Subject: Split Night Sleep Studies for CPAP Titration for Obstructive Sleep Apnea Syndrome (OSAS)		Original Effective Date: 4/2/14
Guidance Number: MCG-159	**Revision Date(s):**	
Medical Coverage Guidance Approval Date: 4/2/14		

PREFACE

This Medical Guidance is intended to facilitate the Utilization Management process. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (i.e., will be paid for by Molina) for a particular member. The member's benefit plan determines coverage. Each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their providers will need to consult the member's benefit plan to determine if there are any exclusions or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid members. CMS's Coverage Database can be found on the following website: http://www.cms.hhs.gov/center/coverage.asp.

FDA INDICATIONS

Split-night sleep study for CPAP titration is a procedure and, therefore, not subject to FDA regulation. Polysomnographs are regulated by the FDA as Class II devices and are classified under product code **OLV** (standard polysomnograph with electroencephalograph). There are numerous 510(k) marketing clearances for devices classified with this code; however, not all of these clearances are for devices cleared for split-night sleep studies. [3]

CENTERS FOR MEDICARE AND MEDICAID SERVICES (CMS)

The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this Molina medical coverage guidance (MCG) document and provide the directive for all Medicare members. The directives from this MCG document may be followed if there are no available NCD or LCD documents available and outlined below.

CMS has a National Coverage Determination (NCD) for sleep testing for obstructive sleep apnea syndrome (OSAS), # 240.4 [1] however, there is no specific mention of split-night sleep testing. Indications for coverage found in this NCD include the following:

- Type I polysomnography (PSG) is covered when used to aid the diagnosis of OSAS in beneficiaries who have clinical signs and symptoms indicative of OSAS if performed attended in a sleep laboratory facility.
- Type II or type III sleep testing devices are covered when used to aid the diagnosis of OSAS in beneficiaries who have clinical signs and symptoms indicative of OSAS if performed unattended in or out of a sleep laboratory facility or attended in a sleep laboratory facility.

- Type IV sleep testing devices measuring three or more channels, one of which is airflow, are covered when used to aid the diagnosis of OSAS in beneficiaries who have signs and symptoms indicative of OSAS if performed unattended in or out of a sleep laboratory facility or attended in a sleep laboratory facility.
- Sleep testing devices measuring three or more channels that include actigraphy, oximetry, and peripheral arterial tone (PAT) are covered when used to aid the diagnosis of OSAS in beneficiaries who have signs and symptoms indicative of OSAS if performed unattended in or out of a sleep laboratory facility or attended in a sleep laboratory facility. [1]

CMS has a National Coverage Determination (NCD) for Continuous Positive Airway Pressure (CPAP) Therapy for Obstructive Sleep Apnea (OSA). NCD #240.4. [24]

INITIAL COVERAGE CRITERIA

Molina Healthcare considers split-night in-laboratory polysomnography as a first line diagnostic test to be the preferred alternative to a two night polysomnogram test.

Split-night Criteria:

1. A split-night in-laboratory polysomnogram (PSG) [CPT code 95811] in which the initial diagnostic portion of the polysomnography is followed by positive airway pressure (PAP) titration may be considered medically necessary and authorized when ALL of the following criteria is met: [5 6 7 8 9 14 21] [ALL]
   - ❑ In adults who are 18 years of age or older; and
   - ❑ Diagnosis of suspected OSA [14] when at least two of the following symptoms are present: [TWO]:
     - snoring,
     - gasping or choking,
     - irregular breathing pattern; **OR**
   - ❑ Diagnosis of suspected OSA [14] with witnessed sleep disturbances and one of the following symptoms are present: [ONE]
     - hypersomnolence;
     - fatigue;
     - moodiness; or
     - morning headaches; **OR**
   - ❑ Unexplained hypersomnolence [14] for more than 8 weeks with documented symptoms that interfere with activities of daily living (ADLs); and
   - ❑ Performed in an American Academy of Sleep Medicine (AASM) accredited sleep facility [8]: [ALL]
     - using Type 1 attended polysomnography; and
     - by a registered sleep technologist; and
     - the results must be reviewed by a board certified sleep specialist; and
   - ❑ An apnea hypopnea index (AHI) of ≥40 events per hour of sleep is documented during ≥2 hours of sleep; [5 6 9 21] **OR**

