

## Sleep Disorder Treatment

<b>LOB(s):</b> <input checked="" type="checkbox"/> Commercial  <input checked="" type="checkbox"/> Medicare  <input checked="" type="checkbox"/> Medicaid	<b>State(s):</b> <input checked="" type="checkbox"/> Idaho <input checked="" type="checkbox"/> Montana <input checked="" type="checkbox"/> Oregon <input checked="" type="checkbox"/> Washington <input type="checkbox"/> Other:  <input checked="" type="checkbox"/> Oregon <input type="checkbox"/> Washington
--	---

### Enterprise Policy

PacificSource is committed to assessing and applying current regulatory standards, widely-used treatment guidelines, and evidenced-based clinical literature when developing clinical criteria for coverage determination. Each policy contains a list of sources (references) that serves as the summary of evidence used in the development and adoption of the criteria. The evidence was considered to ensure the criteria provide clinical benefits that promote patient safety and/or access to appropriate care. Each clinical policy is reviewed, updated as needed, and readopted, at least annually, to reflect changes in regulation, new evidence, and advancements in healthcare.

Clinical Guidelines are written when necessary to provide guidance to providers and members in order to outline and clarify coverage criteria in accordance with the terms of the Member's policy. This Clinical Guideline only applies to PacificSource Health Plans, PacificSource Community Health Plans, and PacificSource Community Solutions in Idaho, Montana, Oregon, and Washington. Because of the changing nature of medicine, this list is subject to revision and update without notice. This document is designed for informational purposes only and is not an authorization or contract. Coverage determinations are made on a case-by-case basis and subject to the terms, conditions, limitations, and exclusions of the Member's policy. Member policies differ in benefits and to the extent a conflict exists between the Clinical Guideline and the Member's policy, the Member's policy language shall control. Clinical Guidelines do not constitute medical advice nor guarantee coverage.

### Background

Common sleep disorders, such as Obstructive Sleep Apnea (OSA), Central Sleep Apnea (CSA), Mixed Sleep Apnea are associated with symptoms of excessive daytime sleepiness, metabolic dysfunction, impaired daytime function, and an increased risk of cardiovascular disease.

#### Classification of Obstructive Sleep Apnea:

- None/Minimal: AHI less than 5 episodes per hour of sleep
- Mild - AHI greater than or equal to 5 and less than 15 episodes per hour of sleep
- Moderate - AHI greater than or equal to 15 and less than 30 episodes per hour of sleep
- Severe - AHI greater than or equal to 30 episodes per hour of sleep

#### Treatment Options:

- CPAP/BiPAP: Nasal continuous positive airway pressure is the treatment of choice for most patients with OSA and subjective daytime sleepiness. CPAP improves upper airway patency by applying positive pressure to the collapsible upper airway segment.
- Oral appliances are designed to advance the mandible or, at the very least, prevent retrusion during sleep.

- Surgical treatment of OSA includes multiple procedures and approaches that enlarge and/or stabilize the upper airway. These procedures can be categorized as nasal, upper pharyngeal, lower pharyngeal and global upper airway procedures.

**NOTE:**

- Orthognathic procedures are subject to benefit book language and are not addressed in this policy.
- Hypopnea is an abnormal respiratory event lasting at least 10 seconds with at least a 30% reduction in thoracoabdominal movement or airflow as compared to baseline, and with at least a 4% oxygen desaturation.

## Criteria

---

### Commercial

#### Prior authorization is required

#### I. Non-surgical Treatment Options for Sleep Disorders

##### A. Oral Appliances

PacificSource considers oral appliances for the treatment of sleep disorders to be medically necessary when **ALL** of the following criteria is met:

1. Documentation of a recent Dental Exam (Within the last 12 months)
2. Apnea Hypopnea Index (AHI), Respiratory Event Index (REI) or Respiratory Disturbance Index (RDI) greater than 15 per nocturnal Polysomnogram (PSG) or Home Sleep Study Testing (HST) that has been completed within the past 5 years. (As defined by Hypopnea definition listed in background)

**OR**

3. Apnea Hypopnea Index, Respiratory Event Index or Respiratory Disturbance Index  $\geq 5$  and  $\leq 15$  events per hour (As defined by Hypopnea definition listed in background) **AND ONE** of the following associated symptoms:
  - a. Excessive daytime sleepiness, as documented by a score of  $\geq 10$  on the Epworth Sleepiness Scale
  - b. Documentation of one of the following:
    - Impaired cognition
    - Mood disorders
    - Hypertension
    - Ischemic heart disease
    - History of stroke

