



Kansas City

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# Polysomnography for Non-Respiratory Sleep Disorders

**Policy Number:** 2.01.99

**Last Review:** 10/2018

**Origination:** 10/2015

**Next Review:** 10/2019

## **Policy**

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Blue Cross and Blue Shield of Kansas City (Blue KC) will provide coverage for Polysomnography for Non-Respiratory Sleep Disorders when it is determined to be medically necessary because the criteria shown below are met.

## **When Policy Topic is covered**

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Polysomnography (PSG) and a multiple sleep latency test performed on the day after the PSG may be considered **medically necessary** in the evaluation of suspected narcolepsy or idiopathic hypersomnia.

PSG may be **medically necessary** when evaluating patients with parasomnias when there is a history of sleep related injurious or potentially injurious disruptive behaviors.

PSG may be **medically necessary** when a diagnosis of periodic limb movement disorder (PLMD) is considered when there is:

- A complaint of repetitive limb movement during sleep by the patient or an observer; **AND**
- No other concurrent sleep disorder; **AND**
- At least one of the following is present:
  - Frequent awakenings; OR
  - Fragmented sleep; OR
  - Difficulty maintaining sleep; OR
  - Excessive daytime sleepiness

## **When Policy Topic is not covered**

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PSG for the diagnosis of PLMD is considered **not medically necessary** when there is concurrent untreated obstructive sleep apnea, restless legs syndrome, narcolepsy, or REM sleep behavior disorder.

PSG is considered **investigational** for the diagnosis of non-respiratory sleep disorders not meeting the criteria above, including but not limited to nightmare disorder, depression, sleep-related bruxism, or noninjurious disorders of arousal.

## Description of Procedure or Service

Populations	Interventions	Comparators	Outcomes
Individuals: <ul style="list-style-type: none"> <li>With suspected hypersomnia</li> </ul>	Interventions of interest are: <ul style="list-style-type: none"> <li>Polysomnography</li> </ul>	Comparators of interest are: <ul style="list-style-type: none"> <li>Clinical diagnosis alone</li> </ul>	Relevant outcomes include: <ul style="list-style-type: none"> <li>Test accuracy</li> <li>Symptoms</li> <li>Functional outcomes</li> <li>Quality of life</li> </ul>
Individuals: <ul style="list-style-type: none"> <li>With a typical or benign parasomnia</li> </ul>	Interventions of interest are: <ul style="list-style-type: none"> <li>Polysomnography</li> </ul>	Comparators of interest are: <ul style="list-style-type: none"> <li>Clinical diagnosis alone</li> </ul>	Relevant outcomes include: <ul style="list-style-type: none"> <li>Test accuracy</li> <li>Symptoms</li> <li>Functional outcomes</li> <li>Quality of life</li> </ul>
Individuals: <ul style="list-style-type: none"> <li>With violent or potentially injurious parasomnia</li> </ul>	Interventions of interest are: <ul style="list-style-type: none"> <li>Polysomnography</li> </ul>	Comparators of interest are: <ul style="list-style-type: none"> <li>Clinical diagnosis alone</li> </ul>	Relevant outcomes include: <ul style="list-style-type: none"> <li>Test accuracy</li> <li>Symptoms</li> <li>Functional outcomes</li> <li>Quality of life</li> </ul>
Individuals: <ul style="list-style-type: none"> <li>With restless legs syndrome</li> </ul>	Interventions of interest are: <ul style="list-style-type: none"> <li>Polysomnography</li> </ul>	Comparators of interest are: <ul style="list-style-type: none"> <li>Clinical diagnosis alone</li> </ul>	Relevant outcomes include: <ul style="list-style-type: none"> <li>Test accuracy</li> <li>Symptoms</li> <li>Functional outcomes</li> <li>Quality of life</li> </ul>
Individuals: <ul style="list-style-type: none"> <li>With periodic limb movement disorder</li> </ul>	Interventions of interest are: <ul style="list-style-type: none"> <li>Polysomnography</li> </ul>	Comparators of interest are: <ul style="list-style-type: none"> <li>Clinical diagnosis alone</li> </ul>	Relevant outcomes include: <ul style="list-style-type: none"> <li>Test accuracy</li> <li>Symptoms</li> <li>Functional outcomes</li> <li>Quality of life</li> </ul>

Polysomnography (PSG) recordings multiple physiologic parameters relevant to sleep. Videorecording may also be performed during PSG to assess parasomnias such as rapid eye movement (REM) sleep behavior disorder (RBD).