- ❑ Alternatively, an AHI of 20 to 39 events per hour of sleep is documented during ≥2 hours of sleep and there is strong supportive evidence of OSA (e.g., repetitive long obstructions with major desaturations); [5 6 9 21] and
- ❑ Positive airway pressure titration is conducted over ≥3 hours, since obstructive events can worsen as the night progresses; [8] and
- ❑ Elimination or near elimination of obstructive events with positive airway pressure is documented by PSG during rapid eye movement (REM) and non-REM (NREM) sleep. This should include REM sleep in the supine position, when apneas are most likely to occur. [8]

2. A second full night PSG* should be performed for titration of positive airway pressure when both of the following criteria are met:
   - ❑ The split night study is not able to conduct PAP titration over ≥ 3 hours; and
   - ❑ PAP has not been documented to eliminate or nearly eliminate respiratory events during REM and NREM sleep including during supine REM sleep [5 7 8]

***Note:** Use McKesson InterQual CP Procedures Polysomnogram Adult criteria for the second night PSG.

CONTINUATION OF THERAPY

N/A

COVERAGE EXCLUSIONS

Molina Healthcare considers all of the following services excluded for the diagnosis and evaluation of obstructive sleep apnea syndrome due to insufficient and unproven evidence in the peer reviewed literature:

- ❑ PAP-nap study [2 13 26]
- ❑ Actigraphy for the evaluation and diagnosis of obstructive sleep apnea [12]
- ❑ Multiple Sleep Latency Test (MSLT) for the evaluation and diagnosis of obstructive sleep apnea and/or PAP titration [21]
- ❑ Split-night sleep study for CPAP titration in members who are under the age of 18 years. [11 23]

DESCRIPTION OF PROCEDURE/SERVICE/PHARMACEUTICAL

Obstructive sleep apnea syndrome (OSAS)

Obstructive sleep apnea syndrome (OSAS) is a type of sleep-disordered breathing (SDB) that is characterized by either a partial reduction or complete cessation of airflow during sleep. Airflow obstruction arises when the muscles in the back of the throat fail to keep the airway open. These muscles support the soft palate, uvula, tonsils, and tongue. When the muscles relax too much, the airway narrows or closes during inhalation. Nocturnal respiration in patients with OSAS is characterized by apnea and hypopnea. Apnea refers to breathing cessation, whereas hypopnea is a marked reduction in breathing volume. The pauses in breathing typically last from 10 to 30 seconds in adults but may be longer, and can lead to blood oxygen levels falling to as low as 40% in severe cases. The brain responds to this oxygen deficit by briefly arousing the body from sleep to restore normal breathing, a pattern that can occur hundreds of times during a single night. Patients with apnea or hypopnea exhibit loud snoring followed by periods of silence, and then snorting, choking, or gasping upon continuation of breathing. This often leads to fragmented sleep and daytime sleepiness. The goal of obstructive

sleep apnea diagnosis is to identify patients with obstructive sleep apnea syndrome (OSAS), to establish the precise factors responsible for the apnea, and to determine the most appropriate strategy for treatment. Home sleep studies are used to diagnose OSAS without the need for a laboratory stay. [2 4]

Risk factors for OSA include obesity (body mass index [BMI] of more than 30; BMI equals weight in kilograms divided by height in meters squared), a neck circumference of 17 or more inches (43 cm) in a man and 16 or more inches (41 cm) in a woman, and nasopharyngeal crowding. Some patients with OSA exhibit retrognathia (posterior jaw position), micrognathia (small jaw), nasal obstruction, elongated uvula, enlarged tonsils, or some combination of these conditions. Common comorbid conditions include type 2 diabetes, hypertension, coronary artery disease, and other types of cardiovascular disease. The differential diagnosis includes hypothyroidism, central sleep apnea, narcolepsy, idiopathic hypersomnolence, sleep deprivation, circadian rhythm disorders, periodic limb movement disorder, nocturnal seizures, and parasomnias. [14]

