MEDICAL POLICY

Sleep Disorder Treatment: Surgical (All Lines of Business Except Medicare)

Effective Date: 12/1/2019

Section: SUR  
Policy No: 342

Medical Policy Committee approved Date: 9/08 ; 9/10; 10/12; 1/13; 8/13; 2/14; 6/14; 9/15; 10/16; 1/18; 1/19; 9/19

Medical Officer Date

See Policy CPT/HCPCS CODE section below for any prior authorization requirements

SCOPE:

Providence Health Plan, Providence Health Assurance, Providence Plan Partners, and Ayin Health Solutions as applicable (referred to individually as “Company” and collectively as “Companies”).

APPLIES TO:

All lines of business except Medicare

BENEFIT APPLICATION

Medicaid Members

Oregon: Services requested for Oregon Health Plan (OHP) members follow the OHP Prioritized List and Oregon Administrative Rules (OARs) as the primary resource for coverage determinations. Medical policy criteria below may be applied when there are no criteria available in the OARs and the OHP Prioritized List.

POLICY CRITERIA

Note: This medical policy does not address surgical treatments for sleep disorders in patients 17 years of age or younger, which may be considered medically necessary.

I. The following surgical treatments for obstructive sleep apnea (OSA) may be considered medically necessary and covered:

- Uvulopalatopharyngoplasty (UPPP)
- Hyoid myotomy and suspension with or without osteotomy and/or genioglossus advancement
- Mandibular-maxillary advancement (MMA)
when all of the following (A.-D.) criteria are met:

A. The patient has been diagnosed with moderate or severe OSA (AHI or RDI ≥ 15 events per hour); \textbf{and}
B. Demonstrated inability to adhere to a minimum 3-month active trial of continuous positive airway pressure (CPAP or BiPAP) therapy or other appropriate non-invasive treatment, such as oral appliance*; \textbf{and}
C. A consult with a sleep specialist to ensure the conservative therapy trials were adequate and the potential benefits and risks of the surgery were discussed; \textbf{and}
D. Evidence of retropalatal or combination retropalatal/retrolingual obstruction as the cause of the obstructive sleep apnea.

*Note: An active trial of conservative therapy should include compliance monitoring, improvement in sleep hygiene, phone calls and visits with a provider or DME representative to make a concerted effort to improve adherence. An active CPAP or BiPAP trial should include mask and pressure adjustment.

II. When criterion I. above is not met, surgical treatments of sleep apnea are considered \textbf{not medically necessary and not covered}, including but not limited to the treatment of snoring without documented OSA.

III. Hypoglossal nerve stimulation (e.g. Inspire™ Upper Airway System) for obstructive sleep apnea may be considered \textbf{medically necessary and covered} when all of the following criteria are met (A.-H.):

A. Member is 22 years of age or older; \textbf{and}
B. Body mass index (BMI) is less than 32 kg/m²; \textbf{and}
C. A polysomnography (PSG) is performed within 24 months of first consultations for Inspire implant; \textbf{and}
D. Apnea hypopnea index (AHI) is 15 to 65 events per hour; \textbf{and}
E. Member has predominantly obstructive events (defined as central and mixed apneas less than 25% of the total AHI); \textbf{and}
F. Demonstrated inability to adhere to a minimum 3-month active trial of continuous positive airway pressure (CPAP or BiPAP) therapy*; \textbf{and}
G. Absence of complete concentric collapse at the soft palate level as seen on a drug-induced sleep endoscopy (DISE) procedure; \textbf{and}
H. No other anatomical findings that would compromise performance of device (e.g. hypertrophied tonsils).

*Note: An active trial of conservative therapy should include compliance monitoring, improvement in sleep hygiene, phone calls and visits with a provider or DME representative to make a concerted effort to improve adherence. An active CPAP or BiPAP trial should include mask and pressure adjustment.
IV. Hypoglossal nerve stimulation (e.g. Inspire™ Upper Airway System) for obstructive sleep apnea is considered not medically necessary and not covered when criteria III. as above is not met.

V. Other surgical treatments of obstructive sleep apnea are considered investigational and are not covered, including but not limited to the following (A.- D.):

A. Laser-assisted uvulopalatoplasty (LAUP)
B. Radiofrequency volume tissue reduction of the soft palate, uvula, tongue base or turbinates (e.g. Somnoplasty™)
C. Palatal stiffening procedures/palatal implants (e.g. the Pillar Procedure™)
D. Tongue suspension systems (e.g. AlRvance® or Encore™)

BILLING GUIDELINES

The following codes should not be used for surgical treatments of sleep apnea as they are related to other surgical procedures, such as orthognathic surgery:

- 21121
- 21122
- 21248
- 21249
- 21193
- 21194
- 21199
- 30930

CPT codes 30140, 41530 and 42160 are investigational and not covered when billed with OSA diagnosis codes. (G47.33, G47.39)

*Laser-assisted Uvulopalatoplasty*

LAUP must not be billed as 42145, Palatopharyngoplasty (e.g., uvulopalatopharyngoplasty, uvulopharyngoplasty). This code is not appropriate for this procedure. If LAUP is billed for denial purposes, it should be coded as 42299, (unlisted procedure, palate, uvula) with "LAUP" in the electronic narrative 2400/SV101-7 equivalent to line 19 of the CMS 1500 form.

*Somnoplasty™*

Somnoplasty™ is a trade name for palate reduction with the Somnoplasty™ System of Somnus Medical Systems. Somnoplasty™ must not be billed as 42145. This code is not appropriate for this procedure.
Somnoplasty™ is billed for denial purposes, it should be coded as 42299, (unlisted procedure, palate, uvula) with "Somnoplasty™" in the electronic narrative 2400/SV101-7 equivalent to line 19 of the CMS 1500 form.