### Hypersomnia

For individuals who have suspected hypersomnia who receive PSG, the evidence includes a systematic review on diagnostic accuracy. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. The evidence has suggested that PSG followed by the multiple sleep latency test is associated with moderate sensitivity and high specificity in support of the diagnosis of narcolepsy. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

### Parasomnias

For individuals who have typical or benign parasomnia who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. The evidence has suggested that typical

and benign parasomnias (eg, sleepwalking, sleep terrors) may be diagnosed on the basis of their clinical features and do not require PSG. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

For individuals who have violent or potentially injurious parasomnia who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. For the diagnosis of REM sleep behavior disorder, the combined use of clinical history and PSG to document the loss of muscle atonia during REM sleep increases diagnostic accuracy and is considered the criterion standard for diagnosis. Diagnostic accuracy is increased with videorecording during PSG to assess parasomnias such as REM sleep behavior disorder. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

### **Sleep-Related Movement Disorders**

For individuals who have restless legs syndrome who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. Restless legs syndrome does not require PSG because the syndrome is a sensorimotor disorder, the symptoms of which occur predominantly when awake; therefore, PSG results are generally not useful. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

For individuals who have periodic limb movement disorder who receive PSG, the evidence includes a systematic review. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. PSG with electromyography of the anterior tibialis is the only method available to diagnose periodic limb movement disorder, but this sleep-related movement disorder is rare and should only be evaluated using PSG in the absence of symptoms of other disorders. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

### **Background Hypersomnias**

The hypersomnias include such disorders as narcolepsy, Klein-Levine syndrome, and idiopathic hypersomnolence. Narcolepsy is a neurologic disorder characterized predominantly by abnormalities of rapid eye movement (REM) sleep, some abnormalities of non-REM (NREM) sleep, and the presence of excessive daytime sleepiness that cannot be fully relieved by any amount of sleep. The classic symptoms include hypersomnolence, cataplexy, sleep paralysis, and hypnagogic (onset of sleep) hallucinations. Cataplexy refers to the total or partial loss of muscle tone in response to sudden emotion. Most patients with cataplexy have abnormally low levels of hypocretin-1 (orexin-A) in the cerebrospinal fluid.<sup>1</sup> Narcolepsy type 1 (narcolepsy with cataplexy) is defined as excessive daytime sleepiness and at least one of the following criteria: (a) hypocretin deficiency or

(b) cataplexy and a positive multiple sleep latency test (MSLT). In the MSLT, the patient lies down in a dark, quiet room to assess the time to enter the different stages of sleep. The test is repeated every 2 hours throughout the day, and the maximum time allowed to fall asleep is typically set at 20 minutes. Patients with narcolepsy often have a mean sleep latency of fewer than 5 minutes and 2 or more early-onset REM periods during the MSLT naps. People with idiopathic hypersomnia fall asleep easily but typically do not reach REM sleep during the MSLT. Narcolepsy type 2 (narcolepsy without cataplexy) is defined by chronic sleepiness plus a positive MSLT; hypocretin-1 levels are in the normal range in most patients.

## **Parasomnias**

Parasomnias are abnormal behavioral, experiential, or physiologic events that occur during entry into sleep, within sleep, or during arousals from sleep. Parasomnias can result in a serious disruption of sleep-wake schedules and family functioning. Some, particularly sleepwalking, sleep terrors, and REM sleep behavior disorder (RBD), can cause injury to the patient and others. Parasomnias are classified into parasomnias associated with REM sleep, parasomnias associated with NREM sleep, and other parasomnias.

