh.2016.34.1.1>. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4853765/>.

93990 – Hemodialysis Access Duplex Scan

CPT Code: 93990

ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II: Testing for Venous Disease and Evaluation of Hemodialysis Access (Gornik, 2013).

Section 5: Hemodialysis Vascular Access Duplex Ultrasound

ACCF et al. Criteria #	Indications A _ appropriate; R _ rarely appropriate; M _ maybe appropriate	Appropriate Use Score (1-9)
Post-Operative Assessment of a Vascular Access Site		
Failure to Mature		
107.	<ul style="list-style-type: none"> “Failure to mature” on basis of physical examination 0-6 weeks after placement 	M (6)
108.	<ul style="list-style-type: none"> “Failure to mature” on basis of physical examination >6 weeks after placement 	A (8)
Symptoms and Signs of Disease		
109.	<ul style="list-style-type: none"> Signs of access site malfunction during dialysis (e.g., low blood flows, kt/V, recirculation times, or increased venous pressure) 	A (8)
110.	<ul style="list-style-type: none"> Mass associated with an AVF/AVG 	A (8)
111.	<ul style="list-style-type: none"> Loss of palpable thrill of AVF/AVG 	A (8)
112.	<ul style="list-style-type: none"> Arm swelling 	A (8)
113.	<ul style="list-style-type: none"> Hand pain, pallor, and/or digital ulceration (i.e., evaluation for suspected arterial steal syndrome) 	A (8)
114.	<ul style="list-style-type: none"> Cool extremity Without pain, pallor, or ulceration 	R (3)
115.	<ul style="list-style-type: none"> Difficult cannulation by multiple personnel on multiple attempts 	A (8)
Asymptomatic		
116.	<ul style="list-style-type: none"> Routine surveillance of a functioning AVF or AVG 	R (3)

BACKGROUND:

A duplex scan is an ultrasonic scanning procedure used to characterize the pattern and direction of blood flow in arteries or veins with the production of real-time images. While duplex ultrasound is a safe and widely available modality it does have its particular shortcomings and specific indications. Obtaining a high quality study requires the interplay of a number of factors. There are established criteria that are important to consider in order to ensure reliable, interpretable and meaningful results.

NOTE: NIA does not review requests for ultrasound studies to determine appropriate INITIAL placement of an access site (“**Assessment Prior to Access Site Placement**” (Gornik, 2013)). NIA reviews only requests for studies of hemodialysis sites already in place. Therefore, indications 105 and 106 of the original intersociety guideline (Gornik, 2013) for pre-operative mapping prior to access placement is not included in the NIA guideline.

Indications for evaluation of hemodialysis access are scored for appropriate use on a scale of 1-9. A median score of 7-9 indicates that this is an appropriate test for the specific indication (“A” or “appropriate”). A median score of 4-6 indicates that there is unclear evidence as to the appropriateness of the test (“M” or “maybe appropriate”). A median score of 1-3 (“R” or “rarely appropriate”) indicates that the test is not generally acceptable for the indication.

OVERVIEW:

(Gornik, 2013)

Definitions:

Claudication: Reproducible muscle discomfort or fatigue occurring with exertion at the same workload and relieved with rest, typically due to arterial obstruction.

Cold extremity: Reduced temperature from patient history or observed on physical examination by physician.

KT/V = Kt/V is another test that tells you how well dialysis is cleaning your blood. Kt/V is considered more accurate than URR (urea reduction ratio) because it takes into account your size, treatment time, blood flow rate, how much urea your body makes during dialysis and the extra urea and fluid removed in your dialysis session

Physiological testing: Evaluation of the peripheral circulation based on measurement of limb blood pressures with pulse volume recordings or Doppler waveforms, or other parameters without utilizing data from direct imaging of the blood vessels.

Resistant hypertension: The failure to normalize blood pressure on 3 or more drug regimen with medications at maximum doses and at least 1 of the medications being a diuretic agent.

Abbreviations:

ACR = American College of Radiology

AVF = autogenous arteriovenous fistula (including venous transpositions)

AVG = prosthetic arteriovenous graft

CHF = congestive heart failure

DVT = deep vein thrombosis

IVC = inferior vena cava

RPVI = registered physician in vascular interpretation

RVT = registered vascular technologist

RVS = registered vascular sonographer

TIPS = transjugular intrahepatic portosystemic shunt

POLICY HISTORY:

REVIEW DATE: June 2019

REVIEW SUMMARY:

- Modified background information and updated references

REFERENCES:

Gornik HL, Gerhard-Herman M, Misra S, et al. ACCF / ACR / AIUM / ASE / IAC / SCAI / SCVS / SIR / SVM / SVS / SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II. Testing for Venous Disease and Evaluation of Hemodialysis Access. *J Am Coll Cardiol*. 2013; 62(7):649-665. doi: 10.1016/j.jacc.2013.05.001.

Reviewed / Approved by  Patrick Browning, VP, Medical Director

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