*Pillar Procedure™*

The Pillar Procedure™ is a trade name for palatal implants. This procedure should be billed by the physician as 42299 (unlisted procedure, palate, uvula) with "Pillar Procedure™" or "palatal implant" in the electronic narrative 2400/SV101-7 equivalent to line 19 of the CMS 1500 form. Hospital outpatient would use code C9727.

**Hypoglossal Nerve Stimulation (Inspire® Sleep System)**

Code 0466T is an add-on code that may only be billed in conjunction with code 64568.

### CPT/HCPCS CODES

<table>
<thead>
<tr>
<th>All Lines of Business Except Medicare</th>
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<tbody>
<tr>
<td><strong>Prior Authorization Required</strong></td>
</tr>
<tr>
<td>21110 Application of interdental fixation device for conditions other than fracture or dislocation, includes removal</td>
</tr>
<tr>
<td>21141 Reconstruction midface, LeFort I; single piece, segment movement in any direction (eg, for Long Face Syndrome), without bone graft</td>
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<tr>
<td>21142 Reconstruction midface, LeFort I; 2 pieces, segment movement in any direction, without bone graft</td>
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<tr>
<td>21143 Reconstruction midface, LeFort I; 3 or more pieces, segment movement in any direction, without bone graft</td>
</tr>
<tr>
<td>21145 Reconstruction midface, LeFort I; single piece, segment movement in any direction, requiring bone grafts (includes obtaining autografts)</td>
</tr>
<tr>
<td>21146 Reconstruction midface, LeFort I; 2 pieces, segment movement in any direction, requiring bone grafts (includes obtaining autografts) (eg, ungrafted unilateral alveolar cleft)</td>
</tr>
<tr>
<td>21147 Reconstruction midface, LeFort I; 3 or more pieces, segment movement in any direction, requiring bone grafts (includes obtaining autografts) (eg, ungrafted bilateral alveolar cleft or multiple osteotomies)</td>
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<tr>
<td>21196 Reconstruction of mandibular rami and/or body, sagittal split; with internal rigid fixation</td>
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<tr>
<td>21198 Osteotomy, mandible, segmental</td>
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<tr>
<td>21199 Osteotomy, mandible, segmental; with genioglossus advancement</td>
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<tr>
<td>21206 Osteotomy, maxilla, segmental (eg, Wassmund or Schuchard)</td>
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<tr>
<td>21685 Hyoid myotomy and suspension</td>
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<td>41500 <strong>TERMED 12/31/18</strong></td>
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**No Prior Authorization Required**

*Note: The following codes are not covered when billed with OSA diagnosis codes (G47.33, G47.39)*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>30140</td>
<td>Submucous resection inferior turbinate, partial or complete, any method</td>
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<tr>
<td>41530</td>
<td>Submucosal ablation of the tongue base, radiofrequency, 1 or more sites, per session</td>
</tr>
<tr>
<td>42160</td>
<td>Destruction of lesion, palate or uvula (thermal, cryo or chemical)</td>
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**Not Covered**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>30801</td>
<td>Ablation, soft tissue of inferior turbinates, unilateral or bilateral, any method (eg, electrocautery, radiofrequency ablation, or tissue volume reduction); superficial</td>
</tr>
<tr>
<td>30802</td>
<td>Ablation, soft tissue of inferior turbinates, unilateral or bilateral, any method (eg, electrocautery, radiofrequency ablation, or tissue volume reduction); intramural (ie, submucosal)</td>
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<tr>
<td>41512</td>
<td>Tongue base suspension, permanent suture technique</td>
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<tr>
<td>C9727</td>
<td>Insertion of implants into the soft palate; minimum of three implants</td>
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<tr>
<td>S2080</td>
<td>Laser-assisted uvulopalatoplasty (laup)</td>
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**Unlisted Codes**

All unlisted codes will be reviewed for medical necessity, correct coding, and pricing at the claim level. If an unlisted code is billed related to services addressed in this policy then prior-authorization is required.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>41599</td>
<td>Unlisted procedure, tongue, floor of mouth</td>
</tr>
<tr>
<td>42299</td>
<td>Unlisted procedure, palate, uvula</td>
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<tr>
<td>64999</td>
<td>Unlisted procedure, nervous system</td>
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**DESCRIPTION**
Indications

Obstructive Sleep Apnea (OSA)

OSA occurs when muscles of the upper airway are not able to maintain an open airway when relaxed during sleep. Consequently, breathing stops and starts repeatedly during sleep. This can lead to a variety of health consequences including hypertension, depression, stroke, coronary and artery disease.¹

Medically Necessary Procedures

Uvulopalatopharyngoplasty (UPPP)

UPPP is a surgical procedure in which tissue in the throat (e.g. tonsils, adenoids, uvula, soft palate) is remodeled and/or removed to improve airflow during sleep.

Mandibular Maxillary Advancement (MMA)

MMA is a surgical procedure in which the bones of the upper and lower jaw are repositioned to relieve airway obstruction. The attached pharyngeal airway muscles are suspended in an anterior position and pharyngeal soft tissue tension is increased.²

Hyoid Myotomy and Suspension

Hyoid myotomy and suspension, also known as hyoid advancement, is a surgical procedure in which the hyoid bone and muscle attachments to the tongue and airway are pulled toward the mandible, which may improve airway stability in the retrolingual and hypopharyngeal airway.

Mandibular Osteotomy

Mandibular osteotomy is a surgical procedure in which the lower jaw is moved into a new position and affixed with small metal plates and screws.

