

02-40000-16

Original Effective Date: 07/15/01

Reviewed: 08/22/24

Revised: 03/15/25

Subject: Medical & Surgical Management of Sleep Apnea, Snoring, and Other Conditions of the Soft Palate and Nasal Passages

THIS MEDICAL COVERAGE GUIDELINE IS NOT AN AUTHORIZATION, CERTIFICATION, EXPLANATION OF BENEFITS, OR A GUARANTEE OF PAYMENT, NOR DOES IT SUBSTITUTE FOR OR CONSTITUTE MEDICAL ADVICE. ALL MEDICAL DECISIONS ARE SOLELY THE RESPONSIBILITY OF THE PATIENT AND PHYSICIAN. BENEFITS ARE DETERMINED BY THE GROUP CONTRACT, MEMBER BENEFIT BOOKLET, AND/OR INDIVIDUAL SUBSCRIBER CERTIFICATE IN EFFECT AT THE TIME SERVICES WERE RENDERED. THIS MEDICAL COVERAGE GUIDELINE APPLIES TO ALL LINES OF BUSINESS UNLESS OTHERWISE NOTED IN THE PROGRAM EXCEPTIONS SECTION.

Position Statement	Billing/Coding	Reimbursement	Program Exceptions	Definitions	Related Guidelines
Other	References	Updates			

DESCRIPTION:

This policy addresses various methods for the management of sleep apnea. CPAP, APAP, BiPAP, and Sleep Testing are addressed in separate policies.

Treatment of obstructive sleep apnea (OSA), an interrupted breathing pattern occurring during sleep, involves both medical and surgical means. Medical management of OSA in adults may include weight loss, avoidance of stimulants, body position adjustment, oral appliances, and use of various types of positive airway pressure therapy (i.e., fixed CPAP, bilevel positive airway pressure [BiPAP], or APAP) during sleep.

Oral appliances can be broadly categorized as mandibular advancing or positioning devices or tongue retaining devices. Oral appliances can either be “off the shelf” or custom made by a dental laboratory or similar provider.

A condition related to OSA has been termed upper airway resistance syndrome (UARS). UARS is characterized by a partial collapse of the airway resulting in increased resistance to airflow. It has been proposed that UARS is a distinct syndrome from OSA that may be considered a disease of arousal.

Traditional surgeries for OSA or UARS include **uvulopalatopharyngoplasty (UPPP)** and a variety of maxillofacial surgeries such as mandibular-maxillary advancement (MMA). **UPPP** involves surgical resection of the mucosa and submucosa of the soft palate, tonsillar fossa, and the lateral aspect of the uvula. The amount of tissue removed is individualized for each patient, as determined by the potential space and width of the tonsillar pillar mucosa between the two palatal arches. UPPP enlarges the

oropharynx but cannot correct obstructions in the hypopharynx; thus, patients who fail UPPP may be candidates for additional procedures, depending on the site of obstruction. Additional procedures include hyoid suspensions, maxillary and mandibular osteotomies, or modification of the tongue. Drug-induced sleep endoscopy and/or cephalometric measurements have been used as methods to identify hypopharyngeal obstruction in these patients. The first-line treatment in children is usually adenotonsillectomy.

Several minimally invasive surgical approaches are being evaluated for OSA in adults including:

- **Laser-Assisted Uvulopalatoplasty (LAUP)** - An outpatient procedure proposed as a treatment of snoring with or without associated OSA. In this procedure, superficial palatal tissues are sequentially reshaped using a carbon dioxide laser. The extent of the surgery is typically different from standard UPPP because only part of the uvula and associated soft palate tissues are reshaped. The procedure does not remove or alter tonsils or lateral pharyngeal wall tissues. The patient undergoes from 3 to 7 sessions at 3- to 4-week intervals. One purported advantage of LAUP is that the amount of tissue ablated can be titrated so treatment can be discontinued once snoring is eliminated. LAUP cannot be considered an equivalent procedure to the standard UPPP, with the laser simply representing a surgical tool that the physician may opt to use. LAUP is considered a unique procedure, which raises its own issues of safety and, in particular, effectiveness.
- **Tongue Base Suspension** - The base of the tongue is suspended with a suture that is passed through the tongue and fixated with a screw to the inner side of the mandible, below the tooth roots. The aim of the suspension is to make it less likely for the base of the tongue to prolapse during sleep.
- **Radiofrequency Ablation of Palatal Tissues and Base of Tongue** - Similar in concept to LAUP, although a different energy source is used. Radiofrequency is used to produce thermal lesions within the tissues rather than using a laser to ablate the tissue surface, which may be painful. For this reason, radiofrequency ablation appears to be growing in popularity as an alternative to LAUP. In some situations, radiofrequency of the soft palate and base of tongue are performed together as a multilevel procedure.
- **Palatal stiffening procedures** - Include insertion of palatal implants, injection of a sclerosing agent (snoreplasty), or a cautery-assisted palatal stiffening operation. The operation uses cautery to induce a midline palatal scar designed to stiffen the soft palate to eliminate excessive snoring. The palatal implant device is a cylindrically shaped segment of braided polyester filaments that is permanently implanted submucosally in the soft palate.
- **Hypoglossal Nerve Stimulation** - Contracts the genioglossus muscle, the largest upper airway dilator muscle. This causes tongue protrusion and stiffening of the anterior pharyngeal wall, potentially decreasing apneic events. Hypoglossal nerve stimulation systems include an implantable neurostimulator, stimulating leads, and electrodes. Stimulation systems include respiratory sensing leads that permit intermittent stimulation during inspiration. Stimulation parameters are titrated during an in-laboratory polysomnography and can be adjusted by the patient during home use. The device is turned on only during sleep periods.
- **Atrial overdrive pacing** - This approach is being tried because of the bradycardia generally noted during episodes of apnea.