### **Parasomnias Associated With REM Sleep**

REM sleep is normally accompanied by muscle atonia, in which there is an almost complete paralysis of the body through inhibition of motor neurons. In patients with RBD, muscle tone is maintained during REM sleep. This can lead to abnormal or disruptive behaviors associated with vivid dreams such as talking, laughing, shouting, gesturing, grabbing, flailing arms, punching, kicking, sitting up or leaping from bed, and running.<sup>2</sup> Violent episodes that carry a risk of harm to the patient or bed partner may occur up to several times nightly. Idiopathic RBD is associated with the development of degenerative synucleinopathies (Parkinson disease, dementia with Lewy bodies, multiple systems atrophy) in about half of patients. Guidelines recommend maintaining a safe sleeping environment for both the patient and bed partner along with medical therapy. Other parasomnias associated with REM sleep are recurrent isolated sleep paralysis and nightmare disorder.

### **Parasomnias Associated With NREM Sleep**

Disorders of arousal from NREM sleep result from the intrusion of wake into NREM sleep. These include confusional arousals, sleepwalking, and sleep terrors. In these parasomnias, the patient has an incomplete awakening from NREM sleep, usually appears awake with eyes open, is unresponsive to external stimuli, and is amnesic to the event. Sleepwalking can range from calm behaviors such as walking through a house to violent and/or injurious behaviors such as jumping out of a second story window. Patients with sleep terrors (also called night terrors) typically awaken with a loud scream and feeling of intense fear, jump out of bed, and occasionally may commit a violent act.

## **Other Parasomnias**

The category of “other parasomnias” has no specific relation to sleep stage and includes sleep-related dissociative disorders, sleep-related enuresis, sleep-related groaning, exploding head syndrome, sleep-related hallucinations, and sleep-related eating disorder. Diagnosis of these disorders is primarily clinical, although polysomnography (PSG) may be used for differential diagnosis.

- In sleep-related dissociative disorders, behaviors occur during an awakening, but the patient is amnesic to them.
- Sleep-related enuresis (bedwetting) is characterized by recurrent involuntary voiding in patients greater than 5 years of age.
- Sleep-related groaning is a prolonged vocalization that can occur during either NREM or REM sleep.
- Exploding head syndrome is a sensation of a sudden loud noise or explosive feeling within the head on falling asleep or during an awakening from sleep.
- Sleep-related hallucinations are hallucinations that occur on falling asleep or on awakening.
- Sleep-related eating disorder is characterized by recurrent episodes of arousals from sleep with involuntary eating or drinking. Patients may have several episodes during the night, typically eat foods that they would not eat during the day and may injure themselves by cooking during sleep.

## **Sleep-Related Movement Disorders**

Sleep-related movement disorders include restless legs syndrome (RLS) and periodic limb movement disorder (PLMD).

### **Restless Legs Syndrome**

RLS is a neurologic disorder characterized by uncomfortable or odd sensations in the leg that usually occur during periods of relaxation, such as while watching television, reading, or attempting to fall asleep. Symptoms occur primarily in the evening. The sensations are typically described as creeping, crawling, itchy, burning, or tingling. There is an urge to move in an effort to relieve these feelings, which may be partially relieved by activities such as rubbing or slapping the leg, bouncing the feet, or walking around the room.

### **Periodic Limb Movement Disorder**

Periodic limb movements are involuntary, stereotypic, repetitive limb movements during sleep, which most often occur in the lower extremities, including the toes, ankles, knees, and hips, and occasionally in the upper extremities. The repetitive movements can cause fragmented sleep architecture, with frequent awakenings, a reduction in slow-wave sleep and decreased sleep efficiency, leading to excessive daytime sleepiness. PLMD alone is thought to be rare because periodic limb movements are typically associated with RLS, RBD, or narcolepsy and represent a distinct diagnosis from PLMD.<sup>3</sup>

## **Diagnosis**

PSG is a recording of multiple physiologic parameters relevant to sleep. The standard full polysomnogram includes:

- Electroencephalography to differentiate the various stages of sleep and wake,
- Chin electromyography and electrooculography to assess muscle tone and detect REM sleep,
- Respiratory effort, airflow, blood oxygen saturation (oximetry), and electrocardiography to assess apneic events,
- Anterior tibialis electromyogram to assess periodic limb movements during sleep, and
- Videorecording to detect any unusual behavior.