Genioglossal Advancement

Genioglossal advancement is a surgical procedure in which the tongue muscle is attached to the lower jaw and pulled forward, thereby rendering the tongue firmer and less likely to collapse during sleep.

Hypoglossal nerve stimulation (e.g. Inspire™ Upper Airway System)

Hypoglossal nerve stimulation refers to a surgical implanted system in which an implanted pulse generator stimulates the medial branch of the hypoglossal nerve, producing selective motor stimulation of the horizontal-longitudinal muscle fibers. These fibers draw the tongue forward, purportedly improving upper airway obstruction. The patient uses a remote control to activate the device before sleep.¹
Non-Covered Procedures

*Laser-assisted uvulopalatoplasty (LAUP)*

LAUP is a surgical procedure that involves partial resection of the uvula and soft palate using a CO₂ laser, eliminating tissue obstruction contributing to sleep apnea.

*Radiofrequency Volume Tissue Reduction (RFVTR)*

Radiofrequency volumetric tissue volume reduction involves radiofrequency ablation of oropharyngeal tissue from the nasal turbinates, or the soft palate, uvula and tongue base so as to improve airflow.³ Somnoplasty™ is a trade name for the Somnoplasty™ System of Somnus Medical Systems, which uses heat energy to modify the tissues of the uvula and soft palate.

*Palatal stiffening procedures/Palatal implants (e.g. the Pillar Procedure)*

Palatal stiffening involves the surgical placement of small polyester rods in the soft palate. The subsequent healing of tissue around the implants stiffens the soft palate, thereby reducing relaxation and vibration of the tissue during sleep.⁴

*Tongue suspension systems (e.g. AIRvance® or Encore™)*

Tongue suspension is a surgical procedure in which the tongue base is prevented from sliding toward the back of the throat during sleep. To this end, a screw is attached to the back of the jawbone below the roots of the front teeth, which is attached to a non-absorbable suture. The suture is passed through the left side of the tongue base and looped back to the front of the tongue base. The suturing process is then repeated to create a loop through the right side of the tongue base. The tension between the suture’s left and right loops keeps the tongue in place.⁵

**REVIEW OF EVIDENCE**

Medically Necessary Procedures

*Uvulopalatopharyngoplasty (UPPP)*

- In 2018, Stuck and colleagues conducted a systematic review and meta-analysis comparing the efficacy of uvulopalatopharyngoplasty (UPPP) with or without tonsillectomy (TE) as a monotherapy for the treatment of adult obstructive sleep apnea (OSA).¹ Independent investigators systematically searched the literature through January 2016, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 48 studies were included for review. Outcomes of interests included the frequency of respiratory events and success/response rates, mean scores of the Epworth Sleepiness Scale (ESS) and apnea-hypopnea index (AHI). Studies demonstrated significant improvement in all outcomes.
measured compared to baseline. Pooled data from two RCT's indicated an AHI mean difference (MD) of -18.59 (95% CI -34.14, -3.04) and an ESS MD of -5.37 (95% CI -7.03, -3.72). Data addressing effect of UPPP ± TE in comparison to baseline was available from three RCTs, indicated a significantly improved AHI from a mean 35.4 to 17.9 (49.5% reduction). Patients receiving UPPP with or without TE also reported improvements in sexual function, ventricular function, sleep stages, serum lipid, depressive disorder and driving performance.

Limitations included a lack of prospective and randomized trials, small sample sizes, inadequate follow-up, non-representative patient group (i.e. predominantly white and male). Investigators concluded that evidence was sufficient to assert that UPPP with or without TE improves adult OSA with regard to respiratory events and daytime sleepiness. Authors called for additional research with long-term follow-up was to compare the effects of UPPPP with or without TE to CPAP, as well as the treatment’s impact on patients’ cardiovascular morbidity.

- In 2016, Choi and colleagues conducted a systematic review and meta-analysis of studies evaluating UPPP as a monotherapy for the treatment of OSA, to identify predictors of success after UPPP.2 Independent investigators systematically searched the literature through January 2015, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 15 retrospective case series were included for review. Age, body mass index (BMI), preoperative apnea-hypopnea index (AHI), Friedman stage and several cephalometric variables were compared between responders and non-responders. Pooled data suggested that Friedman stage I was a strong predictor for success after UPPP, while Friedman stage III and low hyoid position were negative predictors. Age, BMI and preoperative AHI were found not to be predictors of surgical success. Study limitations included the retrospective case series included for review, the lack of RCTs, heterogeneous results and outcome measures constituting treatment success.

- In 2005 (updated 2009; archived 2011), Hayes conducted a systematic review evaluating the safety and efficacy of surgical treatments for sleep apnea.6 Searching the literature through 2011, Hayes included 15 studies for review, of which 7 were RCTs. Three of these RCTs compared UPPP to either continuous positive airway pressure (CPAP), nonsurgical treatment with a mandibular advancement device, or lateral pharyngoplasty (n=198). Results across studies were mixed. One study, with significant attrition, found statistically significant improvements among patients receiving the mandibular advancement device compared to UPPP patients; a second study found significant improvements in daytime sleepiness and snoring but not in decreases in blood oxygen saturation levels during sleep; and a third study found that lateral pharyngoplasty significantly improved daytime sleepiness and AHI compared to UPPP. Findings’ validity was limited by studies’ small sample sizes and lack of long-term follow-up. Hayes ultimately assigned UPPP a “C” rating (potential but unproven benefit), due to a lack of controlled studies relative to CPAP.