Central sleep apnea (CSA) is characterized by repetitive cessation or decrease in both airflow and ventilatory effort during sleep. Central sleep apnea may be idiopathic or secondary (associated with a medical condition such as congestive heart failure, drugs, or high altitude breathing). The use of positive airway pressure devices is currently the most common form of therapy for CSA. An implantable device that stimulates the phrenic nerve in the chest is a potential alternative treatment. The battery-powered device sends signals to the diaphragm in order to stimulate breathing and normalize sleep-related breathing patterns.

A variety of devices have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process for the treatment and management of sleep apnea.

Summary and Analysis of Evidence: Patients with OSA treated with laser-assisted palatoplasty, the evidence includes a randomized controlled trial (RCT). The trial indicates reductions in snoring, but limited efficacy on the Apnea/Hypopnea Index (AHI) or symptoms in patients with mild-to-moderate OSA. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. For OSA patients treated with radiofrequency volumetric reduction of palatal tissues and base of tongue, the evidence includes randomized trials and a prospective, single-arm cohort study. Single-stage radiofrequency to palatal tissues did not improve outcomes compared with sham. Multiple sessions of radiofrequency to the palate and base of tongue did not significantly (statistically or clinically) improve AHI, and the improvement in functional outcomes was not clinically significant. The prospective cohort study included 56 patients with mild-to-moderate OSA who received 3 sessions of office-based multilevel RFA. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. Patients with OSA who have palatal stiffening procedures, the evidence includes sham-controlled RCTs and several case series. The RCTs differed in their inclusion criteria, with the study that excluded patients with Friedman tongue position of IV and palate of 3.5 cm or longer reporting greater improvement in AHI (45% success) and snoring (change of -4.7 on a 10-point visual analog scale) than the second trial. Additional studies are needed to corroborate the results of the more successful trial and, if successful, define the appropriate selection criteria. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. Patients who receive tongue base suspension for OSA, the evidence includes a small RCT. The RCT compared tongue suspension plus UPPP with tongue advancement plus uvulopalatopharyngoplasty and showed success rates of 50% to 57% for both procedures. Additional RCTs with a larger number of subjects are needed to determine whether tongue suspension alone or added to UPPP improves the net health outcome. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. Conventional surgical procedures such as uvulopalatopharyngoplasty (UPPP), hyoid suspension, surgical modification of the tongue, maxillofacial surgery, or adenotonsillectomy for the treatment of clinically significant OSA, the evidence includes studies, trials, and case series. The evidence is sufficient to determine the technology results in an improvement in the net health outcome. Patients with OSA treated with neuromuscular electrical tongue stimulation, the evidence includes an RCT and prospective single-arm studies. The RCT found high adherence to the eXciteOSA device treatment protocol, and exploratory analyses showed improvements in respiratory event index [REI], apnea index, and hypopnea index relative to a sham control but no significant changes in Epworth Sleepiness Scale (ESS) scores. The study was limited by sample size and short follow-up period. The single-arm studies suggest that eXciteOSA may reduce snoring intensity and improve sleep quality, but improvements on the Apnea-Hypopnea Index (AHI)