**AND**

4. Prescription or referral from one of the following:
  - a. Internal Medicine Physician
  - b. Neurologist

- c. Otolaryngologist
- d. Pulmonologist
- e. Primary Care Provider
- f. Certified Sleep Specialist, who must be one of the following:
  - Diplomats of the American Board of Sleep Medicine (D, ABSM)
  - Member of the American Academy of Sleep Medicine (AASM)
  - Certified by the American Academy of Dental Sleep Medicine
  - Subspecialty certification from the American Board of Pediatrics, American Board of Family Medicine or American Board of Psychiatry and Neurology.

**B. Reimbursement / Limits related to Consultations or Office Visits for Oral Appliances or Devices**

1. May be billed separately:
  - One (1) new patient consultation office visit
  - One (1) new patient exam office visit
2. May **NOT** be billed separately (included/bundled as part of reimbursement of appliance):
  - Up to three (3) follow-up office visits for appliance adjustments or fittings
  - Any requests for additional follow-up visits for appliance adjustments, beyond 3 visits require a prior authorization and Dental Director medical necessity review

**II. Surgical Treatment Options for Sleep Disorders**

**A. Palatopharyngoplasty**

PacificSource considers the following surgical treatment types of Palatopharyngoplasty (e.g., uvulopalatopharyngoplasty (UPPP), uvulopharyngoplasty, uvulopalatal flap, expansion pharyngoplasty, lateral pharyngoplasty, transpalatal advancement pharyngoplasty, relocation pharyngoplasty) to be medically necessary for OSA when **ALL** of the following criteria is met:

1. OSA diagnosis documented by a Polysomnogram with an Apnea Hypopnea Index or Respiratory Event Index of at least 15, and/or sustained oxygen desaturation of 85% or less during apneic episodes
2. Documentation that non-surgical alternatives such as CPAP, have been attempted with inadequate response or intolerance (e.g., claustrophobia, difficulty tolerating pressure, inability to sleep with CPAP device, intolerance of nasal or mouth interface, nasal irritation, or repeated removal of CPAP unintentionally during sleep)

**B. Hyoid Myotomy and Suspension**

PacificSource considers hyoid myotomy and suspension to be medically necessary when **ALL** of the following criteria is met:

1. The diagnosis of OSA is based on **ONE** of the following:
  - a. Apnea Hypopnea Index or Respiratory Disturbance Index  $\geq$  15 events per hour (As defined by Hypopnea definition listed in background)

**OR**

2. Apnea Hypopnea Index or Respiratory Disturbance Index  $\geq 5$  (As defined by Hypopnea definition listed in background) **AND**  $\leq 15$  events per hour with documentation demonstrating any of the following symptoms or conditions:
  - Excessive daytime sleepiness, as documented by either a score of greater than 10 on the Epworth Sleepiness Scale
  - Impaired cognition or mood disorders
  - Hypertension
  - Ischemic heart disease or history of stroke
  - Cardiac arrhythmias
  - Pulmonary hypertension
3. Member has a minimum of one month of CPAP monitoring documentation that demonstrates CPAP failure (e.g., Apnea Hypopnea Index  $> 15$  despite CPAP usage) or CPAP intolerance (e.g.,  $< 4$  hours per night, 5 nights per week) (As defined by Hypopnea definition listed in background)
4. Objective evidence of soft tissue and/or tongue base abnormalities with airway collapse
5. Member is 18 years of age or older, or there is documentation that skeletal growth is complete

### **C. Drug-induced Sleep Endoscopy (DISE)**

The Drug-induced Sleep Endoscopy (DISE) is performed to evaluate the appropriateness of hypoglossal nerve stimulation.