Clinical features of obstructive sleep apnea (OSA) include any of the following: [7]

Awakening with choking Cardiac dysrhythmias Cardiovascular disease Cerebrovascular disease Changes in mood Cognitive deficits Cor pulmonale Daytime sleepiness	Floppy eyelid syndrome Gastroesophageal reflux Hypercapnia Insomnia with frequent awakenings Lack of concentration Large neck circumference Morning headaches Narrow or "crowded" airway	Nocturnal restlessness Nonrestorative sleep Obesity Polycythemia Pulmonary hypertension Systemic hypertension Vivid, strange, or threatening dreams Witnessed apneas by bed partner

OSA severity [29] is defined by the American Academy of Sleep Medicine (AASM) [6 9] in three categories:

- mild for AHI or RDI ≥ 5 and < 15
- moderate for AHI or RDI ≥ 15 and ≤ 30
- severe for AHI or RDI > 30/hr

This classification system corresponded to Current Procedural Terminology (CPT) codes. More recently devices have been developed that do not fit well within this classification scheme. In 2011 a new classification system was developed for out-of-center (OOC) testing devices that details the type of signals measured by these devices. This proposed system categorizes OOC devices based on measurements of Sleep, Cardiovascular, Oximetry, Position, Effort, and Respiratory (SCOPER) parameters. [28]

Diagnostic Testing for OSAS

Overnight, laboratory-based polysomnography (PSG) is the most commonly used test in the diagnosis of obstructive sleep apnea syndrome (OSAS). It is often considered the criterion standard for diagnosing OSAS,

determining the severity of the disease, and evaluating various other sleep disorders that can exist with or without OSAS. PSG consists of a simultaneous recording of multiple physiologic parameters related to sleep and wakefulness. PSG can directly monitor and quantify the number of respiratory events (ie, obstructive, central, or complex) and the resultant hypoxemia and arousals related to the respiratory events or even independent of the respiratory events. Assessment of sleep stages requires 3 studies: electroencephalography (EEG), electrooculography (EOG), and surface electromyography (EMG). Polysomnography includes monitoring oxygen saturation, heart rate, chest and abdominal respirations, airflow, eye movements, muscle activity, and the above three sleep parameters. Staging of the severity of sleep apnea can be accomplished by utilization of the apnea-hypopnea index (AHI). Respiratory disturbance index (RDI) is another term used to stage the severity of sleep apnea which includes the number of apneas and hypopneas, as well as the number of respiratory effort-related arousals per hour of sleep. If a sleep apnea syndrome is diagnosed, the patient undergoes a trial and titration of positive airway pressure either in a partial-night PSG titration study or in a second full-night PSG titration study. [2 4]

The American Academy of Sleep Medicine (AASM) has proposed four levels to classify the complexity of recording technology used for the diagnosis of sleep-related breathing disorders. Level I is polysomnography (PSG), where a minimum of seven parameters are measured, including electroencephalogram (EEG), electro-oculogram (EOG), chin electromyogram (EMG), electrocardiogram (ECG), airflow, respiratory effort, and oxygen saturation by pulse oximetry; there is also a technician in constant attendance. Level II studies measure the same parameters; however, a technician is not in constant attendance. Level III is a cardiorespiratory study in which a minimum of four parameters must be measured, including heart rate or ECG, oxygen saturation, and respiratory effort. Respiratory effort in this case is measured with at least two channels of respiratory movement or respiratory movement and airflow. As defined by the AASM, level IV devices measure a minimum of one parameter, usually oxygen saturation. [2 4]