were mixed. Studies were limited to evaluations after the 6-week course of therapy or 2 weeks post-intervention. Larger, well-designed, controlled studies are needed to evaluate improvement in patients who meet the criteria for treatable OSA, to assess continued use after the 6-week trial period, and the durability of observed benefits. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. OSA patients treated with palate expansion, the evidence includes a few small series. Further studies with well-designed trials are needed to evaluate this treatment. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. The evidence for the use of phrenic nerve stimulation with CSA includes systematic review, RCT, and observational studies. RCT compared the use of phrenic nerve stimulation to no treatment among patients with CSA of various etiologies. At 6 months follow-up, the patients with the activated device experienced significant improvements in several sleep metrics and quality of life measures. At 12 months follow-up, patients in the activated device arm showed sustained significant improvements from baseline in sleep metrics and quality of life. A subgroup analysis of patients with heart failure combined 6- and 12-month data from patients in the intervention group and 12- and 18-month data from the control group. Results from this subgroup analysis showed significant improvements in sleep metrics and quality of life at 12 months compared with baseline. Results from observational studies supported the results of the RCT. An invasive procedure would typically be considered only if non-surgical treatments had failed, but there is limited data in which phrenic nerve stimulation was evaluated in patients who had failed the current standard of care, positive airway pressure, or respiratory stimulant medication. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

POSITION STATEMENT:

The following procedures or devices **meet the definition of medical necessity** when the associated criteria are met:

- **Intraoral appliances (tongue-retaining devices or mandibular advancing/positioning devices):**
 - For members with mild to moderate obstructive sleep apnea; **OR**
 - For members with severe obstructive sleep apnea who have failed a trial of continuous positive airway pressure (CPAP) or is contraindicated

(defined in Definition section below)

AND

- The device is prescribed by a treating physician, the device is custom-fitted by qualified dental personnel, **AND** there is absence of temporomandibular dysfunction or periodontal disease.
- **Palatopharyngoplasty** (e.g., uvulopalatopharyngoplasty, uvulopharyngoplasty, uvulopalatal flap, expansion sphincter pharyngoplasty, lateral pharyngoplasty, palatal advancement pharyngoplasty, relocation pharyngoplasty)- when performed for the treatment of clinically significant obstructive sleep apnea (defined in Definition section below) in appropriately select members who have failed an adequate trial of CPAP **OR** failed an adequate trial of an oral appliance.

- **Hyoid suspension, surgical modification of the tongue, or maxillofacial surgery, including mandibular-maxillary advancement (MMA)** – in appropriately selected members with clinically significant OSA and objective documentation of hypopharyngeal obstruction who have not responded to or do not tolerate CPAP **OR** failed an adequate trial of an oral appliance.
- **Adenotonsillectomy**- in pediatric members with clinically significant obstructive sleep apnea (defined in Definition section below) and hypertrophic tonsils.

Surgical treatment of obstructive sleep apnea (OSA) that does not meet the criteria above **does not meet the definition of medical necessity**.

An FDA-approved hypoglossal nerve stimulation device **meets the definition of medical necessity** in adults with OSA who meet **ALL** of the following criteria:

- Age 18 years or older;
- AHI ≥ 15 and ≤ 100 with $\leq 25\%$ central apneas;
- CPAP failure (residual AHI ≥ 15 or failure to use CPAP ≥ 4 hr per night for ≥ 5 nights per week) or inability to tolerate CPAP;
- Body mass index ≤ 35 kg/m²; **AND**
- Absence of complete concentric collapse at the soft palate level on drug-induced sleep endoscopy (DISE).

An FDA-approved hypoglossal nerve stimulation device **meets the definition of medical necessity** in members with Down syndrome and OSA who meet **ALL** of the following criteria:

- 13 to 18 years of age;
- AHI >10 and <50 ;
- Contraindicated for or not effectively treated by adenotonsillectomy;
- BMI ≤ 95 th percentile for members age;
- CPAP failure or intolerance despite attempts to improve compliance; **AND**
- Absence of complete concentric collapse at the soft palate level on drug-induced sleep endoscopy (DISE).

Revision/Replacement

Revision or replacement of an FDA-approved hypoglossal nerve stimulation device **meets the definition of medical necessity** when all of the criteria above are met, the device is not functioning, and is no longer under warranty.

Hypoglossal nerve stimulation is considered **experimental or investigational** for all other indications. The evidence is insufficient to determine the effects of the technology on health outcomes.

The use of a non-FDA-approved hypoglossal nerve stimulation device is considered **experimental or investigational** for all indications. The evidence is insufficient to determine the effects of the technology on health outcomes.

The following are considered **experimental or investigational** for the sole or adjunctive treatment of OSA or upper airway resistance syndrome:

- Laser-assisted palatoplasty (LAUP) or radiofrequency volumetric tissue reduction of the palatal tissues
- Tongue base suspension
- Radiofrequency volumetric tissue reduction of the tongue (with or without radiofrequency reduction of the palatal tissues; i.e. Somnoplasty)
- Palatal stiffening procedures including, but not limited to, cautery-assisted palatal stiffening operation, injection of a sclerosing agent, and the implantation of palatal implants
- Radiofrequency ablation of the nasal passages, soft palate, tonsils, adenoids, or turbinates (i.e. Coblation)
- Atrial overdrive pacing
- Palate and mandible expansion devices
- All other minimally invasive surgical procedures not described above.