This review addresses PSG for non-respiratory sleep disorders, which include the hypersomnias (eg, narcolepsy), parasomnias, and movement disorders (eg, RLS, PLMD).

### **Regulatory Status**

A large number of PSG devices have been approved since 1986. U.S. Food and Drug Administration product code: OLV.

### **Rationale**

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This evidence review was created in August 2015 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through April 30, 2018.

This review was informed by evidence examined by the American Academy of Sleep Medicine (AASM).[1,2,4,5](#)

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

## **HYPERSOMNIAS, PARASOMNIAS, AND SLEEP-RELATED MOVEMENT**

### **Clinical Context and Therapy Purpose**

The purpose of polysomnography (PSG) testing in patients who have hypersomnias (eg, narcolepsy), parasomnias (eg, sleep terrors, sleepwalking, rapid eye movement [REM] behavior disorder [RBD]), and sleep-related movement disorders (eg, restless legs syndrome [RLS], periodic limb movement disorder [PLMD]) is to inform a diagnosis and proceed to appropriate treatment.

The question addressed in this evidence review is: Does PSG testing improve the diagnosis and health outcomes of patients who have hypersomnias, parasomnias, and sleep-related movement disorders?

The following PICOTS were used to select literature to inform this review.

### ***Patients***

The relevant populations of interest are those with hypersomnias (eg, narcolepsy), parasomnias (eg, sleep terrors, sleepwalking, RBD), or sleep-related movement disorders (eg, RLS, PLMD).

### ***Interventions***

The therapy being considered is PSG.

### ***Comparators***

The following practice is currently being used: clinical diagnosis alone.

### ***Outcomes***

The general outcome of interest is to rule in or rule out disease status, which would result in appropriate treatment management to prevent future morbid events.

### ***Timing***

PSG is performed at the time of a clinical assessment of nonrespiratory-related sleep disorders and results are available for interpretation at the conclusion of the study(ies).

### ***Setting***

PSG would be conducted in a sleep lab, which could be attached to a hospital or clinic.

### ***Technically Reliable***

Assessment of technical reliability focuses on specific tests and operators and requires review of unpublished and often proprietary information. Review of specific tests, operators, and unpublished data are outside the scope of this evidence review and alternative sources exist. This evidence review focuses on the clinical validity and clinical utility.

### ***Hypersomnia***

#### ***Clinically Valid***

A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

Evidence reviewed by Chesson et al (1997) for AASM included a data on 1602 patients, of whom 176 patients had narcolepsy, and 1426 had other sleep disorders.<sup>5</sup> However, 7% of obstructive sleep apnea patients and 5% of other

sleep disorders patients had 2 sleep-onset REMs on a multiple sleep latency test (MSLT), leading to a low predictive value for narcolepsy. No data were found that validated the maintenance of wakefulness test (which measures a patient's ability to stay awake in a quiet sleep-inducing environment), limited or partial PSG, portable recording, isolated MSLT, or separately performed PSG and MSLT as an alternative to the criterion standard of nocturnal PSG with an MSLT on the day following the diagnosis of narcolepsy. An evidence review by Kushida et al (2005), also for AASM, found that the presence of 2 or more early sleep-onset latency episodes was associated with a sensitivity of 78% and specificity of 93% for the diagnosis of narcolepsy.<sup>1</sup>

### ***Clinically Useful***

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Based on the evidence reviewed, the updated 2005 AASM guidelines indicated that PSG should be used to rule out other potential causes of sleepiness followed by an MSLT to confirm the clinical impression of narcolepsy. These tests assume greater significance if cataplexy is lacking. In the absence of cataplexy and when there are one or more of the other symptoms, the laboratory criteria are required to establish the diagnosis of narcolepsy.

