INTRODUCTION:

Attended sleep tests, or polysomnography (PSG), are used to assess sleep related disorders. This guideline provides criteria for attended sleep studies for initial and repeat diagnosis as well as follow-up of therapeutic interventions for these conditions for adult and pediatric patients:

- Obstructive sleep apnea
- Narcolepsy
- Parasomnias and seizure disorder
- Periodic limb movement disorder

Sleep studies refer to the continuous and simultaneous recording of various physiological parameters of sleep followed by physician review and interpretation, performed in the diagnosis and management of sleep disorders. Sleep studies have been classified based on the number and type of physiologic variables recorded and whether or not the study is attended by a technologist, or performed with portable equipment in the home or some other unattended setting. (See “Additional Information” below.)

Polysomnography requires a minimum of the following channels: Electroencephalogram (EEG), Electrooculogram (EOG), chin Electromyogram (EMG), air-flow, oxygen saturation, respiratory effort and heart rate, attended by a technologist.

Initial Clinical Reviewers (ICRs) and Physician Clinical Reviewers (PCRs) must be able to apply criteria based on individual needs and based on an assessment of the local delivery system.

INDICATIONS FOR SLEEP STUDY, ATTENDED – ADULTS:

An attended sleep study can be approved for patients who require a sleep assessment and do not have contraindications for an unattended sleep test (Home Sleep Test).

Unattended (home) sleep studies are considered medically necessary for patients with symptoms suggestive of OSA when the home sleep study is used as part of a comprehensive sleep evaluation, using a Type II, Type III or Type IV device measuring airflow.

An attended sleep study (polysomnography (PSG)) is approvable when the patient has:

- At least one of the following co-morbid conditions that degrade the accuracy of portable monitoring:
Moderate to severe pulmonary disease (for example, COPD or asthma) (with nocturnal oxygen use or daytime hypercapnea with documented arterial blood gases showing pO2 less than 60 or pCO2 greater than 45)

- Neuromuscular disease (e.g., Parkinson’s disease, spina bifida, myotonic dystrophy, amyotrophic lateral sclerosis)
- Stroke with residual respiratory effects
- Epilepsy
- Congestive heart failure (NYHA class III or IV or LVEF less than 45%)
- Super obesity (BMI greater than 45, or pulmonary function studies show obesity hypoventilation syndrome (BMI greater than 35 plus arterial blood gas with PCO2 greater than 45, or BMI greater than 35 plus inability to lie flat in bed));

OR

- One or more of the following co-morbid sleep disorders:
  - Periodic limb movement disorder (involuntary, jerking movements of the legs during sleep causing excessive daytime sleepiness (EDS) due to sleep fragmentation),
  - Parasomnias that are unusual or atypical because of the individual’s age at onset, the time, duration or frequency of occurrence of the behavior including, but not limited to: nocturnal seizures, psychogenic dissociative states, REM sleep behavior disorder, sleep talking and/or confusional arousals,
  - narcolepsy,
  - central sleep apnea or complex sleep apnea;

OR

- Negative or technically inadequate portable monitoring results; or
- Low pretest probability of obstructive sleep apnea (BMI less than 30, normal airway, no snoring, and neck circumference less than 17 inches in men and less than 16 inches in women and Epworth Score <10) but with the likelihood of other sleep disorders not identified during unattended studies; or
- Patient lacks the mobility or dexterity to use portable monitoring equipment safely at home.

**Indications for evaluating suspected obstructive sleep apnea**

- Individuals who present with clinical features suggestive of moderate to severe OSA as follows:
  - Excessive daytime sleepiness (EDS) and ONE of the following:
    - BMI greater than 30; or
    - Excessive sleepiness while driving; or
    - Loud/intense snoring; or
    - Epworth Sleepiness Scale (ESS) score of 10 or greater; or
    - Witnessed nocturnal apnea, choking and/or gasping.
- Unattended (home) sleep studies are considered medically necessary for patients with symptoms suggestive of OSA unless criteria for an attended sleep study above are also met.

**Indications for a split night sleep study:**

- Where attended PSG is indicated, a split-night study PSG is considered medically necessary, in which the final portion of the PSG is used to titrate continuous positive
airway pressure (CPAP) if the Apnea Hypopnea Index (AHI) is greater than 15 in first 2 hours of a diagnostic sleep study.

**Indications for a follow-up attended sleep study after split night study:**
- An additional full-night CPAP titration PSG is considered medically necessary only
  - if the AHI is less than or equal to 15 during the first 2 hours of a diagnostic sleep study, or
  - if the split-night study did not allow for the abolishment of the vast majority of obstructive respiratory events.