There is a lack of clinical data to permit conclusions on net health outcomes.

All devices or interventions, including LAUP, radiofrequency volumetric tissue reduction of the palate, or palatal stiffening procedures, **do not meet the definition of medical necessity** for the treatment of snoring in the absence of documented OSA; snoring alone is not considered a medical condition.

The use of daytime electrical stimulation of the tongue (e.g. eXciteOSA®) is considered **experimental or investigational** for the treatment of obstructive sleep apnea . The evidence is insufficient to determine the effects of the technology on health outcomes.

The use of phrenic nerve stimulation (e.g. remede® System) for the treatment of central sleep apnea is considered **experimental or investigational**. The evidence is insufficient to determine the effects of the technology on health outcomes.

BILLING/CODING INFORMATION:

CPT Coding:

21199	Osteotomy, mandible, segmental; with genioglossus advancement
30801	Ablation, soft tissue of inferior turbinates, unilateral or bilateral, any method (e.g., electrocautery, radiofrequency ablation, or tissue volume reduction); superficial
30802	Ablation, soft tissue of inferior turbinates, unilateral or bilateral, any method (e.g., electrocautery, radiofrequency ablation, or tissue volume reduction); intramural (i.e., submucosal)
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 (Investigational)
33277	Insertion of phrenic nerve stimulator transvenous sensing lead (List separately in addition to code for primary procedure) (Investigational)
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) (Investigational)
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 (Investigational)
33280	Removal of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; pulse generator only (Investigational)
33281	Repositioning of phrenic nerve stimulator transvenous lead(s) (Investigational)
33287	Removal and replacement of phrenic nerve stimulator, including vessel catheterization, all imaging guidance, and interrogation and programming, when performed; pulse generator (Investigational)
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) (Investigational)
41512	Tongue base suspension, permanent suture technique
41530	Submucosal ablation of the tongue base, radiofrequency, 1 or more sites, per session (Investigational)
42145	Palatopharyngoplasty (e.g., uvulopalatopharyngoplasty, uvulopharyngoplasty)
64568	Open implantation of cranial nerve (e.g., vagus nerve) neurostimulator electrode array and pulse generator
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
93150	Therapy activation of implanted phrenic nerve stimulator system, including all interrogation and programming (Investigational)
93151	Interrogation and programming (minimum one parameter) of implanted phrenic nerve stimulator system (Investigational)
93152	Interrogation and programming of implanted phrenic nerve stimulator system during polysomnography (Investigational)
93153	Interrogation without programming of implanted phrenic nerve stimulator system (Investigational)

HCPCS Coding:

C1823	Generator, neurostimulator (implantable), non-rechargeable, with transvenous sensing and stimulation leads (Investigational)
E0485	Oral device/appliance used to reduce upper airway collapsibility, adjustable or non-adjustable, prefabricated fabricated, includes fitting and adjustment
E0486	Oral device/appliance used to reduce upper airway collapsibility, adjustable or non-adjustable, 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 (Investigational)
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 (Investigational)
E0492	Power source and control electronics unit for oral device/appliance for neuromuscular electrical stimulation of the tongue muscle, controlled by phone application (Investigational)
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 (Investigational)
S2080	Laser-assisted uvulopalatoplasty (LAUP) (Investigational)

ICD-10 Diagnosis Codes That Support Medical Necessity:

G47.30 – G47.39	Sleep apnea
-----------------	-------------

REIMBURSEMENT INFORMATION:

Reimbursement for oral appliances is limited to one (1) in a 12-month period. Services in excess of the limitation are subject to medical review of documentation supporting medical necessity (The following information may be required documentation to support medical necessity: physician history and physical, initial assessment, procedure note, visit note).

LOINC Codes:

DOCUMENTATION TABLE	LOINC CODES	LOINC TIME FRAME MODIFIER CODE	LOINC TIME FRAME MODIFIER CODES NARRATIVE
Physician history and physical	28626-0	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim.
Physician Initial Assessment	18736-9	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim.

Physician procedure note	11505-5	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim.
Attending physician visit note	18733-6	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim.

PROGRAM EXCEPTIONS:

Federal Employee Program (FEP): Follow FEP guidelines.

State Account Organization (SAO): Follow SAO guidelines.

Medicare Advantage products:

The following National Coverage Determination (NCD) was reviewed on the last guideline reviewed date: Phrenic Nerve Stimulator (160.19) located at cms.gov.

The following Local Coverage Determinations (LCDs) were reviewed on the last guideline reviewed date:

- Hypoglossal Nerve Stimulation for the Treatment of Obstructive Sleep Apnea (L38398) located at fcso.com.
- Oral Appliances for Obstructive Sleep Apnea (L33611) located at cgsmedicare.com.

