

Clinical Policy: Implantable Hypoglossal Nerve Stimulation for Obstructive Sleep Apnea

Reference Number: LA.CP.MP.180

Date of Last Review: 1/24

[Coding Implications](#)

[Revision Log](#)

See [Important Reminder](#) at the end of this policy for important regulatory and legal information.

Description

Hypoglossal nerve stimulation, also referred to as an upper airway stimulation (UAS) system, is proposed as a treatment strategy for select patients with moderate to severe obstructive sleep apnea (OSA), who have failed continuous positive airway pressure. Appropriate polysomnographic, age, body mass index (BMI) and objective upper airway evaluation measures are required for proper patient selection. This policy addresses the medical necessity criteria for hypoglossal nerve stimulation.

Policy/Criteria

- I. It is the policy of Louisiana Healthcare Connections that *implantable hypoglossal nerve neurostimulation* is **medically necessary** for the treatment of moderate to severe OSA when all of the following criteria are met:
 - A. Device is FDA approved for implantation to treat OSA (e.g., Inspire Upper Airway Stimulation);
 - B. $BMI \leq 40 \text{ kg/m}^2$;
 - C. One of the following;
 1. Age is ≥ 22 years and all of the following;
 - a. Diagnosis of moderate to severe obstructive sleep apnea with an apnea-hypopnea index (AHI) of ≥ 15 and ≤ 100 ;
 - b. Failure or intolerance of Positive Airway Pressure (PAP) treatments (such as continuous positive airway pressure [CPAP] or bi-level positive airway pressure [BPAP] machines), one of the following:
 - i. Inability to eliminate OSA (AHI of greater than 15 despite PAP usage);
 - ii. Inability to use PAP (greater than 5 nights per week of usage; usage defined as greater than 4 hours of use per night); or
 - iii. Unwillingness to use PAP (i.e., patient returns the PAP system after attempting to use it);
 2. Age is 18 to 21 years and all of the following;
 - a. Diagnosis of moderate to severe obstructive sleep apnea with an apnea-hypopnea index (AHI) of ≥ 15 and ≤ 100 ;
 - b. Absence of complete concentric collapse at the soft palate level;
 - c. Adenotonsillectomy is contraindicated or ineffective;
 - d. Failed, or intolerance to PAP therapy despite attempts to improve usage;
 - e. Considered all other standard of care alternative/adjunct therapies;
 3. Members/enrollees with Down syndrome age 13 to 18 years and all of the following;
 - a. Diagnosis of moderate to severe obstructive sleep apnea with an apnea-hypopnea index (AHI) > 10 and < 50 ;
 - b. Absence of complete concentric collapse at the soft palate level;
 - c. Adenotonsillectomy is contraindicated or ineffective;

- d. Failed, or intolerance to PAP therapy despite attempts to improve usage;
- e. Considered all other standard of care alternative/adjunct therapies;
- D. None of the following contraindications:
 - a. Central and mixed apneas > 25% of the total apnea–hypopnea index (AHI);
 - b. Any anatomical finding that would compromise the performance of upper airway stimulation, such as the presence of complete concentric collapse of the soft palate;
 - c. Any condition or procedure that has compromised neurological control of the upper airway;
 - d. Member/enrollee is unable or does not have the necessary assistance to operate the device remote;
 - e. Members/enrollees who are pregnant or plan to become pregnant as upper airway stimulation therapy has not been evaluated for safety or efficacy during pregnancy;
 - f. Members/enrollees with an implantable device that may be susceptible to unintended interaction with the Inspire system;
 - g. Members/enrollees who require magnetic resonance imaging (MRI) other than what is specified in the MR Conditional labeling.

Background

Obstructive sleep apnea (OSA) is a disorder characterized by obstructive apneas and hypopneas due to repetitive collapse of the upper airway during sleep. Untreated OSA has many potential consequences and adverse clinical associations, including excessive daytime sleepiness, impaired daytime function, metabolic dysfunction, and an increased risk of cardiovascular disease and mortality.² Positive airway pressure (PAP) therapy is the mainstay of therapy for adults with OSA, however, the general effectiveness of continuous PAP therapy is dependent on patient acceptance of and adherence to the treatment. Alternative treatments to PAP therapy include custom-made oral appliance therapy and various upper airway surgeries.