**Indications for repeat sleep studies in patients with diagnosed OSA**
- Where repeat testing is indicated, attended full-channel nocturnal polysomnography (PSG) (Type I device) performed in a healthcare facility is considered medically necessary for persons who meet criteria for attended PSG above; in all other cases, unattended (home) sleep studies are considered medically necessary.
- Repeat sleep studies are indicated up to twice a year for any of the following indications:
  - To determine whether positive airway pressure treatment (i.e., CPAP, bi-level positive airway pressure (BiPAP), demand positive airway pressure (DPAP), variable positive airway pressure (VPAP), or auto-titrating positive airway pressure (AutoPAP)) continues to be effective; or
  - To determine whether positive airway pressure treatment settings need to be changed; or
  - To determine whether continued treatment with positive airway pressure treatment is necessary; or
  - To assess treatment response after upper airway surgical procedures and after initial treatment with oral appliances.

**Indications for evaluation of patients with Narcolepsy/Idiopathic CNS Hypersomnia**
- A multiple sleep latency test (MSLT) is indicated for patients suspected of having narcolepsy as evidenced by
  - Excessive daytime sleepiness
  - Cataplexy
  - Hypnogogic hallucinations
  - Sleep paralysis
- MSLT is also indicated for the evaluation of suspected idiopathic hypersomnia to help differentiate idiopathic hypersomnia from narcolepsy.
- **All other indications are considered experimental and investigational since effectiveness for other indications have not been established.**

**Indications for the evaluation of patients with parasomnias and seizure disorders**
- Polysomnography with expanded bilateral montage and video recording is indicated for evaluation of patients WITH inconclusive EEG results AND with sleep behaviors suggestive of parasomnias (such as sleep disruptions thought to be sleep-relate seizures or paroxysmal arousals) that are unusual or atypical because of:
  - The patient’s age at onset
  - The time, duration or frequency of occurrence
  - Features of the behaviors that are violent or otherwise potentially injurious to the patient or others
The specifics of the particular motor patterns in question, (e.g. stereotypical, repetitive or focal)

Indications for the evaluation of patients with periodic limb movement disorder
- Polysomnography is indicated when patient or an observer report repetitive limb movements during sleep with the following:
  - Frequent awakenings, or
  - Difficulty maintaining sleep, or
  - Excessive daytime sleepiness, and
  - Movements are not associated with moderate or high pre-test probability of OSA

INDICATIONS FOR SLEEP STUDY, ATTENDED – PEDIATRIC PATIENTS (<18):
- Habitual snoring during sleep to differentiate primary snoring from obstructive sleep apnea syndrome (OSAS)
- Hypersomnia
- Suspected narcolepsy as suggested by the presence of:
  - Excessive daytime sleepiness
  - Cataplexy
  - Hypnogogic hallucinations
  - Sleep paralysis
- Suspected parasomnia or seizure disorders:
  - When NREM parasomnias, epilepsy, or nocturnal enuresis exist, if suspicion for co-morbid sleep disorder such as sleep-disordered breathing has been identified.
  - When there is snoring and craniofacial features that predispose to sleep disordered breathing.
- Suspected restless leg syndrome or periodic limb movement disorder
  - When patient or an observer report repetitive limb movements during sleep and frequent awakenings, fragmented sleep, difficulty maintaining sleep or excessive daytime sleepiness, or
  - to document periodic limb movements when this disorder is suspected.
- Suspected congenital central alveolar hypoventilation syndrome
- Suspected sleep related hypoventilation due to neuromuscular disorders or chest wall deformities
- Following an adenotonsillectomy or other pharyngeal surgery for OSAS when any of the following is met (study should be delayed 6 to 8 weeks postoperatively):
  - Age younger than 3 years; or
  - Cardiac complications of OSAS (e.g., right ventricular hypertrophy); or
  - Craniofacial anomalies; or
  - Failure to thrive; or
  - Neuromuscular disorders; or
  - Obesity; or
  - Prematurity; or
  - Recent respiratory infection; or
  - Severe OSAS was present on preoperative PSG (a respiratory disturbance index of 19 or greater); or
  - Presence of symptoms of OSAS persisting after treatment.
• The use of abbreviated or screening techniques, such as videotaping, nocturnal pulse oximetry, daytime nap PSG, measurements of circulating adropin concentrations, plasma pentraxin 3 and TREM1 levels, or unattended home PSG, is considered experimental and investigational for diagnosis of OSAS in children because their effectiveness for this indication has not been established.

**Indications for repeat sleep studies in pediatric patients**

- To assess for residual sleep related breathing disorder
  - To titrate positive pressure therapy
  - After initiation of therapy for OSA in presence of
    - obesity,
    - craniofacial abnormalities
- Neurologic disorders (e.g. Down syndrome, Prader Willi syndrome) and persistent snoring or other symptoms following treatment
- Significant weight change or significant growth and development.