*Hyoid Myotomy and Suspension, Surgical Modification of the Tongue, and/or Maxillofacial Surgery, Including Maxillomandibular Advancement (MMA)*
In 2018, John and colleagues conducted a systematic review and meta-analysis evaluating the efficacy of maxillomandibular advancement (MMA) for the treatment of OSA. Independent investigators systematically searched the literature through December 2015, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 20 studies (13 retrospective cohort studies, 3 prospective cohort studies, 1 case series, 1 prospective RCT, 1 retrospective review) were included for review (n=462). Outcomes of interest included apnea-hypopnea index (AHI), respiratory disturbance index (RDI), Epworth Sleepiness Scale (ESS), lowest oxygen saturation (LSAT) and body mass index (BMI). Random-effects modeling was adopted for meta-analysis, except for BMI for which the fixed-effects model was used.

The mean difference between the pre- and post-MMA AHI values was -44.76, representing a significant reduction in events per hour. Compared to baseline, an average change of 82.63% was reported, with 51% of patients (129 out of 251) experiencing an improvement of more than 80%. Surgical success was reported at 100%, with random-effects modeling confirming significant improvements among MMA patients. Investigators also reported statistical significance at the meta-analysis and study level for outcomes of RDI, ESS, LSAT and BMI, although only at the meta-analysis level for LSAT and BMI. All four prospective studies were assessed as having a low-risk of bias. Study limitations included reviewed studies’ lack of information across studies regarding allocation or sequence generation, blinding, individual patient data, retrospective study design of most included studies, and attrition. Investigators concluded that MMA is a successful treatment for OSA, while also calling for additional RCTs, and studies evaluating MMA’s efficacy when performed as an isolated primary procedure.

In 2017, Tan and colleagues conducted a review of systematic reviews evaluating the effect of mandibular advancement with or without maxillary procedures on pharyngeal airways. Independent investigators systematically searched the literature through April 2017, identified eligible studies, assessed study quality and extracted data. In total, 11 systematic reviews were included for review. MMA was found to significantly reduce patients’ apnea-hypopnea index (AHI) and the respiratory disturbance index (RDI). Investigators concluded that MMA increases pharyngeal airway dimensions and improves outcomes for patients with OSA with a relatively high treatment success rate (>85%). Given the extensive evidence supporting the benefit of MMA on OSA patients, investigators called for future studies to investigate correlations between patients’ pre-surgical clinical conditions, degree and direction of jaw movement and surgical success rates.

In 2017, Noller and colleagues conducted a systematic review and meta-analysis evaluating the efficacy of mandibular advancement for patients with OSA who had not previously undergone surgical treatment. Independent investigators systematically searched the literature through April 2017, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 11 studies were included for review (n=57). Meta-analysis showed an average AHI reduction of 87% from a mean of 45.89 ± 23.73 to 6.15 ± 10.144 events per hour. Sub-analysis using random effects modelling reported a mean difference of combined RHI/ADI -34.80 events per hour, and an LSAT rate of 13%. There was no heterogeneity and no inconsistency among findings, however, results were limited by the design of included studies (case reports and small
case series). Authors nonetheless concluded that mandibular advancement or mandibular
distraction osteogenesis significantly improves patient’s OSA.

- In 2016, Song and colleagues conducted a systematic review and meta-analysis evaluating the
  safety and efficacy of hyoid surgery as a monotherapy for the treatment of OSA. Independent
  investigators systematically searched the literature through September 2015, identified eligible
  studies, assessed study quality, extracted data and pooled results. In total, 9 studies (2 case
  reports and 7 case series) were included for review (n=101). Outcomes of interest included AHI,
oxigen saturation, quantitative sleepiness data. In patients undergoing isolated hyoid surgery,
the AHI decreased from a mean 6 standard deviation of 37.3 ± 21.1 events per hour to 23.0 ± 18,
corresponding to a 38.3% reduction (p < .0001). AHI reduced by 38.3% for hyoid myotomy with
2 suspension, by 50.7% for hyothyroidopexy, and by 7.1% for hyoid expansion. Patients’ Epworth
Sleepiness Scale scores decreased by 3.2 points from 10.3 ±4.9 (95% CI: 8.8, 11.8) to 7.1 ± 4.2
(95% CI: 5.8, 8.4; p = .0027). Limitations included studies’ retrospective design, heterogeneous
outcome measures, small sample sizes and inadequate follow-up. Investigators concluded that
while hyoid surgery improved patients’ OSA severity and sleepiness, additional high-quality
studies were needed to establish the long-term safety and efficacy of hyoid myotomy as a
monotherapy.

Hypoglossal Nerve Stimulation

- In 2018, Hayes conducted a systematic review evaluating the safety and efficacy of hypoglossal
nerve stimulation (HGNS) for the treatment of obstructive sleep apnea (OSA). In total, 26
publications base on 10 observational pretest/posttest studies were included for review. At 5-
year follow-up, studies reported significant improvements in patients’ airflow mechanics, and
scores on indices of apnea-hypoxia and oxygen desaturation. All but one study also reported
improvements in patient-reported outcome measures (i.e. Functional Outcomes of Sleep
Questionnaire, Epworth Sleepiness Scale, Sleep Apnea Quality of Life Index, and Beck
Depression Index). Three studies reported improvements in airflow mechanics. Studies reported
conflicting results related to improvements in patients’ sleep parameters, including changes in
sleep efficiency and time spent in stage 1 non-rapid eye movement and rapid eye movement
sleep. Evidence was insufficient to determine definitive patient selection criteria.