PacificSource considers the use of Drug-induced Sleep Endoscopy medically necessary when **ALL** the following criteria is met:

1. Suspected multi-level of obstruction (e.g., palate, oropharynx, tongue base, and epiglottis)
2. When criteria for Hypoglossal Nerve Stimulation (below #1-8) is met

### **D. Hypoglossal Nerve Stimulation**

PacificSource considers a hypoglossal nerve stimulation (e.g., Inspire II System) to be medically necessary when **ALL** of the following is met:

1. Diagnosis of obstructive sleep apnea (OSA)
2. Member is 18 years of age or older
3. Body mass index (BMI) is less than 32 kg/m<sup>2</sup>
4. A Polysomnography (PSG) is performed within 24 months of first consultation for Inspire implant
5. Member has predominantly obstructive events (defined as central and mixed apneas less than 25% of the total AHI)
6. Apnea Hypopnea Index (AHI) is 15 to 65 events per hour (As defined by Hypopnea definition listed in background)

7. Member has a minimum of one month of CPAP monitoring documentation that demonstrates CPAP failure (e.g., Apnea Hypopnea Index > 15 despite CPAP usage) or CPAP intolerance (e.g., < 4 hours per night, 5 nights per week)
8. No other anatomical findings that would compromise performance of device (e.g., tonsil size 3 or 4 per tonsillar hypertrophy grading scale)
9. Absence of complete concentric collapse at the soft palate level as seen on a Drug Induced Sleep Endoscopy procedure

**Exclusions:**

Member benefit books may not include coverage for any treatment or surgical procedures for a diagnosis of snoring and/or upper airway resistance disorders.

Imaging or radiographic studies are excluded for sleep apnea treatment (e.g., Orthopantomogram panoramic x-ray).

**Medicaid**

PacificSource Community Solutions follows Guideline Note 27 of the Oregon Health Plan (OHP) Prioritized List of Health Services and per Oregon Administrative Rules (OAR) 410-122-0202 & 410-122-0205 for Treatment of Sleep Apnea.

**Medicare**

PacificSource Medicare follows Local Coverage Determination L33611 for Oral Appliances and L33718 for Positive Airway Pressure Devices for the treatment of Obstructive Sleep Apnea.

PacificSource Medicare follows Local Coverage Determination L34526 for the Surgical Treatment of Obstructive Sleep Apnea.

PacificSource Medicare follows L38312 for Hypoglossal Nerve Stimulation for the Treatment of Obstructive Sleep Apnea.

**Experimental/Investigation/Unproven**

---

PacificSource considers phrenic nerve stimulation or diaphragm pacing (e.g., Remedē System) to be experimental, investigational, unproven for treatment of central sleep apnea.

PacificSource considers neuromuscular electrical stimulation (NMES) using eXciteOSA® to be experimental, investigational, or unproven for the treatment of obstructive sleep apnea.

PacificSource considers the following surgical and non-surgical sleep disorder treatments and procedures to be experimental, investigational, or unproven for all indications:

- Actigraphy testing
- Advance System (an adjustable tongue-advancement device)
- AIRvance Tongue Suspension
- Apnea-triggered muscle stimulation
- Cardiac (atrial) pacing
- Cautery-Assisted Palatal Stiffening Operation (CAPSO)
- Coblation (radiofrequency ablation of the nasal passages and soft palate)

- Devices for positional therapy (e.g., Lunoa System, NightBalance, Night Shift Positioner or the Zzoma Positional Device)
- Nasal Expiratory Positive Airway Pressure (EPAP) device (e.g., ULTepap)
- Encore Tongue Base Suspension
- Endoscopically Assisted Surgical Expansion (EASE)
- Epiglottidectomy or partial epiglottidectomy
- Genioplasty and Genial Tubercle Advancement
- Injection Snoreplasty (injection of sclerosing agent into the soft palate)
- Laser-assisted uvulopalatoplasty (LAUP)
- Mandibular Distraction Osteogenesis
- Nasal dilators
- Pillar™ Palatal Implant System
- Radiofrequency tissue volume reduction (RFTVR)
- Rapid Maxillary Expansion
- Remotely controlled mandibular positioner as a predictive screening tool for oral appliances
- Respiratory muscle therapy (e.g., breathing exercises, oropharyngeal exercises, and wind musical instruments)
- Somnoplasty (radiofrequency ablation of the tongue base, uvula, or soft palate)
- Standalone uvulectomy procedures for OSA
- Surgical palatal expansion
- Transcutaneous electrical nerve stimulation (TENS)
- Tongue base reduction procedures (e.g., midline glossectomy, lingualplasty)

## Coding Information

---

The following list of codes are for informational purposes only and may not be all-inclusive. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