Hypoglossal nerve stimulation is proposed as a treatment strategy for select patients with moderate to severe OSA, who have failed CPAP, a BMI ≤ 40 kg/m², and no unfavorable collapse on drug-induced sleep endoscopy. Not all adult patients are candidates for UAS (upper airway stimulation) therapy and appropriate polysomnographic, age, BMI and objective upper airway evaluation measures are required for proper patient selection.^{16,17} At this time, the only FDA approved device (Inspire® Upper Airway Stimulation device) consists of implantable pulse generator (IPG), stimulation lead and sensing lead, and external components (i.e., physician and patient programmer). The IPG detects respiratory effort and maintains airway patency with mild stimulation of the hypoglossal nerve during inspiration. The physician can configure the stimulation settings using the external physician programmer. The patient-operated sleep remote allows the patient to turn therapy on prior to going to sleep and turn therapy off upon waking up. It also provides the ability to pause therapy and adjust stimulation amplitude within physician defined limits that are within the therapeutic range of treatment.²¹

A meta-analysis of uncontrolled studies of upper airway stimulation therapy showed 50 to 57% reductions in AHI, 48 to 52% reductions in oxygen desaturation index, and significant improvements in sleepiness and quality of life at 3 and 12 months.⁹ The largest individual study

of 126 highly selected patients showed major improvements in polysomnography parameters in about two-thirds of patients, improvement in subjective measures of sleepiness, and high adherence (84 percent).¹ These benefits were maintained at five years postoperatively.¹⁰ A pooled analysis of all available patient-level data from the 4 published studies using a single type of hypoglossal nerve stimulator (Inspire II) for OSA reported that hypoglossal nerve stimulation appeared to demonstrate clinically significant improvements in objective measures of OSA severity and subjective measures of daytime sleepiness and sleep-related quality of life in CPAP-intolerant patients with moderate to severe OSA. They noted further that younger and heavier adults tended to have less improvement in disease.¹²

The ADHERE (Adherence and Outcome of Upper Airway Stimulation for OSA International Registry) registry was created to collect demographic, surgical outcome, complications, quality of life and patient-reported outcomes undergoing treatment with upper airway stimulation (UAS) in the U.S. and Europe. The post-approval registry reported median AHI was reduced from 34 to 7 events, median Epworth sleepiness scale reduced from 12 to 7 from baseline to final visit at 12-month post-implant. In post hoc analyses, for each 1-year increase in age, there was a 4% increase in odds of treatment success. For each 1-unit increase in body mass index (BMI), there was 9% reduced odds of treatment success. In the multivariable model, age persisted in serving as statistically significant predictor of treatment success. The authors concluded, UAS is an effective treatment option with high patient satisfaction and low adverse events. Increasing age and reduced BMI are predictors of treatment response.¹¹

Another study was completed on patients who had undergone implantation of the Inspire system and had at least one follow-up visit recorded in the ADHERE database as of June 8, 2021. Patients were placed into 5 subgroups according to baseline AHI: subgroup 1 (AHI 0 to 15), 2 (AHI 15 to 30), 3 (AHI \geq 30 to 50), 4 (AHI > 50 to 65), and 5 (AHI > 65). After 12 months there was significant improvement in objective sleep parameters in subgroups with a baseline AHI of 15 or above. The results suggest that UAS is an effective treatment for patients with an AHI \geq 15 events per hour, independent of preoperative OSA severity. These results clearly support that the indication of UAS could be broadened for patients with an AHI above 65 events per hour, which, to date, is not common practice.²³ Another study suggested that patients with a BMI up to 35 kg/m² had a positive treatment response with UAS therapy.²⁴ The findings, together with the results of the present analysis, suggest that the current indications for Inspire could be broadened. Patient satisfaction remained high in all subgroups. The results support the broader indication for UAS therapy in patients with an AHI above 50 events/h and even above 65 events per hour of sleep. This group of patients has the highest burden of disease, in whom no other effective treatment options are available in case of CPAP failure.