Hayes assessed the overall quality of evidence as “low,” (1 study rated as “fair quality;” 6 studies
rated as “poor quality”; 3 studies rated as “very poor” quality) largely due to individual study
limitations including pretest/posttest study design, potential for selection bias, unclear handling
of missing data, loss to follow-up, and small sample sizes. Hayes assigned a “C” rating (potential
but unproven benefit) for HGNS for the treatment of moderate-to-severe OSA in adults for
whom CPAP therapy has failed to provide relief. Investigators concluded that while low-quality
evidence suggests that HGNS may help lessen the severity of OSA and improve quality of life,
more consistent high-quality findings were necessary to definitively establish efficacy and
patient selection criteria for HGNS. Nonetheless, investigators also noted that higher-quality
evidence may never be obtainable due to challenges in conducting high-quality studies in
patients that fail or cannot tolerate CPAP.
• In 2018, Kompelli and colleagues conducted a systematic review and meta-analysis evaluating outcome of HGNS for the treatment of OSA.\textsuperscript{11} Independent investigators systematically searched the literature through July 2017, identified eligible studies, assessed study quality, extracted data and pooled results. In total 16 studies were included for review, analyzing outcomes for 381 patients. Follow-up was 12 months. Patients experienced significant improvements in mean AHI, disability, and Epworth Sleepiness Scale score at 12-months follow-up, but not quality of life. Adverse events were common, including pain (6.2%), tongue abrasion with or without lesions (11.0%), internal device malfunction (3.0%). Other adverse events were experienced by 7.0% of patients. Limitations included the lack of long-term follow-up and significant heterogeneity of data in studies included for review ($I^2 = 64\%, p <0.00001$). Investigators concluded that while HGNS is a safe and effective treatment for OSA refractory to CPAP, further study comparing HGNS to other therapies are necessary to establish HGNS’s place in clinical practice.

• In May of 2018, ECRI published an execute summary regarding the Inspire Upper Airway Stimulation (UAS) system indicating that the evidence was somewhat favorable for the use of HGNS as a treatment of moderate to severe OSA in adult patients.\textsuperscript{12} The reviewed noted that long-term data are still lacking compared to surgical treatment. In addition, the ECRI review concluded, “Findings are at high risk of bias and require further validation in prospective controlled studies of patients with typical OSA risk factors and comorbidities (e.g., obesity, age >65 years). Ongoing studies may partially address evidence gaps.” The ECRI report also identified 38 FDA reports of major adverse events which included 30 injuries and 8 device malfunctions. Finally, ECRI noted there were two prospective are on-going with result expected in 2019 and 2021.

Non-Covered Procedures

\textit{Laser-Assisted Uvulopalatoplasty (LAUP)}

• In 2017, Camacho and colleagues conducted a systematic review and meta-analysis evaluating the safety and efficacy of LAUP for the treatment of obstructive sleep apnea (OSA).\textsuperscript{13} Independent investigators systematically searched the literature through October 2016, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 23 studies were included for review (n=717).

Compared to baseline, LAUP patients experienced a 32% improvement in apnea-hypopnea index (AHI), with random effects modeling for 519 patients demonstrated an AHI mean difference of -6.56 (95% CI -10.14, -2.97) events per hour. Individual patient data analyses demonstrated a 23% success rate (≥50% reduction in AHI and <20 events/h) and an 8% cure rate. Lowest oxygen saturation (LSAT) rates also improved compared to baseline, albeit minimally. The overall success rate was calculated at 23% and a cure rate of 8%. In contrast, 44% of patients' AHI worsened after LAUP. Limitations included case series study design of most studies included for review, and a lack of randomized, controlled studies with long-term follow-up. Moreover, not all studies published individual patient data or sleep study data. The meta-analysis mostly showed insignificant heterogeneity but high inconsistency. In conclusion, investigators speculated that
LAUP may blunt the reflexogenic dilation of the pharyngeal airway, thereby negating any potential improvements of OSA. As such, investigators recommended that LAUP be performed with caution or not performed at all given the unfavorable results of studies published to date.

- In 2005 (updated 2009; archived 2011), Hayes conducted an evidence review of surgical treatments of sleep apnea.\(^6\) Searching the literature through September 2009, 15 studies were included for review of which 3 studies, all RCTs, that evaluated LAUP for the treatment of mild OSA. One RCT with 8 months’ follow-up (n=45) evaluated LAUP versus no treatment. Although patients receiving multiple LAUP treatments experienced significant improvements in snoring and apnea-hypopnea index compared to the control group, improvements in daytime sleepiness and sleep apnea quality of life were not statistically significant. The benefits of LAUP were also limited, corresponding to a 44% decrease in mean snoring intensity and 35% decrease in apnea-hypopnea index. A second study, involved a randomized crossover design comparing LAUP to radiofrequency ablation of the palate (n=17). At 3-months’ follow-up, patients receiving multiple LAUP treatments experienced significant reductions in other symptoms of sleep-disordered breathing (e.g. daytime sleepiness, upper airway collapse). A placebo-controlled study (n=25) reported no significant differences at 3-month follow-up between the control group (no treatment) and LAUP treatment group in snoring, daytime sleepiness, AHI, or quality of life measures. Hayes ultimately assigned a “C” rating (potential but unproven benefit) for LAUP in the treatment of sleep apnea.