If this Medical Coverage Guideline contains a step therapy requirement, in compliance with Florida law 627.42393, members or providers may request a step therapy protocol exemption to this requirement if based on medical necessity. The process for requesting a protocol exemption can be found at [Coverage Protocol Exemption Request](#).

DEFINITIONS:

Mild to Moderate Obstructive Sleep Apnea:

- Apnea/Hypopnea Index (AHI), Respiratory Event Index (REI), or Respiratory Disturbance Index (RDI) of 15 or more events per hour, **OR**
- AHI, REI, or RDI of 5 or more events per hour in a member with one or more signs or symptoms associated with OSA (eg, excessive daytime sleepiness, hypertension, cardiovascular heart disease, or stroke).

Severe Obstructive Sleep Apnea:

- AHI, REI, or RDI greater than 30 events per hour.

Clinically significant obstructive sleep apnea is defined as those members who have:

1. Apnea/Hypopnea Index (AHI), Respiratory Event Index (REI), or Respiratory Disturbance Index (RDI) of 15 or more events per hour, **OR**
2. AHI, REI, or RDI of 5 or more events per hour in a member with one or more signs or symptoms associated with OSA (eg, excessive daytime sleepiness, hypertension, cardiovascular heart disease, or stroke).

Clinically significant OSA is defined as those pediatric members who have:

1. AHI or RDI of at least 5 per hour, **OR**
2. AHI or RDI of at least 1.5 per hour in a member with excessive daytime sleepiness, behavioral problems, or hyperactivity.

RELATED GUIDELINES:

[Positive Airway Pressure Devices, 09-E0000-21](#)

[Sleep Testing, 01-95828-01](#)

OTHER:

BMI Percentile Calculator for Child and Teen located at:

<https://www.cdc.gov/healthyweight/bmi/calculator.html>

REFERENCES:

1. Agency for Healthcare Research and Quality. Comparative Effectiveness of Diagnosis and Treatment of Obstructive Sleep Apnea in Adults – Clinician Summary (08/08/2011).
2. American Academy of Otolaryngology-Head and Neck Surgery. 2016 Position Statement: Hypoglossal Nerve Stimulation for Treatment of Obstructive Sleep Apnea (OSA), accessed at entnet.org.
3. American Academy of Otolaryngology- Head and Neck Surgery. 2016 Position Statement: Tongue Suspension, accessed at entnet.org.
4. American Academy of Otolaryngology - Head and Neck Surgery. 2012 Position Statement: Uvulopalatopharyngoplasty, accessed at entnet.org.
5. American Academy of Pediatrics. Tonsillectomy Care for the Pediatrician. Pediatrics Vol. 130 No. 2 August 1, 2012. pp. 324 -334.
6. American Academy of Sleep Medicine. Littner M, Kushida CA, Hartse K, Anderson WM, Davila D, Johnson SF, Wise MS, Hirshkowitz M, Woodson BT. Practice parameters for the use of laser-assisted uvulopalatoplasty: an update for 2000. [Sleep 2001 Aug 1; 24(5): 603-19].
7. American Academy of Sleep Medicine. Epstein LJ, Kristo D, Strollo PJ Jr, Friedman N, Malhotra A, Patil SP, Ramar K, Rogers R, Schwab RJ, Weaver EM, Weinstein MD, Adult Obstructive Sleep Apnea Task Force of the American Academy of Sleep Medicine. Clinical guideline for the evaluation, management and long-term care of obstructive sleep apnea in adults. J Clin Sleep Med 2009 Jun 15;5(3):263-76.
8. American Sleep Disorders Association. Aurora RN, Casey KR, Kristo D, Auerbach S, Bista SR, Chowdhuri S, Karippot A, Lamm C, Ramar K, Zak R, Morgenthaler TI. Practice parameters for the surgical modifications of the upper airway for obstructive sleep apnea in adults. Sleep 2010 Oct 1;33(10):1408-13.