### ***Section Summary: Hypersomnia***

Evidence from a systematic review has indicated that, in patients suspected of having hypersomnia, nocturnal PSG should be used to rule out other sleep disorders that may cause daytime sleepiness. After excluding other sleep disorders with nocturnal PSG or a portable sleep study, short sleep latency in an MSLT has high specificity for the diagnosis of hypersomnia.

## **Parasomnias**

### ***Typical or Benign Parasomnia***

Evidence reviewed by Chesson et al (1997) for AASM indicated that typical sleepwalking or sleep terrors, with onset in childhood, a positive family history, occurrence during the first third of the night, amnesia for the events, prompt return to sleep following the events, and relatively benign automatistic behaviors, may be diagnosed on the basis of their historical clinical features.<sup>5</sup> This conclusion was based on very consistent descriptive literature (case series and cohort studies).

### ***Section Summary: Typical or Benign Parasomnia***

The evidence on the diagnosis of typical or benign parasomnias includes a systematic review of case series and cohort studies. This evidence has shown that PSG does not provide additional diagnostic information beyond what can be obtained from historical clinical features.

## ***Violent or Potentially Injurious Parasomnia***

### *Clinically Valid*

A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

When events are not typical of benign partial arousals and where other diagnoses, prognoses, and interventions should be considered, PSG was recommended by Chesson et al (1997) and supported by AASM. This evidence review included only 3 articles on disorders of arousal and 2 articles for RBD that included comparison data for normal controls.<sup>5</sup> Most articles supporting the utility of PSG were limited by biases inherent in uncontrolled clinical reports. Evidence reviewed by Aurora et al (2010) for an AASM best practice guideline indicated that sleep-related injuries are a significant portion of the morbidity in RBD, with a prevalence in diagnosed RBD patients ranging from 30% to 81%.<sup>2</sup> Types of injuries ranged from ecchymoses and lacerations to fractures and subdural hematomas, with ecchymoses and lacerations being significantly more common than fractures. In a series of 92 patients, 64% of the bed partners sustained punches, kicks, attempted strangulation, and assault with objects. Minimal diagnostic criteria for RBD requires the presence of REM sleep without atonia, defined as sustained or intermittent elevation of submental electromyogram tone or excessive phasic muscle activity in the limb electromyogram.<sup>2</sup> Two clinical series with over 100 patients each with various parasomnias found that PSG had an overall diagnostic yield in 65% and 91% of cases. In a systematic review assessing the diagnosis of RBD, Neikrug and Ancoli-Israel (2012) reported that diagnostic accuracy increases when combining the use of clinical history and video PSG to document the intermittent or sustained loss of muscle atonia or the actual observation of RBD occurrences.<sup>6</sup>

### *Clinically Useful*

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

The need for PSG was also indicated in a review of parasomnias by Goldstein (2011), who concluded that, although RBD is the only parasomnia requiring PSG for diagnosis, PSG may be needed to rule out another sleep pathology, such as sleep-disordered breathing or PLMs of sleep, that might cause a parasomnia.<sup>7</sup>

### *Section Summary: Violent or Potentially Injurious Parasomnia*

The evidence on the use of PSG for diagnosing violent or potentially injurious parasomnia includes many series and a systematic review of nonrandomized comparative studies. The large series showed a high diagnostic yield for video PSG in cases with a violent or potentially injurious parasomnia based on clinical history. Clinical utility is based on the importance of excluding other sleep disorders and appropriate interventions in patients who exhibit REM sleep without atonia.

## **Sleep-Related Movement Disorder**

### ***Restless Legs Syndrome***

#### *Clinically Valid*

A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

The 4 cardinal diagnostic features of RLS include (1) an urge to move the limbs (this is usually associated with paresthesias or dysesthesias), (2) symptoms that start or worsen with rest, (3) at least partial relief of symptoms with physical activity, and (4) worsening of symptoms in the evening or at night.<sup>3</sup> Evidence reviewed by AASM included a case-control study that found RLS patients, when compared with controls, had reduced total sleep time, reduced sleep efficiency, prolonged sleep latencies, decreased slow-wave sleep, and increased nocturnal awakening.