Studies comparing hypoglossal nerve stimulation to other treatments of OSA as well as large long term randomized controlled trials are lacking. This treatment is continuing to evolve with ongoing enhancements in the device hardware, software, implantation procedure, and treatment protocols. Additional research is needed to determine criteria for outcomes assessment, patient selection, predictors of treatment success, and the possibility of combination therapy to eradicate OSA and address additional accompanying comorbidities.¹⁹

American Academy of Otolaryngology-Head and Neck Surgery

The American Academy of Otolaryngology-Head and Neck Surgery considers UAS via the hypoglossal nerve for the treatment of adult OSA syndrome to be an effective second-line treatment of moderate to severe OSA in patients who are intolerant or unable to achieve benefit with PAP.⁶

American Academy of Sleep Medicine

The American Academy of Sleep Medicine suggests referral to a sleep surgeon for adults meeting certain clinical parameters and persistent inadequate PAP adherence due to pressure-related side effects as part of a patient-oriented discussion of adjunctive or alternative treatment options. Available data indicate upper airway surgery elicits a moderate effect in decreasing minimum therapeutic PAP level and improving compliance with PAP use.²⁰

International Society for Sleep Surgery

The International Society for Sleep Surgery indicates that hypoglossal nerve stimulation has been shown to be effective in the treatment of sleep disordered breathing/obstructive sleep apnea syndrome in adults when applied to select patients based on their anatomy, physiology, body mass index and neck size, prior therapy and co-morbidities. Treatment should be preceded by an appropriate evaluation, which may include polysomnography, home sleep testing, awake or drug induces sleep endoscopy and possible cephalometric or other radiographic evaluations.¹⁷

National Institute of Health and Care Excellence (NICE)

Current evidence on the safety and efficacy of hypoglossal nerve stimulation for moderate to severe obstructive sleep apnea is limited in quantity and quality. Therefore, this procedure should only be used with special arrangements for clinical governance, consent and audit or research.¹⁴

Coding Implications

This clinical policy references Current Procedural Terminology (CPT®). CPT® is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2022, American Medical Association. All rights reserved. CPT codes and CPT descriptions are from the current manuals and those included herein are not intended to be all-inclusive and are included for informational purposes only. Codes referenced in this clinical policy are for informational purposes only and may not support medical necessity. Inclusion or exclusion of any codes does not guarantee coverage. Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

NOTE: Coverage is subject to each requested code’s inclusion on the corresponding LDH fee schedule. Non-covered codes are denoted (*) and are reviewed for Medical Necessity for members under 21 years of age on a per case basis.

CPT® Codes	Description
64582	Open implantation of hypoglossal nerve neurostimulator array, pulse generator, and distal respiratory sensor electrode or electrode array

CLINICAL POLICY
Implantable Hypoglossal Nerve Stimulation



CPT® Codes	Description
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

HCPCS Codes	Description
C1767	Generator, neurostimulator (implantable), nonrechargeable
C1778	Lead, neurostimulator (implantable)
C1787*	Patient programmer, neurostimulator
L8679*	Implantable neurostimulator, pulse generator, any type
L8680*	Implantable neurostimulator electrode, each
L8681*	Patient programmer (external) for use with implantable programmable neurostimulator pulse generator, replacement only
L8686*	Implantable neurostimulator pulse generator, single array, nonrechargeable, includes extension

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Converted corporate to local policy.	11/2020	
Annual review completed. I.C. Changed BMI to 35 kg/m ² ; I.E. Adjusted AHI to ≥15 to ≤ 65 events per hour; I.F.1. Adjusted 20 to 15. Added criteria I.I.5. and I.I.8. through 14. Background updated and minor rewording with no clinical significance. Added CPT codes 64582, 64583, and 64584. Removed CPT codes 0466T, 0467T, 0468T, 61886, 61888, 64568, 64569, 64570, and 64585. Removed ICD-10 diagnosis table. References reviewed, reformatted and updated. Reviewed by internal specialist. Changed "Last Review Date" in the header to "Date of Last Review" and "Date" in revision log to "Revision Date."	1/2023	4/3/23
Annual review. Edits were made to criteria to align with the FDA updates issued June 8, 2023, for the Inspire Upper Airway Stimulation System. Updated criteria B. from "Age > 22 years" to "BMI ≤ 40 kg/m ² "; changed C. from "BMI < 35 kg/m ² " to "One of the following:" adding C.1 to C.3, indicating the updated age ranges and associated criteria. Contraindications were updated to I.D.a to I.D.g. The original criteria points I.E to I.I were removed. Background updated with no clinical significance. References reviewed and updated. Reviewed by external specialist. Added note for non-covered codes.	1/24	3/25/24