A split-night study is most often performed using continuous positive airway pressure (CPAP), which allows the technologist to simultaneously increase both inspiratory and expiratory pressures throughout the polysomnography recording to determine the single fixed pressure that will eliminate respiratory disturbances during subsequent nightly usage at home. A bilevel positive airway pressure (BPAP) device may be used when a patient demonstrates difficulty acclimating to high airway pressure during the expiration phase of breathing. BPAP allows the sleep technologist to separately increase inspiratory or expiratory pressures during the polysomnography to arrive at two pressures for subsequent use in the home. [8]

An abbreviated cardiorespiratory sleep study, referred to as a PAP-nap study, has been proposed as a method to accustom patients to PAP and promote adherence to therapy. The PAP-nap study includes mask and pressure desensitization and therapy to overcome aversive emotional reactions, mental imagery, and physiologic exposure to PAP therapy during a nap period. There is insufficient evidence in the published medical literature to determine whether PAP-nap studies result in improved adherence to therapy of improved patient outcomes. [2]

GENERAL INFORMATION

Summary of Medical Evidence

There is sufficient published evidence for split-night sleep testing for CPAP titration in adults with OSA. The majority of the literature report positive findings for net health outcomes in adults. There is insufficient published evidence to evaluate this testing in children.

Chou et al. (2011) aimed to test the validity of partial-night PSG and to determine the optimum AHI cut-off points. 636 patients who visited the sleep centre at a tertiary medical centre between January and December 2008, for symptoms related to sleep disorders (sleepiness, snoring, sleep disturbance), and who completed full-night PSG, were evaluated for this study. Subjects older than 80 years or younger than eighteen years were excluded. Full-night PSG data were processed to obtain partial-night PSG data, from which AHI were computed as a reference for diagnosing severe OSA. Full-night and partial-night PSG data obtained over different recording times (expressed as x-h PSG, where xONL001831140 =1-6) were compared using receiver operating characteristic (ROC) curve analysis. The diagnostic validity of 2-h PSG with different AHI cut-off points (25/h to 45/h) was also calculated. Data from 198 PSG recordings was processed. For 2-h PSG, an AHI cut-off point of 30/h gave the highest accuracy of 90.9%. Comparing areas under the ROC curves (AUC), 2-h PSG (AUC=0.97) was as good as 2.5-h PSG (AUC=0.977, P=0.057) and 3-h PSG (AUC=0.978, P=0.125), but was better than 1.5-h PSG (AUC=0.955, P=0.016). The authors concluded that partial-night PSG is effective for diagnosing severe OSA. If there is an unabridged PSG recording indicating an AHI of ≥30/h for 2h, severe OSA can be diagnosed and PAP titration initiated. [15]

Khawaja et al. (2010) sought to determine the diagnostic accuracy of SN-PSG, including at the lower range of AHIs. 114 consecutive full-night PSGs (FN-PSG) performed at our center between August 2006 and November 2008 on subjects enrolled in studies in which obstructive sleep apnea (OSA) were included in this observational study. We compared the AHI from the first 2 hours (2 hr-AHI) and 3 hours (3 hr-AHI) of sleep with the "gold standard" AHI from FN-PSG (FN-AHI), considering OSA present if FN-AHI > or = 5. The 2 hr-AHI and 3 hr-AHI correlated strongly with the FN-AHI (concordance correlation coefficient [CCC] = 0.93 and 0.97, respectively). After adjusting for percentage of sleep in stage REM sleep and in supine position, the correlation of 2 hr- and 3 hr-AHI with FN-AHI remained strong (0.92 and 0.96, respectively). The area under the receiver operating curves (AUC) for 2 hr-AHI and 3 hr-AHI using FN-AHI > or = 5 were 0.93 and 0.95, respectively. The authors concluded that the AHI derived from the first 2 or 3 hours of sleep is of sufficient diagnostic accuracy to rule-in OSA at an AHI threshold of 5 in patients suspected of having OSA. This study suggests that the current recommended threshold for split-night studies (AHI > or = 20 to 40) may be revised to a lower number, allowing for more efficient use of resources. [16]