#### *Clinically Useful*

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Because the principal symptoms of RLS occur during wake, RLS does not require PSG for diagnosis, except where uncertainty exists in the diagnosis.<sup>1,5</sup> RLS frequently also has a primary motor symptom that is characterized by the occurrence of PLMs during sleep. PLMs occur in 80% to 90% of patients who have RLS and support the diagnosis of RLS.

#### *Section Summary: Restless Legs Syndrome*

A case-control study has shown that RLS impairs PSG measures of sleep; however, the principle symptoms of RLS occur during wake and, therefore, the disorder does not require PSG for diagnosis.

### ***Periodic Limb Movement Disorder***

PLMD can be diagnosed in the following cases: during PSG; during a subjective perception of poor sleep in the absence of RLS; or during a sleep-related breathing disorder.<sup>3</sup>

The evidence reviewed by Chesson et al (1997) for AASM suggested difficulty in diagnosing PLMD without PSG.<sup>5</sup> In a series of 123 patients evaluated for chronic insomnia, a PLMD diagnosis was confirmed in 5 patients and discovered with PSG in another 10 patients. The PLMD scale from a sleep questionnaire had low sensitivity and specificity. Actigraphy, evoked potentials, and blink reflexes have been found to have little diagnostic specificity or utility. PSG-based diagnosis of PLMD correlated best with frequent awakening at night. In a series of 1171 patients who had PSG at 1 sleep disorders center, 67 (6%) patients had PLMD as the primary and sole sleep diagnosis. The mean sleep efficiency was 53%, and

daytime sleepiness was reported by 60% of the cohort. The PLMD patients reported disturbed sleep during a mean of 4 nights per week for a mean of 7 years.

### *Section Summary: Periodic Limb Movement Disorder*

The evidence for use of PSG for diagnosing PLMD includes a systematic review that concluded the diagnosis of PLMD is difficult without PSG. The review found low diagnostic accuracy of a sleep questionnaire or actigraphy, while a PSG-based diagnosis of PLMD correlated best with awakening at night.

## **Summary of Evidence**

### **Hypersomnia**

For individuals who have suspected hypersomnia who receive PSG, the evidence includes a systematic review on diagnostic accuracy. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. The evidence has suggested that PSG followed by the multiple sleep latency test is associated with moderate sensitivity and high specificity in support of the diagnosis of narcolepsy. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

### **Parasomnias**

For individuals who have typical or benign parasomnia who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. The evidence has suggested that typical and benign parasomnias (eg, sleepwalking, sleep terrors) may be diagnosed on the basis of their clinical features and do not require PSG. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

For individuals who have violent or potentially injurious parasomnia who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. For the diagnosis of REM sleep behavior disorder, the combined use of clinical history and PSG to document the loss of muscle atonia during REM sleep increases diagnostic accuracy and is considered the criterion standard for diagnosis. Diagnostic accuracy is increased with videorecording during PSG to assess parasomnias such as REM sleep behavior disorder. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

### **Sleep-Related Movement Disorders**

For individuals who have restless legs syndrome who receive PSG, the evidence includes systematic reviews of studies on diagnostic accuracy and controlled cohort studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. Restless legs syndrome does not require PSG because the syndrome is a sensorimotor disorder, the symptoms of which occur

predominantly when awake; therefore, PSG results are generally not useful. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

For individuals who have periodic limb movement disorder who receive PSG, the evidence includes a systematic review. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. PSG with electromyography of the anterior tibialis is the only method available to diagnose periodic limb movement disorder, but this sleep-related movement disorder is rare and should only be evaluated using PSG in the absence of symptoms of other disorders. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

## Supplemental Information

### Practice Guidelines and Position Statements

In 2005, the American Academy of Sleep Medicine (AASM) published practice parameters for polysomnography (PSG) and related procedures.<sup>1</sup> AASM made the following recommendations on the use of PSG for nonrespiratory indications (see Table 1).