References

1. Strollo PJ Jr, Soose RJ, Maurer JT, et al. Upper-airway stimulation for obstructive sleep apnea. *N Engl J Med*. 2014;370(2):139 to 149. doi:10.1056/NEJMoa1308659
2. Kryger MH, Malhotra A. Management of obstructive sleep apnea in adults. UpToDate. www.uptodate.com. Updated July 18, 2023. Accessed October 13, 2023.
3. Weaver EM, Kapur VK. Surgical treatment of obstructive sleep apnea in adults. UpToDate. www.uptodate.com. Published June 12, 2023. Accessed October 13, 2023.
4. United States Food and Drug Administration. Approval letter for inspire upper airway stimulation (P130008). <https://www.fda.gov/medical-devices/recently-approved-devices/inspirer-upper-airway-stimulation-p130008s039> Approved April 14, 2020. Accessed October 10, 2023.
5. Health technology assessment: Hypoglossal nerve stimulation (HGNS) for the treatment of obstructive sleep apnea. Hayes. www.hayesinc.com. Published October 30, 2018 (annual review December 27, 2022). Accessed October 13, 2023.
6. American Academy of Otolaryngology-Head and Neck Surgery. Position Statement: hypoglossal nerve stimulation for treatment of obstructive sleep apnea (OSA). Revised November 13, 2019. <https://www.entnet.org/resource/position-statement-hypoglossal-nerve-stimulation-for-treatment-of-obstructive-sleep-apnea-osa/> Accessed October 11, 2023.
7. Kline LR. Clinical presentation and diagnosis of obstructive sleep apnea in adults. UpToDate. www.uptodate.com. Updated October 5, 2023. Accessed September 9, 2022.
8. Inspire Medical Systems. Inspire therapy. <https://professionals.inspiresleep.com/>. Accessed October 5, 2023.
9. Certal VF, Zaghi S, Riaz M, et al. Hypoglossal nerve stimulation in the treatment of obstructive sleep apnea: a systematic review and meta-analysis. *Laryngoscope*. 2015;125(5):1254 to 1264. doi:10.1002/lary.25032
10. Woodson BT, Strohl KP, Soose RJ, et al. Upper airway stimulation for obstructive sleep apnea: 5-year outcomes. *Otolaryngol Head Neck Surg*. 2018;159(1):194 to 202. doi:10.1177/0194599818762383
11. Heiser C, Steffen A, Boon M, et al. Post-approval upper airway stimulation predictors of treatment effectiveness in the ADHERE registry. *Eur Respir J*. 2019;53(1):1801405. Published 2019 Jan 3. doi:10.1183/13993003.01405-2018
12. Kent DT, Carden KA, Wang L, Lindsell CJ, Ishman SL. Evaluation of hypoglossal nerve stimulation treatment in obstructive sleep apnea. *JAMA Otolaryngol Head Neck Surg*. 2019;145(11):1044 to 1052. doi:10.1001/jamaoto.2019.2723
13. 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*. 2010;33(10):1408 to 1413. doi:10.1093/sleep/33.10.1408
14. National Institute of Health and Care Excellence (NICE). Hypoglossal nerve stimulation for moderate to severe obstructive sleep apnoea. Interventional procedures guidance [IPG598]. <https://www.nice.org.uk/guidance/ipg598> Published November 2017. Accessed October 13, 2023.
15. Suurna M. Hypoglossal nerve stimulation for adult patients with obstructive sleep apnea. UpToDate. www.uptodate.com. Updated August 22, 2023. Accessed October 13, 2023.