Collen et al (2010) sought to determine whether CPAP use, after a split-night examination, is comparable to the use following separate diagnostic and titration studies. 400 consecutive patients presenting for follow-up 4-6 weeks after initiating CPAP therapy were included in this observational study. Objective measures of CPAP use were recorded, and adherence to therapy was analyzed based on the initial method of diagnosis and titration-split-night versus dual-night study. A total of 400 patients (78% male, mean age 47 +/- 8 years) were included. Among the patients, 267 and 133 underwent split- and dual-night studies, respectively. The groups were similar at baseline; however, the average apnea-hypopnea index was significantly higher in the split-night group. Mean

number of days between diagnosis and titration in the dual-night group was 80.5 days. There was no difference in therapeutic adherence between groups as measured by percentage of nights used (78.7% vs. 77.5%; p = 0.42), hours per night used (3.9 vs. 3.9; p = 0.95), or percentage of patients using continuous positive airway pressure for >4 hours per night for >70% of nights (52.9% vs. 51.8%; p = 0.81). There was no difference in use after adjusting for severity of disease. The authors concluded that split-night polysomnography does not adversely affect short-term continuous positive airway pressure adherence in patients with obstructive sleep apnea. [17]

Patel et al (2007) studied the efficacy and cost-effectiveness of employing split-night polysomnography as a diagnostic and treatment strategy. The evidence assessing the split-night strategy is comprised predominantly of case series and case-control studies in patients with severe OSA. Based on this current evidence, split-night polysomnography appears to be a legitimate alternative to full-night diagnostic study followed by full-night titration study in specific settings. Patients with a high pretest probability for OSA are more likely to receive an accurate diagnosis and titration, especially if > 3 h of baseline sleep is recorded,25 although the AASM requires only 2 h of sleep and an AHI > 40/h. An absence of REM sleep and/or < 3 h of baseline sleep recorded can lead to significant underestimation of sleep apnea severity. Using cutoffs of AHI > 5/h or AHI > 10/h to represent low-to-moderate risk groups, respectively, the negative predictive value (approximately 60%) of a split-night study is inadequate to permit exclusion of sleep apnea as a diagnosis. Therefore, full-night polysomnography is required in clinically suspected cases. In addition, those patients who are unable to have an adequate titration (i.e., < 3 h of CPAP titration, inability to eliminate events during REM and non-REM, or lack of REM sleep during titration) should undergo a subsequent full-night titration. The authors concluded that split-night polysomnography is an acceptable mode of testing to facilitate the diagnosis and treatment of OSA in specific settings. [18]

Ciftci and colleagues (2008) compared the sleep and respiratory parameters during the first 3 hours of the night with the values found during the remainder of sleep and during the whole night. Forty-five patients were included in the study. Each patient underwent a standard full-night PSG and the PSG data for each patient were divided into 2 periods: PSG1, defined as the initial 3 hours of the total sleep time and PSG2, defined as the remaining period. Sleep and breathing data from PSG1 and PSG2 were then separately computed and compared with each other and with data for the total sleep time (PSGt). The percentage of total sleep time in stage III-IV and the apnea-hypopnea index (AHI) were significantly higher and the percentage of time in rapid eye movement (REM) sleep was significantly lower during PSG1 than during PSG2 (P< .001). Similarly, the percentage of time in stage III-IV sleep was significantly higher and the percentage of REM sleep was significantly lower during PSG1 than during PSGt (P< .001), but there was no significant difference in the AHI between PSG1 and PSGt. The authors concluded that the diagnosis for the first 3 hours of the night will give a reliable reflection of the whole night. In addition, optimal positive airway pressure titrated during the second half of the night is also optimal for the first half of the night. [19]