- |       |   |
|-------|---|
| 21085 | Impression & Custom Preparation; Oral Surgical Splint: "Unbundled" when billed with E0486 |
| 21089 | Unlisted maxillofacial prosthetic procedure   |
| 21120 | Genioplasty; Augmentation (Autograft, Allograft, Prosthetic Material)-                    |
| 21121 | Genioplasty; sliding osteotomy, single piece  |
| 21122 | Genioplasty; sliding osteotomies, two or more, wedge excision                             |
| 21123 | Genioplasty; sliding, augmentation w/bone grafts w/obtaining autograft                    |
| 21125 | Augmentation, mandibular body/angle; Prosthetic material                                  |
| 21127 | Augmentation, mandibular, with bone graft/Onlay/Interpositional W/Obtaining Autograft     |

- 21142 Reconstruction midface, LeFort I; 2 pieces, segment movement in any direction, without bone graft
- 21198 Osteotomy, mandible, segmental
- 21199 Osteotomy, mandible, with genioglossus advancement
- 21685 Hyoid myotomy and suspension-
- 33276 Insertion of phrenic nerve stimulator system (pulse generator and stimulating lead[s]), including vessel catheterization, all imaging guidance, and pulse generator initial analysis with diagnostic mode activation, when performed
- 33277 Insertion of phrenic nerve stimulator transvenous sensing lead (List separately in addition to code for primary procedure)
- 33278 Removal of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; system, including pulse generator and lead(s)
- 33279 Removal of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; transvenous stimulation or sensing lead(s) only
- 33280 Removal of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; pulse generator only
- 33281 Repositioning of phrenic nerve stimulator transvenous lead(s)
- 33287 Removal and replacement of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; pulse generator
- 33288 Removal and replacement of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; transvenous stimulation or sensing lead(s)
- 41512 Tongue base suspension, permanent suture technique
- 41530 Submucosal radiofrequency tissue/volume reduction/sleep apnea-
- 41599 Unlisted Proc, Tongue, Mouth Floor
- 42140 Uvulectomy, excision of uvula
- 42145 Palatopharyngoplasty
- 42299 Unlisted Proc, Palate, Uvula
- 42950 Pharyngoplasty (plastic or reconstructive operation on pharynx)
- 42975 Drug-induced sleep endoscopy, with dynamic evaluation of velum, pharynx, tongue base, and larynx for evaluation of sleep disordered breathing, flexible, diagnostic--
- 61886 Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to 2 or more electrode arrays
- 61888 Revision or removal of cranial neurostimulator pulse generator or receiver-
- 64553 Percutaneous implantation of neurostimulator electrode array; cranial nerve

- 64555 Percutaneous implantation of neurostimulator electrode array; peripheral nerve (excludes sacral nerve)
- 64568 Open implantation of cranial nerve (e.g., vagus nerve) neurostimulator electrode array and pulse generator
- 64569 Revision or replacement of cranial nerve (e.g., vagus nerve) neurostimulator electrode array, including connection to existing pulse generator
- 64570 Removal of cranial nerve (e.g., vagus nerve) neurostimulator electrode array and pulse generator
- 64575 Incision for Open implantation of neurostimulator electrode array; peripheral nerve (excludes sacral nerve)
- 64580 Incision for Open implantation of neurostimulator electrode array; neuromuscular
- 64582 Open implantation of hypoglossal nerve neurostimulator array, pulse generator, and distal respiratory sensor electrode or electrode array
- 64583 Revision or replacement of hypoglossal nerve neurostimulator array and distal respiratory sensor electrode or electrode array, including connection to existing pulse generator
- 64584 Removal of hypoglossal nerve neurostimulator array, pulse generator, and distal respiratory sensor electrode or electrode array
- 64585 Revision or removal of peripheral neurostimulator electrode array
- 64590 Insertion or replacement of peripheral or gastric neurostimulator pulse generator or receiver, direct or inductive coupling
- 64999 Unlisted procedure, nervous system
- 70355 Orthopantomogram (~~e.g.,~~ panoramic x-ray)
- 93150 Therapy activation of implanted phrenic nerve stimulator system, including all interrogation and programming
- 93151 Interrogation and programming (minimum one parameter) of implanted phrenic nerve stimulator system
- 93152 Interrogation and programming of implanted phrenic nerve stimulator system during polysomnography
- 93153 Interrogation without programming of implanted phrenic nerve stimulator system
- 94799 Unlisted Pulmonary Service/Procedure-
- 95803 Actigraphy testing, recording, analysis, interpretation, and report
- A7049 Expiratory positive airway pressure intranasal resistance valve
- C1767 Generator, neurostimulator (implantable), nonrechargeable
- C1787 Patient programmer, neurostimulator
- C1823 Generator, neurostimulator (implantable), non-rechargeable, with transvenous sensing and stimulation leads
- C9727 Insertion of implants into the soft palate; minimum of 3 implants