Radiofrequency Volume Tissue Reduction of the Soft Palate, Uvula, Tongue Base or Turbinates

- In 2019, Mulholland and colleagues conducted a systematic review and meta-analysis evaluated the safety and efficacy of multilevel and tongue base surgical treatment of OSA.\(^14\) Independent investigators systematically searched the literature through March 2017, identified eligible studies, assessed study quality, extracted data and pooled results. In total, 46 studies were included for review, including 11 surgical subgroups and 1,806 patients. Two studies (1 prospective cohort study, 1 retrospective case controlled trial) examined UPPP with hyoid suspension and radiofrequency tongue-base reduction (RFTBR). Another study evaluated 472 patients receiving RFTBR alongside soft-palate surgery (e.g. UPPP). In this patient group, surgical success ranged from 35.5% to 66.7%, with random-effects modelling reporting a superior decrease in AHI among patients receiving surgical treatment (-16.24, 95% CI -24.62 to -7.85, I² = 95%). The soft-palate procedure (SP), hyoid suspension and RFTBR, and SP and RFTBR groups showed decreases in AHI of -16.57 (95% CI: -21.11 to -12.04) and -18.09 (95% CI: -24.68 to -11.50) respectively. Limitations included the lack of large, prospective, randomized trials with follow-up beyond 9 months. On the basis of these data, investigators concluded that multilevel surgery conferred substantial clinical benefit, despite a need for additional, large controlled studies to better establish treatment safety and efficacy.

- In 2015, Baba conducted a systematic review and meta-analysis evaluating the safety and efficacy of temperature-controlled radiofrequency ablation (TCRFTA) at different sites for the treatment of obstructive OSA.\(^15\) Independent investigators systematically searched the literature through April 2013, identified eligible studies, assessed study quality, extracted data and pooled results. Effectiveness was measured separately for application of RVTR at the base of tongue
and soft palate, and for multi-level intervention. Outcomes of interest were the respiratory disturbance index (RDI), lowest oxygen saturation (LSAT), Epworth sleepiness scale (ESS), and visual analogue scale (VAS snoring). In total, 20 studies were included for review.

In total, 29 studies were included for qualitative review, 20 of which were included for meta-analysis. Meta-analysis reported substantial and consistent improvement among TCRFTA patients in polysomnography (PSG) and subjective outcomes in the base of tongue and multilevel surgery groups only. Specifically, application of RVTR at the base of tongue was associated with significant improvements in RDI (RoM 0.60, CI 0.47-0.76), ESS (RoM 0.59, CI 0.51-0.67), and VAS snoring (RoM 0.48, CI 0.37-0.62) and improvements in LSAT RDI. Complication rates were low and rarely serious across all studies. Investigators concluded that RVTR appears clinically effective in the short-term in reducing RDI levels and symptoms of sleepiness in patients with OSA syndrome when directed at the base of tongue or as a multilevel procedure. Nonetheless, researchers called for long-term studies with less heterogeneity to determine patient selection criteria.

- In 2007 (updated 2011; archived 2012), Hayes conducted an evidence review evaluating the safety and efficacy of radiofrequency tissue volume reduction (RTVR) for the treatment of upper airway obstruction. Searching the literature through February 2011, Hayes included 9 studies for review (8 controlled or comparative trials; 1 uncontrolled trial). Five of the controlled trials were RCTs, one of which was placebo-controlled. Studies focused on reduction of the soft palate, uvula and soft palate, tongue base, tongue base and soft palate and tonsils. Outcomes of interest included quality of life as assessed by questionnaires, respiratory distress index (RDI), apnea index (AI), hypopnea index (HI) and apnea hypopnea index (AHI).

Results from the sole randomized placebo-controlled trial comparing tongue base and palate RTVR with sham RTVR and with nasal CPAP, indicated that CPAP-compliant patients experienced superior AI and AHI outcomes, and comparable quality of life improvements. Results from a small retrospective case-matched comparative trial and a prospective nonrandomized comparative study both reported comparable benefits among RTVR and CPAP patients; however, neither study reported results at follow-up after the post-treatment assessment. Similarly, results of a parallel-arm study did not report the statistical significance of differences between the RTVR and LAUP groups. While one randomized study reported comparable improvements among snoring and OAS for patients undergoing RTVR or palate and uvula compared to radiofrequency channeling, no data was reported beyond four months. RTVR patients also experienced inferior-to-comparable improvements relative to patients, receiving either UPPP, tonsillectomy/adenoidectomy, and conventional surgical treatments for sleep apnea. Patient selection criteria could not be determined.

Hayes ultimately assigned a “C” rating (potential but unproven benefit) for RTVR of the tongue base or tongue base and palate and uvula for the treatment of mild to moderate OSA. Hayes assigned “D” rating (insufficient evidence) for RTVR for the treatment of severe OSA. Limitations included the lack of long-term, prospective studies.

*Palatal Stiffening Procedures/Palatal implants (e.g. the Pillar Procedure™)*
Two systematic reviews were identified that conducted systematic reviews evaluating the safety and efficacy of palatal stiffening operations for OSA.\textsuperscript{16,17} The first study assessed cautery-assisted palatal stiffening operations (CAPSO), and reported statistically and clinically significant improvements in patients' apnea-hypopnea index, oxygen saturation, sleepiness and snoring. Hayes conducted an evidence review assessing palatal implants, including 2 RCTs.\textsuperscript{17} Hayes noted that the validity of the small-to-moderate benefit reported in these studies was limited by a lack of additional controlled trials, a small magnitude of benefit, and lack of long-term follow-up and patient selection criteria. Hayes ultimately assigned a “C” rating (potential but unproven benefit).

\textit{Tongue Suspension Systems (e.g. Repose or Encore)}

Three systematic reviews were identified that evaluated the safety and efficacy of tongue based suspension (TBS) procedures for hypopharyngeal obstruction in OSA.\textsuperscript{5,18,19} Each review noted that while TBS success rates were comparable to UPPP, study findings were limited due to the lack of prospective, randomized and/or controlled studies available for review, small sample sizes for studies assessing TBS as a stand-alone procedure, and the lack of patient selection criteria. Two of the systematic reviews called for further controlled trials assessing efficacy at long-term follow-up.

