

## Clinical Policy: Vagus Nerve Stimulation

Reference Number: CP.MP.12

Last Review Date: 08/18

[Coding Implications](#)

[Revision Log](#)

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

### Description

Vagus nerve stimulation (VNS) has been used in the treatment of epilepsy and has been studied for the treatment of refractory depression and other indications. Electrical pulses are delivered to the cervical portion of the vagus nerve by an implantable device called a neurocybernetic prosthesis. Chronic intermittent electrical stimulation of the left vagus nerve is designed to treat medically refractory epilepsy. It has recently been introduced and approved by the FDA as an adjunctive therapy for treatment-resistant major depression.

### Policy/Criteria

- I. It is the policy of health plans affiliated with Centene Corporation® that VNS is **medically necessary** in patients with medically refractory seizures who meet all of the following:
  - A. Diagnosis of focal onset (formerly partial onset) seizures or generalized onset seizures;
  - B. Intractable epilepsy (both):
    1. Failure of at least 1 year of adherent therapy of at least two anti-seizure drugs, *and*
    2. Continued seizures which have a major impact on activities of daily living; *and*
  - C. Not a suitable candidate for or has failed resective epilepsy surgery;
  - D. Request is for an FDA-approved device.
  
- II. It is the policy of health Plans affiliated with Centene Corporation that VNS therapy is considered **investigational** for any other conditions, including but not limited to the following, because the evidence is limited supporting its safety and efficacy:
  - A. Refractory (treatment resistant) major depression or bipolar disorder;
  - B. Obesity;
  - C. Headaches;
  - D. Cognitive impairment associated with Alzheimer's disease.
  
- III. It is the policy of health plans affiliated with Centene Corporation that the following types of VNS therapy are considered **investigational** due to the lack of large, high-quality studies supporting their use:
  - A. Aspire SR Model 106 (Cyberonics) for vagus nerve stimulation;
  - B. Transcutaneous VNS or active auricular transcutaneous electrical nerve stimulation.

### *Removal of Implant*

Less than 0.5 percent of all patients have had the device removed. It can be turned off in the physician's office if the patient feels it is not helping or if the patient cannot tolerate the stimulation. If the device needs to be removed, only the pulse generator is removed, as attempting to remove the electrodes from around the nerve can cause damage and is not recommended.

## **Background**

The vagus nerve stimulator is a pacemaker-like device implanted under the skin in the left side of the chest through a small incision, with a second small incision made at the base of the neck. The surgery is performed under local, regional, or general anesthesia and lasts 45 minutes to two hours. Most often, it is performed as an outpatient surgery but some patients need to stay in the hospital overnight following surgery.

### *Focal (partial) seizures*

Several studies have been done evaluating the safety and effectiveness of vagus nerve stimulation for treatment of epilepsy. A randomized active-control trial known as the E05 study found that 94 patients (of the total 254 patients in the study) receiving high stimulation showed an average reduction in seizure frequency, compared to baseline, of 28% versus 15% reduction in the 102 patients receiving low stimulation. A total of 310 patients completed the E03 and E05 double-blinded trials. Mean decline of seizure frequency overall was about 25-30% compared to baseline. Clinical experience has shown that improvement in seizures is maintained, or may even increase over time, but these data are based on uncontrolled observations. Side effects in both studies were similar and included hoarseness and occasional shortness of breath.

Although questions regarding patient selection criteria, optimal stimulation parameters, and cost-effectiveness in the United States remain under investigation, there is sufficient evidence regarding the benefit and safety of VNS to conclude that VNS may improve health outcomes in patients with medically refractory focal-onset seizures who are not suitable candidates for surgery or in whom surgical treatment has failed.

### *Generalized seizures*

Study results suggest VNS may be effective for generalized epilepsy (Karciski & Schachter, 2015). However, case series and observational studies constitute the majority of available evidence. Although VNS is not currently FDA approved for the treatment of generalized seizures, it is often used in children and other patients, and in Europe is approved as adjunct therapy for epileptic disorders predominantly characterized by generalized or focal seizures that are refractory to antiseizure medications. In addition, the National Institute for Health and Care Excellence (NICE) recommends VNS for focal and generalized seizures, and the Scottish Intercollegiate Guidelines Network (SIGN) guidelines recommend VNS for epilepsy in patients unsuitable for respective surgery without stipulating seizure type.

### *Depression*

VNS was FDA-approved for treatment resistant depression in 2005. However, VNS has no rigorous research data proving it is efficacious for treatment-resistant, unipolar major depression. Open-label studies suggest VNS may be effective; however, these are at risk for bias due to placebo effects. The one randomized trial of VNS for depression found no benefit, with outcomes comparable for active and sham treatment (response rates of 15 vs. 10 percent). In addition, there is a lack of thorough safety data for the use of VNS in depression.

### *Other Investigational Indications*

Ongoing research efforts continue to investigate the role of vagus nerve stimulation (VNS) for a the treatment of a variety of indications, including but not limited to cognitive deficits in

## CLINICAL POLICY

### Vagus Nerve Stimulation

Alzheimer's disease, resistant obesity, and headaches. Data supporting the long-term safety and efficacy from large clinical trials of VNS for the treatment of these indications, however, continue to be lacking.