**ADDITIONAL INFORMATION RELATED TO SLEEP STUDY, ATTENDED:**

**CPAP titration:** A cardiorespiratory sleep study without EEG recording is not recommended for CPAP titration. CPAP titration should include sleep staging and the ability to identify arousals to appropriately titrate CPAP with a goal of the elimination or near elimination of apneas, hypopneas and respiratory related arousals in REM and NREM sleep, including REM sleep with the patient in the supine position.

**Daytime nap polysomnography** (sometimes referred to as “PAP-nap”) is not considered medically necessary.

**Maintenance of wakefulness test** is considered investigational for members with symptoms suggestive of OSA because its effectiveness for this indication has not been established:

**Epworth sleepiness scale:** The Epworth sleepiness scale can be found at [http://www.narcolepsynetwork.org/wp-content/uploads/2010/05/ESS_Form-052210.pdf](http://www.narcolepsynetwork.org/wp-content/uploads/2010/05/ESS_Form-052210.pdf)

**Home sleep test (HST):** When a Sleep Study, Unattended (i.e. Home Sleep Test, or HST) is a covered benefit, the health plan may require use of the unattended study unless the patient has contraindications or co-morbidities that would require an attended sleep study. (See separate clinical guideline for “Sleep Study, Unattended” when that procedure requires authorization.)

**Narcolepsy:** For Narcolepsy, PSG may be done on the night preceding MSLT to rule out other sleep disorders and to document adequate nocturnal sleep time prior to daytime MSLT to help confirm diagnosis of narcolepsy and determine severity of daytime sleepiness
  - Multiple Sleep Latency Testing (MSLT) includes minimum channels of EEG, EOG, chin EMG and ECG
  - The use of MSLT to support a diagnosis of narcolepsy is suspect if Total Sleep Time on prior night sleep study is less than 6 hours
  - MSLT should not be performed after a split night sleep study
OSA: Obstructive sleep apnea is characterized by recurrent episodes of upper airway obstruction, and is linked with reductions in ventilation, resulting in repeated arousals and episodic oxyhemoglobin desaturations during sleep.

Parasomnias and seizure disorders: Polysomnography for evaluation of parasomnias and seizure disorders includes minimum channels of EEG, EOG, chin EMG: (EEG using an expanded bilateral montage; and anterior tibialis or extensor digitorum EMG for body movements) and video with documented technologist observations.

- PSG is used to assist in the diagnosis of paroxysmal arousals or other sleep disruptions that are thought to be sleep related seizures when initial clinical evaluation and standard EEG are inconclusive.
- PSG is not routinely indicated in cases of typical, uncomplicated, non-injurious parasomnias when the diagnosis is clearly delineated.
- For pediatric patients, studies have indicated that there is a significant prevalence of sleep disordered breathing, ranging from 58% to 100% on PSG in children with chronic NREM parasomnias.

Periodic limb movement disorder: Polysomnography for the evaluation of periodic limb movement disorder includes minimum channels of EEG, EOG, chin EMG, and left and right anterior tibialis EMG AND respiratory effort, airflow and oximetry.

Split-night study: A split-night study must be used unless criteria are met for a second night titration study (see above in “split night study” section). A split night study is expected for most attended PSGs. In a split night sleep study, the diagnosis of OSA is established in the first half of the night and the optimal CPAP pressure is determined during the second half of the night, if the Apnea+ Hypopnea Index (AHI) is >15 in the first 2 hours of the diagnostic portion of the study.

Types/Levels: The types of sleep studies are as follows:

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<thead>
<tr>
<th>Type(Level)</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Standard polysomnography (PSG) with a minimum of 7 parameters measured, including EEG, EOG, chin EMG, and ECG, as well as monitors for airflow, respiratory effort, and oxygen saturation. A sleep technician is in constant attendance.</td>
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<tr>
<td>II</td>
<td>Comprehensive portable PSG studies that measure the same channels as type I testing, except that a heart rate monitor can replace the ECG and a sleep technician is not necessarily in attendance.</td>
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<tr>
<td>III</td>
<td>Monitor and record a minimum of 4 channels and must record ventilation (at least two channels of respiratory movement, or respiratory movement and airflow), heart rate or ECG, and oxygen saturation. A sleep technician is not necessarily in constant attendance but is needed for preparation.</td>
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<tr>
<td>IV</td>
<td>Three or more channels, one of which is airflow. Other measurements include oximetry and at least 2 other parameters (e.g. body position, EOG, peripheral arterial tonometry (PAT) snoring, actigraphy, airflow). A sleep technician is not necessarily in attendance but is needed for preparation.</td>
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REFERENCES


Reviewed/Approved by Michael Pentecost, MD, Chief Medical Officer