\section*{CLINICAL PRACTICE GUIDELINES}

\textbf{Medically Necessary Procedures}

\textit{Uvulopalatopharyngoplasty (UPPP)}

- In 2019, the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) issued a clinical practice guideline on the basis of expert opinion and a non-systematic review of evidence.\textsuperscript{20} The body concluded that UPPP and its modifications reduced but does not normalize AHI, but remains an “effective therapies that result in important health and quality of life improvements in properly selected patients.”\textsuperscript{20}

- In 2013, the American College of Physicians issued an evidence-based clinical practice guideline addressing the management of OSA in adults.\textsuperscript{21} Investigators concluded that evidence to date was insufficient to support the use of surgical interventions (including UPPP) over control treatment, CPAP or mandibular advancement devices.

- In 2010, the American Academy of Sleep Medicine issued an evidence-based clinical practice guideline addressing surgical modifications of the upper airway for OSA in adults.\textsuperscript{22} The body concluded that UPPP should only be offered for patients who failed CPAP, given the inability of UPPP to normalize the AHI when treating moderate to severe OSA.

\textit{Mandibular Maxillary Advancement (MMA)}
• In 2013, the American College of Physicians issued an evidence-based clinical practice guideline addressing the management of OSA in adults.21 On the basis of low-quality evidence, the body issued a weak recommendation for mandibular advancement devices in adult OSA patients intolerant to CPAP. Investigators also concluded that evidence to date was insufficient to support the use of surgical interventions (including genioglossal advancement) over control treatment, CPAP or mandibular advancement devices.

• In 2010, the American Academy of Sleep Medicine issued an evidence-based clinical practice guideline addressing surgical modifications of the upper airway for OSA in adults.22 The body stated that maxillomandibular advancement is indicated for surgical treatment of severe OSA in patients who cannot tolerate or who are unwilling to adhere to CPAP, which are more often appropriate in mild and moderate OSA patients.

**Hyoid Myotomy and Suspension, Surgical Modification of the Tongue, and/or Maxillofacial Surgery, including Maxillomandibular Advancement (MMA)**

• In 2013, the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) issued a clinical practice guideline on the basis of expert opinion and a non-systematic review of evidence.23 The body concluded that “genioglossus advancement and hyoid myotomy/suspension, whether performed separately or combined, are considered effective and non-investigational with proven clinical results when considered as part of the comprehensive surgical management of symptomatic adult patients with mild OSA and adult patients with moderate and severe OSA assessed as having tongue base or hypopharyngeal obstruction.”

**Hypoglossal Nerve Stimulation**

• In 2017, NICE issued a guidance stating that HGNS “should only be used with special arrangements” given the limited quantity and quality of research evaluating HGNS’s safety and efficacy.24 NICE called for additional long-term research evaluating treatment safety, patient selection criteria, quality of life, and the position of the procedure in the treatment pathway.

• In 2016, the American Academy of Otolaryngology-Head and Neck Surgery issued a clinical practice guidance, stating that upper airway stimulation (UAS) via the hypoglossal nerve is an effective second-line treatment of moderate to severe obstructive sleep apnea in patients who are intolerant or unable to achieve benefit with positive pressure therapy. 25

**Non-Covered Procedures**

**Laser-Assisted Uvulopalatoplasty (LAUP)**

• In 2013, the American College of Physicians issued an evidence-based clinical practice guideline addressing the management of OSA in adults.21 Investigators concluded that evidence to date was insufficient to support the use of surgical interventions (including LAUP) over control treatment, CPAP or mandibular advancement devices.
• In 2010, the American Academy of Sleep Medicine issued an evidence-based clinical practice guideline addressing surgical modifications of the upper airway for OSA in adults. The body concluded that LAUP should not routinely recommended as a treatment for OSA. This determination was made of the basis of “low quality” evidence (2 RCTs and 6 observational studies), reporting LAUP’s inability to normalize patients’ AHI and secondary outcomes.

Radiofrequency Volume Tissue Reduction of the Soft Palate, Uvula, Tongue Base or Turbinates

• In 2013, the American College of Physicians issued an evidence-based clinical practice guideline addressing the management of OSA in adults. Investigators concluded that evidence to date was insufficient to support the use of surgical interventions (including radiofrequency ablation) over control treatment, CPAP or mandibular advancement devices.

• In 2010, the American Academy of Sleep Medicine issued an evidence-based clinical practice guideline addressing surgical modifications of the upper airway for OSA in adults. The body concluded that radiofrequency ablation (RFA) may be effective in some patients with mild OSA who cannot or will not tolerate positive airway pressure therapy, or in whom oral appliances have failed. This recommendation was made on the basis of “very low quality evidence” (7 observational case series and 1 RCT), reporting improvements in sleepiness and quality of life. The guidance also noted that RFA may not be “predictably efficacious” and that long-term sequelae of RFA had not been published.

Palatal stiffening procedures/Palatal implants (e.g. the Pillar Procedure™)

• In 2010, the American Academy of Sleep Medicine issued an evidence-based clinical practice guideline addressing surgical modifications of the upper airway for OSA in adults. The body concluded that palatal implants may be effective in some patients with mild OSA who cannot or will not tolerate positive airway pressure therapy, or in whom oral appliances have failed. This recommendation was made on the basis of “very low quality evidence” (2 case series and 1 RCT). The body also noted to that “it is difficult to predict if [palatal implants] will be ultimately found to be a reliably effective intervention.”