- E0485 Oral device/appliance used to reduce upper airway collapsibility, adjustable or nonadjustable, prefabricated, includes fitting and adjustment
- E0486 Oral device/appliance used to reduce upper airway collapsibility, adjustable or nonadjustable, custom fabricated, includes fitting and adjustment
- E0490 Power source and control electronics unit for oral device/appliance for neuromuscular electrical stimulation of the tongue muscle, controlled by hardware remote
- E0491 Oral device/appliance for neuromuscular electrical stimulation of the tongue muscle, used in conjunction with the power source and control electronics unit, controlled by hardware remote, 90-day supply
- E0492 Power source and control electronics unit for oral device/appliance for neuromuscular electrical stimulation of the tongue muscle, controlled by phone application
- E0493 Oral device/appliance for neuromuscular electrical stimulation of the tongue muscle, used in conjunction with the power source and control electronics unit, controlled by phone application, 90-day supply
- E0530 Electronic positional obstructive sleep apnea treatment, with sensor, includes all components and accessories, any type
- E1399 Durable Medical Equipment Miscellaneous—
- K1027 Oral device/appliance used to reduce upper airway collapsibility, without fixed mechanical
- L8679 Implantable neurostimulator, pulse generator, any type
- L8680 Implantable neurostimulator electrode, each
- L8686 Implantable neurostimulator pulse generator, single array, nonrechargeable, includes extension
- L8688 Implantable neurostimulator pulse generator, dual array, non-rechargeable, includes extension
- S2080 Laser-assisted uvulopalatoplasty (LAUP)

CPT® codes, descriptions and materials are copyrighted by the American Medical Association (AMA).

HCPCS® codes, descriptions and materials are copyrighted by Centers for Medicare and Medicaid Services (CMS).

## Definitions

---

**Adaptive servo-ventilation (ASV)** - modality provided by the VPAP Adapt SV™ which uses a small, varying amount of inspiratory pressure superimposed on a low level of CPAP. The VPAP is a BiPAP machine.

**Apnea** - cessation of airflow for at least 10 seconds. Apnea is considered obstructive if there is effort to breathe during the episode.

**Apnea Hypopnea Index (AHI)** - the average number of episodes of apnea and hypopnea per hour as documented in a sleep study. This term is used synonymously with "Respiratory Disturbance Index" (RDI) in the American Academy of Sleep Medicine (AASM) Practice Parameters.

**Auto-titrating Positive Airway Pressure (APAP)** - also called auto PAP, auto-set, and auto adjusting CPAP. APAP devices change treatment pressure based on feedback from several patient measures such as airflow, pressure fluctuations, or measures of airway resistance. APAP machines are coded as CPAP (E0601).

**Bilevel Positive Airway Pressure (BiPAP or BPAP)** - modality which provides higher ventilatory pressure airflow than CPAP. Lower pressure is applied to during the expiratory phase so that the total pressure applied to the airway is reduced when compared to CPAP. BiPAP may be used as an alternative to CPAP in patients who have OSA and coexisting respiratory conditions such as chronic obstructive pulmonary disease (COPD).

**Central Sleep Apnea (CSA)** – apnea caused by the brain failing to send the right signals to the muscles that control breathing during sleep, but there is no airway blockage.

**Continuous Positive Airway Pressure (CPAP)** - modality in which pressurized airflow is delivered using a nasal mask held tight to the face with straps or other headgear. Full face masks or nasal pillows may be used if nasal masks are unsatisfactory to the patient.

**Drug-Induced Sleep Endoscopy (DISE)** - is a diagnostic test, which is done under sedation and assesses the upper airway of snorers and obstructive sleep apnea patients in conditions that mimic natural sleep.

**Epworth Sleepiness Scale**- is a scale intended to measure the daytime sleepiness

**Hypopharyngeal obstruction** – an obstruction that may be caused by the prominence or relaxation of the base of the tongue, lateral pharyngeal wall, and occasionally, the aryepiglottic folds or epiglottis.

**Hyoid Myotomy and Suspension** – a surgical procedure where an incision is created in the neck and the hyoid bone, which is connected to the tongue base and epiglottis, is advanced and secured in order to stabilize the airway. This procedure is meant to make it less likely for the base of the tongue to block the airway during sleep.