Jorquera and associates (2006) assessed if CPAP pressure can be adequately titrated in patients with OSA using a split-night polysomnography. One hundred fifty six patients with OSA were studied with split night polysomnography. CPAP pressure titration was considered adequate when there were less than five apnea/hypopnea episodes per hour, the registry time was more than 30 min, REM sleep occurred in more than 15% of the time and measurements were made in supine position. An adequate titration was achieved in 80% of patients. The variables associated with an adequate titration were a higher registry time during the titration period, a higher percentage of stage III/IV or REM sleep during such period and the comfort experienced by the patient during the study. On the other hand, patients with an inadequate titration had a longer basal registry period. The authors concluded that an adequate CPAP pressure can be prescribed to 80% of patients subjected to a split-night polysomnography. The basal registry period should not be longer than three hours, to allow an adequate titration lapse. [20]

Hayes, Cochrane, UpToDate

Hayes does not have a directory report on this topic but does have a technology brief report and two search & summary reports for split-night sleep study for CPAP titration in adults and children with obstructive sleep apnea. [10 11] The results presented in the majority of the literature report overall positive findings for health outcomes for split-night sleep testing for CPAP titration in adults with OSA. [10] There is insufficient published evidence to evaluate this testing in children. [11]

UpToDate has several topics on the diagnosis and treatment of OSA in adults and children. In adults split-night PSG testing provides accurate appraisal of disease severity and establishes the correct positive airway pressure in a single night in the majority of patients; appears to be cost effective; decreases health care costs, minimizes scheduling delays, and does not adversely affect compliance. [5] Split night protocols are not addressed in children. [24 25]

Professional Organizations

*American Association of Sleep Technologists (AAS*T) 2012 technical guideline: Split Night Protocols for Adults Patients indicate that a split-night PAP titration is indicated for patients who are diagnosed with severe OSA, which is defined as an AHI of at least 40 documented during a minimum of two (2) hours of diagnostic PSG. A split-night study may be considered in a patient with an AHI of 20 to 40, based on clinical judgment. [8]

The American Academy of Sleep Medicine's (AASM) practice parameters for polysomnography and related procedures (2005) [5 6 9] indicate that a split night study is a valid alternative to full night diagnostic PSG followed by a second full night of positive airway pressure titration, if the following three criteria are met:

- An apnea hypopnea index (AHI) of ≥40 events per hour of sleep is documented during ≥2 hours of sleep. Alternatively, an AHI of 20 to 39 events per hour of sleep is documented during ≥2 hours of

sleep and there is strong supportive evidence of OSA (egg, repetitive long obstructions with major desaturations).

- Positive airway pressure titration is conducted over ≥3 hours, since obstructive events can worsen as the night progresses.
- Elimination or near elimination of obstructive events with positive airway pressure is documented by PSG during rapid eye movement (REM) and non-REM (NREM) sleep. This should include REM sleep in the supine position, when apneas are most likely to occur.

A second full night PSG should be performed for titration of positive airway pressure if the second and third criteria are not met. [5] [6]

American Academy of Sleep Medicine (AASM): Clinical Guideline (2009) for the Evaluation, Management and Long-term Care of Obstructive Sleep Apnea in Adults [21] indicate that a full night PSG is recommended for the diagnosis of a sleep related breathing disorder but a split-night study may be performed if the AHI ≥ 40 per hour is documented in the first 2 hours of a diagnostic study or may be performed for an AHI of 20-40 per hour based on clinical judgment. [21]

American Academy of Sleep Medicine (AASM): Practice parameters (2010) for the respiratory indications for polysomnography in children indicate that Nap (abbreviated) polysomnography is not recommended for the evaluation of obstructive sleep apnea syndrome in children. Split-night PSG testing is not addressed. [26]

The American Academy of Pediatrics Clinical Practice Guideline (2012) Diagnosis and Management of Childhood Obstructive Sleep Apnea Syndrome indicate that all children/adolescents should be screened for snoring. Polysomnography should be performed in children/adolescents with snoring and symptoms/signs of OSAS; if polysomnography is not available, then alternative diagnostic tests or referral to a specialist for more extensive evaluation may be considered. Split-night PSG testing is not addressed. [27]