Tongue Suspension Systems (e.g. Repose or Encore)

• In 2014, the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) issued a clinical practice guideline on the basis of expert opinion and a non-systematic review of evidence. Investigators concluded that tongue-based suspension is “effective and even comparable to genioglossus advancement...when considered as part of a comprehensive approach” in the management of mild OSA in adults. The body also noted that efficacy appears to the procedure’s efficacy appears to diminish in obese patients.

POLICY SUMMARY
Professional clinical organizations and low-quality but consistent evidence from clinical trials support the use of uvulopalatopharyngoplasty, hyoid myotomy and suspension with or without mandibular osteotomy with genioglossus (tongue) advancement, mandibular-maxillary advancement and hypoglossal nerve stimulation for the treatment of obstructive sleep apnea. Evidence does not support, however, the efficacy of laser-assisted uvulopalatoplasty, radiofrequency volume tissue reduction of the soft palate, uvula, tongue base or turbinates; palatal implants; tongue suspension systems; or. Systematic reviews evaluating the latter treatments have noted a lack of long-term evidence from controlled, prospective trials, and called for additional studies to establish these procedures’ safety and efficacy.

INSTRUCTIONS FOR USE

Company Medical Policies serve as guidance for the administration of plan benefits. Medical policies do not constitute medical advice nor a guarantee of coverage. Company Medical Policies are reviewed annually and are based upon published, peer-reviewed scientific evidence and evidence-based clinical practice guidelines that are available as of the last policy update. The Companies reserve the right to determine the application of Medical Policies and make revisions to Medical Policies at any time. Providers will be given at least 60-days’ notice of policy changes that are restrictive in nature.

The scope and availability of all plan benefits are determined in accordance with the applicable coverage agreement. Any conflict or variance between the terms of the coverage agreement and Company Medical Policy will be resolved in favor of the coverage agreement.

REGULATORY STATUS

<table>
<thead>
<tr>
<th>Device</th>
<th>Indications for Use</th>
<th>Contraindications</th>
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<tbody>
<tr>
<td><strong>Somnoplasty System</strong></td>
<td>The Somnoplasty System is intended for the reduction of the incidence of airway obstructions in patients suffering from Upper Airway Resistance Syndrom (UARS) or Obstructive Sleep Apnea Syndrome (OSAS). This device is intended for use by qualified medical personnel trained in the use of electrosurgery.</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>AIRVance®</strong></td>
<td>The AIRvance™ Bone Screw System is intended for anterior tongue base suspension by fixation of the soft tissue of the tongue base to the mandible bone using a bone screw with pre-threaded suture. It is indicated for the treatment of obstructive sleep apnea (OSA) and/or snoring. The AIRvance™ Bone Screw System is also suitable for the performance of a hyoid suspension procedure which can be used in combination with other</td>
<td>n/a</td>
</tr>
</tbody>
</table>
| **MEDICAL POLICY** | **Sleep Disorder Treatment: Surgical**  
| (All Lines of Business Except Medicare) |
| --- | --- |
| procedures for the treatment of obstructive sleep apnea (OSA). It is indicated for the treatment of obstructive sleep apnea (OSA) and/or snoring. |  |
| **Encore™ System**<sup>29</sup> | The Siesta Medical, Inc. ENCORE Tongue Suspension System is intended to be used for anterior advancement of the tongue base by means of a bone screw threaded with suture. It is indicated for the treatment of mild or moderate obstructive sleep apnea (OSA) and /or snoring. |
| **Pillar™ Palatal Implant System**<sup>30</sup> | The Pillar™ Palatal Implant System is intended for the reduction of the incidence of airway obstructions in patients suffering from mild to moderate OSA (Obstructive Sleep Apnea). |
| **Inspire Upper Airway Respiratory (UAS) system (Inspire Medical Systems Inc.)**<sup>31</sup> | Inspire Upper Airway Stimulation (UAS) is used to treat a subset of patients with moderate to severe Obstructive Sleep Apnea (OSA) (Apnea-hypopnea Index [AHI] of greater or equal to 20 and less than or equal to 65). Inspire UAS is used in adult patients 22 years of age and older who have been confirmed to fail or cannot tolerate Positive Airway Pressure (PAP) treatments (such as continuous positive airway pressure [CPAP] or bi-level positive airway pressure [BPAP] machines) and who do not have a complete concentric collapse at the soft palate level. PAP failure is defined as an inability to eliminate OSA (AHI of greater than 20 despite PAP usage) and PAP intolerance is defined as: 1. Inability to use PAP (greater than 5 nights per week of usage; usage defined as greater than 4 hours of use per night), or 2. Unwillingness to use PAP (for example, a patient returns the PAP system after attempting to use it). Contraindications for the use of Inspire therapy include the following:  
- Central and mixed apneas make up over 1/4 of the total apnea-hypopnea index (AHI)  
- Patients with an implantable device that could experience unintended interaction with the Inspire system. Consult the device manufacturer to assess the possibility of interaction.  
- Patients who are, or who plan to become pregnant  
- Patients who require magnetic resonance imaging (MRI)  
- Patients who are unable or do not have the necessary assistance to operate the sleep remote  
- Any condition or procedure that has compromised neurological control of the upper |
Airway (consult your doctor)
- Any anatomical finding that would compromise the performance of upper airway stimulation.

Mental Health Parity Statement

Coverage decisions are made on the basis of individualized determinations of medical necessity and the experimental or investigational character of the treatment in the individual case.

REFERENCES

5. Hayes Inc. Repose® Tongue And Hyoid Suspension (THS) System (Medtronic Xomed Inc.) For Obstructive Sleep Apnea. 2010 (updated 2012; archived 2013).
<table>
<thead>
<tr>
<th>Medical Policy</th>
<th>Sleep Disorder Treatment: Surgical (All Lines of Business Except Medicare)</th>
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