**Mixed Sleep Apnea** - (AKA Complex sleep apnea syndrome), as the name implies, is a combination of both Obstructive Sleep Apnea and Central Sleep Apnea.

**Obstructive Sleep Apnea (OSA)** – is characterized by frequent episodes of hypopnea or apnea during sleep when throat muscles relax and a person's tongue and soft palate collapse against the back of the throat during sleep, closing the airway.

**Phrenic Nerve Stimulation** – an implantable device that stimulates the phrenic nerve in the chest which sends signals to the diaphragm to restore a normal breathing pattern.

**Respiratory Disturbance Index (RDI)** - the average number of respiratory disturbances (obstructive apneas, hypopneas, and respiratory event-related arousals [RERAs]) per hour as documented in a sleep study.

**Respiratory Event Index (REI)** - the average number of respiratory disturbances (obstructive apneas and hypopneas) per hour of recording time in a sleep study.

**Sleep Studies** - Some contracts require sleep studies to be ordered by a pulmonologist, neurologist, otolaryngologist, or certified sleep medicine specialist. Sleep studies ordered by family practice or internal medicine physicians, nurse practitioners and physicians assistants are coverable per this policy.

**Upper Airway Resistance Syndrome (UARS)** - partial collapse of the upper airway results in decreased oxygen uptake but does not interrupt breathing.

## **Related Policies**

---

Care of the Surgical Patient

Documentation Requirements for Health Practitioners

## References

---

American Academy of Sleep Medicine (AASM). Practice Guidelines, AASM, Darien, IL, 2020.

<https://aasm.org/clinical-resources/practice-standards/practice-guidelines/>

Aurora, R. N., et. al. (2016). The Treatment of Central Sleep Apnea Syndromes in Adults: Practice Parameters with an Evidence-Based Literature Review and Meta-Analyses. Accessed 8/09/2023

<http://www.aasmnet.org/Resources/PracticeParameters/CSA.pdf>

Centers for Medicare and Medicaid Services (CMS), National Coverage Determinations (NCD) for Continuous Positive Airway Pressure (CPAP) therapy for Obstructive Sleep Apnea (OSA) (240.4)

8/4/2008, 09/28/2020 <https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=226&ncdver=3&CoverageSelection=National&Keyword=obstructive+sleep+apnea&KeywordLookUp=Title&KeywordSearchType=And&bc=gAAAAACAAAAAAA%3d%3d&>

ClinicalKey®. Huyett, P., Soose, R. J. (2020). Rationale and indications for surgical treatment. (2020).

In: Friedman M, Jacobowitz O. Sleep Apnea and Snoring. 2nd ed. Elsevier; 2020:66-69.

<http://www.clinicalkey.com>.

Costantino, A., Rinaldi, V., Moffa, A., Luccarelli, V., Bressi, F., Cassano, M., Casale, M., & Baptista, P. (2020). Hypoglossal nerve stimulation long-term clinical outcomes: a systematic review and meta-analysis. *Sleep & breathing = Schlaf & Atmung*, 24(2), 399–411.

Costanzo, M. R., Javaheri, S., Ponikowski, P., Oldenburg, O., Augostini, R., Goldberg, L. R., Stellbrink, C., Fox, H., Schwartz, A. R., Gupta, S., McKane, S., Meyer, T. E., Abraham, W. T., & remede®System Pivotal Trial Study Group (2021). Transvenous Phrenic Nerve Stimulation for Treatment of Central Sleep Apnea: Five-Year Safety and Efficacy Outcomes. *Nature and Science of Sleep*. 2021;13, :515–526. <https://doi.org/10.2147/NSS.S300713>

De Vito, A., Woodson, B. T., Koka, V., Cammaroto, G., Iannella, G., Bosi, M., Pelucchi, S., Filograna-Pignatelli, G. R., El Chater, P., & Vicini, C. (2021). OSA Upper Airways Surgery: A Targeted Approach. *Medicina (Kaunas, Lithuania)*, 57(7), 690. <https://doi.org/10.3390/medicina57070690>

Donatini, G., Danion, J., Zerrweck, C., Etienne, P., Lacoste, L., & Kraimps, J. L. (2020). Single Dose Steroid Injection After Loss of Signal (LOS) During Thyroid Surgery is Effective to Recover Electric Signal Avoiding Vocal Cord Palsy and the Need of Staged Thyroidectomy: Prospective Evaluation on 702 Patients. *World journal of surgery*, 44(2), 417–425. <https://doi.org/10.1007/s00268-019-05295-2>