CODING INFORMATION

CPT	Description
95803	Actigraphy testing, recording, analysis, interpretation, and report (minimum of 72 hours to 14 consecutive days of recording) (**NOT COVERED for OSA)**
95805	Multiple sleep latency or maintenance of wakefulness testing, recording, analysis and interpretation of physiological measurements of sleep during multiple trials to assess sleepiness **(NOT COVERED for OSA)**
95807	Sleep study, simultaneous recording of ventilation, respiratory effort, ECG or heart rate, and oxygen saturation, attended by a technologist **(use modifier 52 for theNAP study) NOT Covered for OSA**
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. [split night study]

HCPCS	Description

	N/A

ICD-9	Description
327.23	Obstructive sleep apnea (adult)(pediatric)

ICD-10	Description
G47.33	Obstructive sleep apnea (adult)(pediatric)

RESOURCE REFERENCES

1. Centers for Medicare & Medicaid Services (CMS). Medicare Coverage Database. National Coverage Determination (NCD) for Sleep Testing for Obstructive Sleep Apnea (OSA) (240.4.1). Effective March 3, 2009. Accessed at: http://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=330&ncdver=1&DocID=240.4.1&TAId=24&bc=gAAAAAgAAAAAAA%3d%3d&
2. Hayes Medical Technology Directory. Home Sleep Studies for Diagnosis of Obstructive Sleep Apnea Syndrome in Patients Younger Than 18 Years of Age. Winifred Hayes Inc. Lansdale, PA. Oct 2012. Updated Oct 29, 2013.
3. Center for Devices and Radiological Health (CDRH). 510(k) Premarket Notification Database [search: Product Code MNR]. Accessed at: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm/pmn.cfm.
4. Hayes Medical Technology Directory. Home Sleep Studies for Diagnosis of Obstructive Sleep Apnea Syndrome in Adults. Winifred Hayes Inc. Lansdale, PA. Last updated May 2012.
5. UpToDate: [Website] Millman R, Kramer N. Polysomnography in obstructive sleep apnea in adult. Nov 2013.
6. Kushida CA, Littner MR, Morgenthaler T, et al. Practice parameters for the indications for polysomnography and related procedures: an update for 2005. Sleep 2005; 28:499. Accessed at: http://www.aasmnet.org/Resources/PracticeParameters/PP_Polysomnography.pdf
7. UpToDate: [Website] Kline L. Clinical presentation and diagnosis of obstructive sleep apnea in adults. Nov 2013.
8. American Association of Sleep Technologists (AAST) technical guideline: Split Night Protocols for Adults Patients. Updated July, 2012. Accessed at: http://www.aastweb.org/Resources/Guidelines/TGSpltNight.pdf
9. Epstein LJ, Kristo D. et al. American Academy of Sleep Medicine (AASM) clinical guideline Clinical Guideline for the Evaluation, Management and Long-term Care of Obstructive Sleep Apnea in Adults. J Clin Sleep Med. 2009;5(3):263-276. Access at: http://www.aasmnet.org/Resources/clinicalguidelines/OSA_Adults.pdf
10. Hayes Search & Summary. Split-Night Sleep Study for CPAP Titration in Adults with Obstructive Sleep Apnea. Winifred Hayes Inc. Lansdale, PA. Dec 11, 2013
11. Hayes Search & Summary. Split-Night Sleep Study for CPAP Titration in Children with Obstructive Sleep Apnea. Winifred Hayes Inc. Lansdale, PA. Dec 11, 2013