9. Aurora RN, Bista SR, Casey KR, et al. Updated Adaptive Servo-Ventilation Recommendations for the 2012 AASM Guideline: "The Treatment of Central Sleep Apnea Syndromes in Adults: Practice Parameters with an Evidence-Based Literature Review and Meta-Analyses". *J Clin Sleep Med*. 2016 May 15;12(5):757-61.
10. Aurora RN, Casey KR, Kristo D, et al. Practice parameters for the surgical modifications of the upper airway for obstructive sleep apnea in adults. *Sleep*. Oct 1 2010;33(10):1408-1413.
11. Badr MS. Central sleep apnea: Treatment. In: UpToDate, Collop N, Eichler AF (Eds), UpToDate, Waltham, MA; accessed at uptodate.com.
12. Baptista PM, de Apodaca PMR, et al. Daytime Neuromuscular Electrical Therapy of Tongue Muscles in Improving Snoring in Individuals with Primary Snoring and Mild Obstructive Sleep Apnea. *JClinMed*. 2021 Apr 27;10(9):1883. PMID: 33925376.
13. Baugh RF, Archer SM, et al. American Academy of Otolaryngology-Head and Neck Surgery Foundation. Clinical practice guideline: tonsillectomy in children. *Otolaryngol Head Neck Surg*. 2011 Jan;144(1 Suppl):S1-30.
14. Blue Cross Blue Shield Association Evidence Positioning System®. 2.02.33 Phrenic Nerve Stimulation for Central Sleep Apnea, 06/24.
15. Blue Cross Blue Shield Association Evidence Positioning System®. 7.01.101 Surgical Treatment of Snoring and Obstructive Sleep Apnea Syndrome, 08/24.
16. Blue Cross Blue Shield Association Evidence Positioning System®. 8.01.67 Medical Management of Obstructive Sleep Apnea Syndrome, 07/24.
17. Blue Cross Blue Shield Association Technology Evaluation Center "Radiofrequency Volumetric Tissue Reduction for Sleep Related Breathing Disorders", (12/00).
18. Blue Cross Blue Shield Association Technology Evaluation Center "Surgical Procedures for the Treatment of Obstructive Sleep Apnea Syndrome", (04/96).
19. Boon M, Huntley C, et al. Upper Airway Stimulation for Obstructive Sleep Apnea: Results from the ADHERE Registry. *Otolaryngol Head Neck Surg*. 2018 Aug;159(2):379-385.
20. Caloway CL, Diercks GR, et al. Update on hypoglossal nerve stimulation in children with down syndrome and obstructive sleep apnea. *Laryngoscope*. 2019 Jun 20. doi: 10.1002/lary.28138.[Epub ahead of print]. PMID: 31219619.
21. Centers for Medicare & Medicaid Services. National Coverage Determination (NCD) for Phrenic Nerve Stimulator (160.19); located at cms.gov.
22. CGS Administrators, LLC, Local Coverage Determination (LCD): Oral Appliances for Obstructive Sleep Apnea (L33611) located at cgsmedicare.com.
23. Costantino A, Rinaldi V, et al. Hypoglossal nerve stimulation long-term clinical outcomes: a systematic review and meta-analysis. *Sleep Breath*. 2019 Aug 15. doi: 10.1007/s11325-019-01923-2.[Epub ahead of print]. PMID: 31418162.
24. Costanzo MR, Javaheri S, et al. Transvenous Phrenic Nerve Stimulation for Treatment of Central Sleep Apnea: Five-Year Safety and Efficacy Outcomes. *Nat Sci Sleep*. 2021 Apr 29;13:515-526.
25. Costanzo MR, Ponikowski P, Coats A, et al. Phrenic nerve stimulation to treat patients with central sleep apnoea and heart failure. *Eur J Heart Fail*. 2018 Dec;20(12):1746-1754.
26. Costanzo MR, Ponikowski P, Javaheri S, et al. Sustained 12 Month Benefit of Phrenic Nerve Stimulation for Central Sleep Apnea. *Am J Cardiol*. 2018 Jun 1;121(11):1400-1408.
27. Costanzo MR, Ponikowski P, Coats A, et al. Transvenous neurostimulation for central sleep apnoea: a randomised controlled trial. *Lancet*. 2016 Sep 3;388(10048):974-82.
28. Costanzo MR, ponikowski P, Javaheri S, et al. Sustained 12 Month Benefit of Phrenic Nerve Stimulation for Central Sleep Apnea. *Am J Cardiol*. 2018 Jun 1;121(11):1400-1408.