**Table 1. Practice Parameters on PSG for Nonrespiratory Indications**

<b>Recommendation</b>	<b>Grade</b>
<b>Polysomnography and a multiple sleep latency test performed on the day after the polysomnographic evaluation are routinely indicated in the evaluation of suspected narcolepsy</b>	Standard
<b>Common, uncomplicated, noninjurious parasomnias, such as typical disorders of arousal, nightmares, enuresis, sleeptalking, and bruxism, can usually be diagnosed by clinical evaluation alone</b>	Standard
<b>Polysomnography is not routinely indicated in cases of typical, uncomplicated, and noninjurious parasomnias when the diagnosis is clearly delineated</b>	Option
<b>A clinical history, neurologic examination, and a routine EEG obtained while the patients is awake and asleep are often sufficient to establish the diagnosis and permit the appropriate treatment of a sleep-related seizure disorder. The need for a routine EEG should be based on clinical judgment and the likelihood that the patient has a sleep-related seizure disorder.</b>	Option
<b>Polysomnography is not routinely indicated for patients with a seizure disorder who have no specific complaints consistent with a sleep disorder</b>	Option
<b>Polysomnography is indicated when evaluating patients with sleep behaviors suggestive of parasomnias that are unusual or atypical because of the patient's age at onset; the time, duration or frequency of occurrence of the behavior; or the specifics of the particular motor patterns in question</b>	Guideline
<b>Polysomnography ... is indicated in evaluating sleep-related behaviors that are violent or otherwise potentially injurious to the patient or others</b>	Option
<b>Polysomnography may be indicated in situations with forensic considerations (e.g., if onset follows trauma or if the events themselves have been associated with personal injury)</b>	Option
<b>Polysomnography may be indicated when the presumed parasomnia or sleep-related seizure disorder does not respond to conventional therapy</b>	Option
<b>Polysomnography is indicated when a diagnosis of periodic limb</b>	Standard

<b>Recommendation</b>	<b>Grade</b>
<b>movement disorder is considered because of complaints by the patient or an observer of repetitive limb movement during sleep and frequent awakenings, fragmented sleep, difficulty maintaining sleep, or excessive daytime sleepiness</b>	
<b>Intra-individual night-to-night variability exists in patients with periodic limb movement sleep disorder, and a single study might not be adequate to establish this diagnosis</b>	Option
<b>Polysomnography is not routinely indicated to diagnose or treat restless legs syndrome, except where uncertainty exists in the diagnosis</b>	Standard
<b>Polysomnography is not routinely indicated for the diagnosis of circadian rhythm sleep disorders</b>	Standard

EEG: electroencephalography.

In 2017, AASM updated its practice parameters on PSG.<sup>8</sup> The update made few recommendation changes to this review. For narcolepsy, the guidelines note that a clinical history, sleep diaries, PSG, and a MSLT are key items in the evaluation of the disorder.

In 2012, AASM published practice parameters on nonrespiratory indications for PSG and multiple sleep latency testing in children.<sup>4</sup> Table 2 lists recommendations for PSG and multiple sleep latency testing.

**Table 2. Practice Parameters on PSG for Nonrespiratory Indications in Children**

<b>Recommendation</b>	<b>Grade</b>
<b>PSG is indicated for children suspected of having PLMD for diagnosing PLMD</b>	Standard
<b>The MSLT, preceded by nocturnal PSG, is indicated in children as part of the evaluation for suspected narcolepsy</b>	Standard
<b>Children with frequent NREM parasomnias, epilepsy, or nocturnal enuresis should be clinically screened for the presence of comorbid sleep disorders, and polysomnography should be performed if there is a suspicion for sleep-disordered breathing or periodic limb movement disorder</b>	Guideline
<b>The MSLT, preceded by nocturnal PSG, is indicated in children suspected of having hypersomnia from causes other than narcolepsy to assess excessive sleepiness and to aid in differentiation from narcolepsy</b>	Option
<b>The polysomnogram using an expanded EEG montage is indicated in children to confirm the diagnosis of an atypical or potentially injurious parasomnia or differentiate a parasomnia from sleep-related epilepsy when the initial clinical evaluation and standard EEG are inconclusive</b>	Option
<b>Polysomnography is indicated in children suspected of having RLS who require supportive data for diagnosing RLS</b>	Option
<b>Polysomnography is not routinely indicated for evaluation of children with sleep-related bruxism</b>	Standard

EEG: electroencephalography; MSLT: multiple sleep latency test; NREM: non-rapid eye movement; PLMD: periodic limb movement disorder; PSG: polysomnography; RLS: restless legs syndrome.