Downey, R., et. al. (2014) Obstructive Sleep Apnea Differential Diagnoses. *Medscape* 8/20/2014. Accessed June 6, 2017, Accessed June 6, 2017, September 19, 2018, June 24, 2019, September 28, 2020. <http://emedicine.medscape.com/article/295807-differential>

Eastwood, P. R., Barnes, M., MacKay, S. G., Wheatley, J., R., Hillman, D. R., Nguyễn, X. L., et al. (2020). Bilateral hypoglossal nerve stimulation for treatment of adult obstructive sleep apnoea. *The European Respiratory Journal*. 2020; Jan 9;55(1).

Epworth Sleepiness Scale - Centers for Disease Control and Prevention. (n.d.).

<https://www.cdc.gov/niosh/work-hour-training-for-nurses/02/epworth.pdf>

Fudim, M., Spector, A. R., Costanzo, M. R., Pokorney, S. D., Mentz, R. J., Jagielski, D., Augostini, R., Abraham, W. T., Ponikowski, P. P., McKane, S. W., & Piccini, J. P. (2019). Phrenic Nerve Stimulation for the Treatment of Central Sleep Apnea: A Pooled Cohort Analysis. *Journal of clinical sleep medicine*:

Clinical Sleep Medicine. JCSM: official publication of the American Academy of Sleep Medicine, 15(12), 1747–1755. <https://doi.org/10.5664/jcsm.8076>.

Hayes Knowledge Center: SympI. Hayes Knowledge Center | sympI. (2023, May 23). <https://evidence.hayesinc.com/report/earb.uvulectomy5618>

Hayes Knowledge Center. (June 12, 2018, Annual Review: June 22, 2020). Health Technology Brief: Phrenic Nerve Stimulation (Remedē System) for Central Sleep Apnea.

Journal of Clinical Sleep Medicine. (2019). Clinical Guideline for the Evaluation, Management and Long-term Care of Obstructive Sleep Apnea in Adults. American Academy of Sleep Medicine. Retrieved from [https://aasm.org/resources/clinicalguidelines/osa\\_adults.pdf](https://aasm.org/resources/clinicalguidelines/osa_adults.pdf)

Mallur, P. S., & Rosen, C. A. (2010). Vocal fold injection: review of indications, techniques, and materials for augmentation. Clinical and experimental otorhinolaryngology, 3(4), 177–182. <https://doi.org/10.3342/ceo.2010.3.4.177>

Ong, A. A., Buttram, J., Nguyen, S. A., Platter, D., Abidin, M. R., & Gillespie, M. B. (2017). Hyoid myotomy and suspension without simultaneous palate or tongue base surgery for obstructive sleep apnea. World journal of otorhinolaryngology - head and neck surgery, 3(2), 110–114.

Schwab, R.J. (January 3, 2022). Upper airway imaging in obstructive sleep apnea in adults. <http://www.uptodate.com/>

Teckchandani, P. H., Truong, K. K., Zezoff, D., Healy, W. J., & Khayat, R. N. (May 26, 2023). Transvenous Phrenic Nerve Stimulation for Central Sleep Apnea: Clinical and Billing Review. Chest, 161(5), 1330–1337.

Washington State Health Care Authority, Health Technology Reviews, 2020. <https://www.hca.wa.gov/about-hca/health-technology-assessment/health-technology-reviews>

Weaver, E.M. and Kapur, V.K. (May 14, 2021). Surgical treatment of obstructive sleep apnea in adults from <https://uptodate.com/surgical-treatment-of-obstructive-sleep-apnea-in-adults>

Waltham, MA. Withrow, K., Evans, S., Harwick, J., Kezirian, E., & Strollo, P. (2019). Upper Airway Stimulation Response in Older Adults with Moderate to Severe Obstructive Sleep Apnea. Otolaryngology--head and neck surgery: official journal of American Academy of Otolaryngology-Head and Neck Surgery, 161(4), 714–719.

## Appendix

---

**Policy Number:**

**Effective:** 1/1/2021

**Next review:** 10/1/2025

**Policy type:** Enterprise

**Author(s):**

**Depts.:** Health Services, Claims, Customer Service

**Applicable regulation(s):**

**Commercial OPs:** 6/2025

**Government OPs:** 6/2025