29. Dedhia RC, Woodson BT. Standardized Reporting for Hypoglossal Nerve Stimulation Outcomes. *J Clin Sleep Med*. 2018 Nov 15;14(11):1835-1836.
30. Diercks GR, Keamy D, et al. Hypoglossal Nerve Stimulator Implantation in an Adolescent with Down Syndrome and Sleep Apnea. *Pediatrics*. 2016 May;137(5). PMID: 27244805.
31. Diercks GR, Wentland C, et al. Hypoglossal Nerve Stimulation in Adolescents with Down syndrome and Obstructive Sleep Apnea. *JAMA Otolaryngol Head Neck Surg*. 2018 Jan 1;144(1):37-42. PMID: 29098288.
32. Ding N, Zhang X. Transvenous phrenic nerve stimulation, a novel therapeutic approach for central sleep apnea. *J Thorac Dis*. 2018 Mar;10(3):2005-2010.
33. First Coast Service Options, Inc. (FCSO). Local Coverage Determination (LCD): Hypoglossal Nerve Stimulation for the Treatment of Obstructive Sleep Apnea (L38398); located at fcso.com.
34. First Coast Service Options, Inc. (FCSO). Local Coverage Determination (LCD): Oral Appliances for Obstructive Sleep Apnea (L33611); located at fcso.com.
35. Fox H, Oldenburg O, et al. Long-term Efficacy and Safety of Phrenic Nerve Stimulation for the Treatment of Central Sleep Apnea. *Sleep*. 2019 Oct 21;42(11):zsz158.
36. Friedman M, Salapatras AM, Bonzelaar LB. Updated Friedman Staging System for Obstructive Sleep Apnea. *Adv Otorhinolaryngol*. 2017;80:41-48.
37. Gillespie MB, Soose RJ, Woodson BT, et al. Upper Airway Stimulation for Obstructive Sleep Apnea: Patient-Reported Outcomes after 48 Months of Follow-up. *Otolaryngol Head Neck Surg*. 2017 Apr;156(4):765-771.
38. Heiser C, Maurer JT, Hofauer B, et al. Outcomes of Upper Airway Stimulation for Obstructive Sleep Apnea in a Multicenter German Postmarket Study. *Otolaryngol Head Neck Surg*. 2017 Feb;156(2):378-384.
39. Hoekema A, Stegenga B, et al. Obstructive sleep apnea therapy. *J Dent Res*. 2008 Sep;87(9):882-7. PMID: 18719218.
40. International Surgical Sleep Society. ISSS Position Statement on Sleep Surgery; accessed at surgicalsleepp.org.
41. Jagielski D, Ponikowski P, Augostini R, et al. Transvenous stimulation of the phrenic nerve for the treatment of central sleep apnoea: 12 months' experience with the remedē® System. *Eur J Heart Fail*. 2016 Nov;18(11):1386-1393.
42. Lee CH, Seay EG, et al. Therapeutic Positive Airway Pressure Level Predicts Response to Hypoglossal Nerve Stimulation for Obstructive Sleep Apnea. *J Clin Sleep Med*. 2019 Aug 15;15(8):1165-1172.doi:10.5664/jcsm.7814. PMID: 31482839.
43. Lim J, Lasserson TJ, Fleetham J, Wright J. Oral appliances for obstructive sleep apnoea. *Cochrane Database of Systematic Reviews* 2006, Issue 1. Art. No.:CD004435. DOI: 10.1002/14651858.CD004435.pub3.
44. Liu P, Kong, W, et al. Hypoglossal nerve stimulation in adolescents with down syndrome and obstructive sleep apnea: A systematic review and meta-analysis. *Front Neurol*. 2022 Oct 25;13:1037926.
45. Marcus CL, Brooks LJ, et al. Diagnosis and management of childhood obstructive sleep apnea syndrome. *Pediatrics*. 2012 Sep;130(3):576-84.
46. Moffa A, Giorgi L, et al. New non-invasive electrical stimulation devices for treatment of snoring and obstructive sleep apnoea: a systematic review. *Sleep Breath*. 2022 Apr 23. PMID: 35460429.
47. National Institute for Health and Care Excellence (NICE). Hypoglossal nerve stimulation for moderate to severe obstructive sleep apnoea. *Interventional procedures guidance [IPG598]* Published date: November 2017; accessed at nice.org.

48. Ramar K, Dort LC, et al. Clinical Practice Guideline for the Treatment of Obstructive Sleep Apnea and Snoring with Oral Appliance Therapy: An Update for 2015. *J Clin Sleep Med*. 2015 Jul 15;11(7):773-827.
49. Respicardia Inc. remedē® System for the Treatment of Central Sleep Apnea Dossier, 2019.
50. Respicardia Inc. Respicardia remedē® System for the Treatment of Central Sleep Apnea- Executive Summary, 2021.
51. Schwartz AR, Goldberg LR, et al. Transvenous phrenic nerve stimulation improves central sleep apnea, sleep quality, and quality of life regardless of prior positive airway pressure treatment. *Sleep Breath*. 2021 Mar 20. doi: 10.1007/s11325-021-02335-x.
52. Sundaram S, Bridgman SA, Lim J, Lasserson TJ. Surgery for obstructive sleep apnoea. *Cochrane Database of Systematic Reviews* 2005, Issue 4. Art. No.: CD001004. DOI: 10.1002/14651858.CD001004.pub2.
53. U.S. Food & Drug Administration (FDA); accessed at [fda.gov](https://www.fda.gov).
54. Van de Perck E, Beyers J, et al. Successful Upper Airway Stimulation Therapy in an Adult Down Syndrome Patient With Severe Obstructive Sleep Apnea. *Sleep Breath*. 2019 Sep;23(3):879-883. PMID: 30430373.
55. Weeks B, Boa G, Gilbert TM, et al. Hypoglossal Nerve Stimulator Implantation in a Non-Academic Setting: Two-Year Result. *Laryngoscope Investig Otolaryngol*. 2018 Aug 9;3(4):315-318.
56. Woodson BT, Soose RJ, Gillespie MB, et al. Three-Year Outcomes of Cranial Nerve Stimulation for Obstructive Sleep Apnea: The STAR Trial. *Otolaryngol Head Neck Surg*. 2016 Jan;154(1):181-8.
57. Woodson BT, Strohl KP, et al. Upper Airway Stimulation for Obstructive Sleep Apnea: 5-Year Outcomes. *Otolaryngol Head Neck Surg*. 2018 Jul;159(1):194-202.
58. Yancy CW, Jessup M, Bozkurt B, et al. 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America. *J Card Fail*. 2017 Aug;23(8):628-651.
59. Yu PK, Stenerson M, et al. Evaluation of Upper Airway Stimulation for Adolescents With Down Syndrome and Obstructive Sleep Apnea. *JAMA Otolaryngol Head Neck Surg*. 2022 Jun 1;148(6):522-528.

COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the Florida Blue Medical Policy and Coverage Committee on 08/22/24.

GUIDELINE UPDATE INFORMATION:

05/17/01	MCG reformatted; revised to include information for somnoplasty.
01/01/02	Annual HCPCS coding update: added S2080.
06/15/02	Reviewed; clarification statement added for LAUP vs. laser-assisted UPPP; references updated.
02/15/03	Revised; added information regarding oral orthotic devices for treating OSA.
06/15/03	Reviewed; no changes.
06/15/04	Scheduled review, no revisions.
01/15/05	Annual HCPCS coding update (0088T added).

03/15/05	Scheduled review; no change in coverage statement; add procedure code 0088T.
10/15/05	Revision consisting of adding information regarding palatal stiffening procedures and hyoid suspension.
01/01/06	Annual HCPCS coding update: revise descriptor for 0088T. Add E0485 and E0486.
03/15/06	Scheduled review; no change in coverage statement; remove Program Exception for Medicare Advantage.
04/01/06	2 nd Quarter HCPCS coding update: removed S8260.
03/15/07	Scheduled review; added information for atrial pacing; updated references, revised Description section.
06/15/07	Reformatted guideline; updated references.
04/15/08	Scheduled review; no change in position statement; updated ICD-9 coding section and references.
01/01/09	Annual HCPCS coding update: removed 0088T; added 41512 and 41530.
04/15/09	Scheduled review; added position statement regarding somnoplasty; reformatting changes; references updated.
01/01/10	Annual HCPCS coding update: simple revision to descriptor for 41530.
03/15/10	Revision of Position Statement to include additional coverage criteria for UPPP.
10/15/10	Revision; related ICD-10 codes added.
07/15/11	Revision; formatting changes.
03/15/12	Review; position statement revised to include information regarding coblation; references updated.
02/15/13	Review of position statement for Somnoplasty and Coblation; position statement revised for clarification; references updated.
03/15/14	Position statement for coblation reviewed with literature search; no change in position statement; Program Exceptions section updated; references updated.
02/15/15	Revision: added CPT codes 30801 and 30802.
07/30/15	Revision; position statement section and references updated.
11/01/15	Revision: ICD-9 Codes deleted.
02/15/16	Revision; position statement section updated.
11/15/17	Review; description, position statements, coding, program exception, and references updated.
02/15/19	Revision; phrenic nerve stimulation for CSA position statement added; title, description, coding, and references updated.
03/15/19	Review; Implantable hypoglossal nerve stimulators experimental or investigational position maintained.
10/15/19	Review; hypoglossal nerve stimulation position statement maintained; definitions section and references updated.
08/15/20	Review; hypoglossal nerve stimulation position statement updated; all other position statements maintained; coding and references updated.
09/15/21	Review; Position statements maintained and references updated.
01/01/22	Annual CPT/HCPCS coding update. Codes 64582-64584 added; 0466T-0468T deleted.
09/15/22	Review: Use of daytime electrical stimulation of the tongue investigational statement added; coding and references updated.

03/15/23	Revision: Intraoral appliances criteria updated; definition section and references updated.
05/25/23	Update to Program Exceptions section.
10/01/23	Quarterly CPT/HCPCS coding update. Codes E0490 & E0491 added; code K1028 revised.
01/01/24	Annual CPT/HCPCS coding update. Codes 33276-33288, 93150-93153, E0492, E0493 added; codes 0424T- 0436T, K2028, K2029 deleted.
09/15/24	Review: HNS position statements, description, and references updated.
03/15/25	Code 64568 added.