AASM issued practice parameter in 2012 on the treatment of restless legs syndrome (RLS) and periodic limb movement disorder in adults.<sup>3</sup> The practice parameter noted different treatment efficacy measures are used to assess RLS due to its multifaceted nature. Measures included a number of subjective scales; the

only objective measurements were sleep-related parameters by PSG or actigraphy.

AASM issued best practice guide in 2010 on the treatment of nightmare disorders in adults (classified as a parasomnia).<sup>9</sup> AASM stated that overnight PSG is not routinely used to assess nightmare disorder but may be used to exclude other parasomnias or sleep-disordered breathing. PSG may underestimate the incidence and frequency of posttraumatic stress disorder–associated nightmares.

AASM issued best practice guide in 2010 on the treatment of rapid eye movement (REM) sleep behavior disorder (RBD).<sup>2</sup> Minimal diagnostic criteria for RBD included:

- “A) Presence of R[EM] sleep without atonia, defined as sustained or intermittent elevation of submental EMG [electromyographic] tone or excessive phasic muscle activity in the limb EMG [electromyography] ...;
- B) At least 1 of the following:
  - 1) Sleep related injurious or potentially injurious disruptive behaviors by history;
  - 2) Abnormal R[EM] behaviors documented on polysomnogram (PSG);
- C) Absence of epileptiform activity during R[EM] sleep unless RBD can be clearly distinguished from any concurrent R[EM] sleep-related seizure disorder;
- D) Sleep disturbance not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use, or substance use disorder.”

## U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS

Not applicable.

### Medicare National Coverage

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

### Ongoing and Unpublished Clinical Trials

Some currently unpublished trials that might influence this review are listed in Table 3.

**Table 3. Summary of Key Trials**

NCT No.	Trial Name	Planned Enrollment	Completion Date
<b>Ongoing</b>			
<b>NCT03047408</b>	Evolution of REM Sleep Behavior Disorder in Parkinson's Disease Patients RBD Diagnosed Three Years Earlier	50	Jun 2019

NCT: national clinical trial.

References

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**Billing Coding/Physician Documentation Information**

- 95805** Multiple sleep latency or maintenance of wakefulness testing, recording, analysis and interpretation of physiological measurements of sleep during multiple trials to assess sleepiness
- 95808** Polysomnography; any age, sleep staging with 1-3 additional parameters of sleep, attended by a technologist
- 95810** Polysomnography; age 6 years or older, sleep staging with 4 or more additional parameters of sleep, attended by a technologist
- 95811** Polysomnography; age 6 years or older, sleep staging with 4 or more additional parameters of sleep, with initiation of continuous positive airway pressure therapy or bilevel ventilation, attended by a technologist
- 95782** Polysomnography; younger than 6 years, sleep staging with 4 or more additional parameters of sleep, attended by a technologist
- 95783** Polysomnography; younger than 6 years, sleep staging with 4 or more additional parameters of sleep, with initiation of continuous positive airway pressure therapy or bi-level ventilation, attended by a technologist

**ICD-10 Codes**

- G47.411, G47.419** Narcolepsy code range
- G47.50- G47.59** Parasomnia code range
- G47.61** Periodic limb movement disorder

## **Additional Policy Key Words**

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PSG

## **Policy Implementation/Update Information**

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10/1/2015 New Policy. Considered medically necessary under specified conditions.  
10/1/16 No policy statement changes.  
10/1/17 No policy statement changes.  
10/1/18 No policy statement changes.

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