16. Mashaqi S, Patel SI, Combs D, et al. The hypoglossal nerve stimulation as a novel therapy for treating obstructive sleep apnea—a literature review. *Int J Environ Res Public Health*. 2021;18(4):1642. Published 2021 Feb 9. doi:10.3390/ijerph18041642
17. Local coverage determination: Hypoglossal nerve stimulation for the treatment of obstructive sleep apnea (L38310). Centers for Medicare and Medicaid Services Web site. www.cms.gov/medicare-coverage-database/search.aspx. Published March 15, 2020. Accessed October 13, 2023.
18. Local coverage article: Billing and Coding: Hypoglossal nerve stimulation for the treatment of obstructive sleep apnea (A57948). Centers for Medicare and Medicaid Services Web site. www.cms.gov/medicare-coverage-database/search.aspx. Published March 15, 2020 (revised January 1, 2022). Accessed October 11, 2023.
19. Suurna MV, Jacobowitz O, Chang J, et al. Improving outcomes of hypoglossal nerve stimulation therapy: current practice, future directions, and research gaps. Proceedings of the 2019 International Sleep Surgery Society Research Forum. *J Clin Sleep Med*. 2021;17(12):2477 to 2487. doi:10.5664/jcsm.9542
20. Kent D, Stanley J, Aurora RN, et al. Referral of adults with obstructive sleep apnea for surgical consultation: an American Academy of Sleep Medicine clinical practice guideline. *J Clin Sleep Med*. 2021;17(12):2499 to 2505. doi:10.5664/jcsm.9592
21. United States Food and Drug Administration. Approval letter for inspire upper airway stimulation (P130008, S090). https://www.accessdata.fda.gov/cdrh_docs/pdf13/P130008S090A_Approved_June_8, 2023. Accessed October 5, 2023
22. Evidence Analysis Research Brief. Hypoglossal Nerve Stimulation for the treatment of Obstructive Sleep Apnea. Hayes. www.hayesinc.com. Published August 28, 2023. Accessed October 9, 2023.
23. Bosschiet PFN, de Vries N, Mehra R, et al. Similar effect of hypoglossal nerve stimulation for obstructive sleep apnea in 5 disease severity categories. *J Clin Sleep Med*. 2022;18(6):1657 to 1665. doi:10.5664/jcsm.9956
24. Suurna MV, Steffen A, Boon M, et al. Impact of Body Mass Index and Discomfort on Upper Airway Stimulation: ADHERE Registry 2020 Update. *Laryngoscope*. 2021;131(11):2616-2624. doi:10.1002/lary.29755

Important Reminder

This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. LHCC makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage

CLINICAL POLICY

Implantable Hypoglossal Nerve Stimulation



decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable LHCC administrative policies and procedures.

This clinical policy is effective as of the date determined by LHCC. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. LHCC retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members/enrollees. This clinical policy is not intended to recommend treatment for members/enrollees. Members/enrollees should consult with their treating physician in connection with diagnosis and treatment decisions.

Providers referred to in this clinical policy are independent contractors who exercise independent judgment and over whom LHCC has no control or right of control. Providers are not agents or employees of LHCC.

This clinical policy is the property of LHCC. Unauthorized copying, use, and distribution of this clinical policy or any information contained herein are strictly prohibited. Providers, members/enrollees and their representatives are bound to the terms and conditions expressed herein through the terms of their contracts. Where no such contract exists, providers, members/enrollees and their representatives agree to be bound by such terms and conditions by providing services to members/enrollees and/or submitting claims for payment for such services.

©2024 Louisiana Healthcare Connections. All rights reserved. All materials are exclusively owned by Louisiana Healthcare Connections and are protected by United States copyright law and international copyright law. No part of this publication may be reproduced, copied, modified, distributed, displayed, stored in a retrieval system, transmitted in any form or by any means, or otherwise published without the prior written permission of Louisiana Healthcare Connections. You may not alter or remove any trademark, copyright or other notice contained herein. Louisiana Healthcare Connections is a registered trademark exclusively owned by Louisiana Healthcare Connections.