12. Hayes Medical Technology Directory. Actigraphy for Diagnosis of Circadian Rhythm Sleep Disorders. Winifred Hayes Inc. Lansdale, PA. Nov 2010, updated Nov 14, 2013.
13. Krakow B, Uibarri V et al. A Daytime, Abbreviated Cardio-Respiratory Sleep Study (CPT 95807–52) To Acclimate Insomnia Patients with Sleep Disordered Breathing to Positive Airway Pressure (PAP-NAP). J Clin Sleep Med. 2008 June 15; 4(3): 212–222. Accessed at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2546453/
14. McKesson InterQual Clinical Evidence Summary. Obstructive Sleep Apnea. 2013.
15. Chou KY, Chang YT et al. The minimum period of polysomnography required to confirm a diagnosis of severe obstructive sleep apnoea. Respirology. 2011 Oct;16(7):1096-102. doi: 10.1111/j.1440-1843.2011.02022.x. Accessed at: http://onlinelibrary.wiley.com/doi/10.1111/j.1440-1843.2011.02022.x/pdf
16. Khawaja IS, Olson EJ et al. Diagnostic accuracy of split-night polysomnograms. J Clin Sleep Med. 6 (4) (pp 357-362), 2010.
17. Collen J, Holley A et al. The impact of split-night versus traditional sleep studies on CPAP compliance. Sleep Breath. 14 (2) (pp 93-99), 2010.
18. Patel NP, Ahmed M, Rosen I. Split-night polysomnography. Chest. 132 (5) (pp 1664-1671), 2007. Accessed at: http://journal.publications.chestnet.org/article.aspx?articleid=1085480
19. Ciftci B, Ciftci TU, Guven SF. [Split-night versus full-night polysomnography: comparison of the first and second parts of the night]. Arch Bronconeumol. 2008 Jan;44(1):3-7.
20. Jorquera A J, Santín J, Godoy J. [Split night polysomnography to titrate continuous positive airway pressure therapy in adult patients with obstructive sleep apnea]. Rev Med Chil. 2006 Nov;134(11):1377-82. Epub 2007 Jan 2.
21. Epstein LJ, Kristo D, Strollo P et al. American Academy of Sleep Medicine (AASM) clinical guideline Clinical Guideline for the Evaluation, Management and Long-term Care of Obstructive Sleep Apnea in Adults. J Clin Sleep Med. 2009;5(3):263-276. Accessed at: http://www.aasmnet.org/Resources/clinicalguidelines/OSA_Adults.pdf
22. Centers for Medicare and Medicaid Services. National Coverage Determination for Continuous Positive Airway Pressure (CPAP) Therapy for Obstructive Sleep Apnea (OSA). NCD #240.4. Effective March 13, 2008.
23. Beck S, Marcus C. Pediatric polysomnography. Sleep Med Clin. 2009 September; 4(3): 393–406. Accessed at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2739664/
24. UpToDate: [Website]: Wise M, Glaze D. Assessment of sleep disorders in children. Nov 2013.
25. UpToDate: [Website]: Paruthi S. Evaluation of suspected obstructive sleep apnea in children. Nov 2013.
26. Aurora RN Zak RS et al. Practice parameters for the respiratory indications for polysomnography in children. SLEEP 2011;34(3):379-388. Accessed at: http://www.aasmnet.org/Resources/PracticeParameters/pppolysomnographychildren.pdf
27. Marcus C et al. The American Academy of Pediatrics Clinical Practice Guideline Diagnosis and Management of Childhood Obstructive Sleep Apnea Syndrome. Pediatrics Vol. 130 No. 3 September 1, 2012. pp. 576 -584 Accessed at: http://pediatrics.aappublications.org/content/130/3/576.long
28. Collop NA, Tracy SL, Kapur V, et al. Obstructive Sleep Apnea Devices for Out-Of-Center (OOC) Testing: Technology Evaluation. J Clin Sleep Med. 2011 Oct 15;7(5):531-48. Available at: http://www.aasmnet.org/Resources/PracticeParameters/Outofcenter.pdf.

29. UpToDate: [Website]: Kline L. Clinical presentation and diagnosis of obstructive sleep apnea in adults. Nov 2013.
30. Health Technology Brief. Split-Night Polysomnography for Continuous Positive Airway Pressure (CPAP) Titration in Adults with Obstructive Sleep Apnea. Winifred Hayes, Inc. March 19, 2014.
31. Advanced Medical Review (AMR): Policy reviewed by a practicing MD Board certified in Internal Medicine, Pulmonary Disease, Critical Care, Sleep Medicine. Jan 24, 2014