#### *AspireSR Model 106 (Cyberonics) for Vagus Nerve Stimulation*

The AspireSR Model 106 (Cyberonics Inc.) received FDA Premarket Approval (PMA) in February 2014. The newest modification to the vagus nerve stimulation (VNS) implant detects tachycardia heart rates, which may be associated with an impending seizure, and automatically delivers stimulation to the vagus nerve. Like its predecessors, the AspireSR can also deliver stimulation in the normal and magnet modes. However, when programmed for AutoStim mode, the AspireSR requires no patient interaction to trigger the delivery of electrical stimulation. The AutoStim mode should not be used in patients with significant arrhythmias being treated with pacemakers and/or an implantable defibrillator, beta-blockers, or any other treatment that may impact the intrinsic heart rate.

A few small, preliminary studies and case reports have evaluated the AspireSR Model 106, and have shown positive results (Boon et al., 2015; Fisher et al., 2015; Schneider et al., 2015; Hampel et al, 2015). However, there is insufficient evidence to establish the safety and efficacy of the AspireSR Model 106 in reducing seizures until further, high quality trials establish its clinical value.

#### *Transcutaneous Vagus Nerve Stimulation*

Active auricular transcutaneous electrical nerve stimulation is also referred to as transcutaneous vagus nerve stimulation (tVNS). Noninvasive, tVNS stimulates the afferent auricular branch of the vagus nerve located medial of the tragus at the entry of the acoustic meatus. Given that the right vagal nerve has efferent fibers to the heart, tVNS is safe to be performed only in the left ear. tVNS has been proposed to study cognitive functioning in patients with epilepsy and major depression. The rationale is that direct stimulation of the afferent nerve fibers on the ear area with afferent vagus nerve distribution should produce a similar effect as classic VNS in reducing depressive symptoms without the burden of surgical intervention.

A noninvasive, transcutaneous vagal nerve stimulator has been in use in Europe. The device stimulates the auricular branch of the vagus nerve. It does this via a small earphone-like stimulator. Although no randomized studies have been done in patients with epilepsy, it appears promising in one pilot study (Bauer et al, 2016). Small studies have shown positive results with tVNS for the treatment of depression (Hein et al, 2013; Fang et al, 2016). Additional, larger, peer-reviewed studies, with longer follow-up are necessary to determine the long-term safety and efficacy of transcutaneous VNS for depression.

### **Coding Implications**

This clinical policy references Current Procedural Terminology (CPT<sup>®</sup>). CPT<sup>®</sup> is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2018, 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. Inclusion or exclusion of any codes does not guarantee coverage.

**CLINICAL POLICY**  
**Vagus Nerve Stimulation**

Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

<b>CPT® Codes</b>	<b>Description</b>
61885	Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to a single electrode array
61886	Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to two or more electrode arrays
64553	Percutaneous implantation of neurostimulator electrodes; cranial nerve
64568	Incision for implantation of cranial nerve (eg, vagus nerve) neurostimulator electrode array and pulse generator
64569	Revision or replacement of cranial nerve (eg, vagus nerve) neurostimulator electrode array, including connection to existing pulse generator
64570	Removal of cranial nerve (eg, vagus nerve) neurostimulator electrode array and pulse generator

<b>HCPCS Codes</b>	<b>Description</b>
C1767	Generator, neurostimulator (implantable), nonrechargeable
C1778	Lead, neurostimulator (implantable)
C1816	Receiver and/or transmitter, neurostimulator (implantable)
C1883	Adaptor/extension, pacing lead or neurostimulator lead (implantable)
L8680	Implantable neurostimulator electrode, each
L8681	Patient programmer (external) for use with implantable programmable neurostimulator pulse generator, replacement only
L8682	Implantable neurostimulator radiofrequency receiver
L8683	Radiofrequency transmitter (external) for use with implantable neurostimulator radiofrequency receiver
L8685	Implantable neurostimulator pulse generator, single array, rechargeable, includes extension
L8686	Implantable neurostimulator pulse generator, single array, nonrechargeable, includes extension
L8687	Implantable neurostimulator pulse generator, dual array, rechargeable, includes extension
L8688	Implantable neurostimulator pulse generator, dual array, nonrechargeable, includes extension
L8689	External recharging system for battery (internal) for use with implanted neurostimulator, replacement only

**ICD-10-CM Diagnosis Codes that Support Coverage Criteria**

<b>ICD-10-CM Code</b>	<b>Description</b>
G40.001	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, with status epilepticus

**CLINICAL POLICY**  
**Vagus Nerve Stimulation**

<b>ICD-10- CM Code</b>	<b>Description</b>
G40.009	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, without status epilepticus
G40.011	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, with status epilepticus
G40.019	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, without status epilepticus
G40.111	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, with status epilepticus
G40.119	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, without status epilepticus
G40.201	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, with status epilepticus
G40.209	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, without status epilepticus
G40.211	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, with status epilepticus
G40.219	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, without status epilepticus
G40.309	Generalized idiopathic epilepsy and epileptic syndromes, not intractable, without status epilepticus
G40.319	Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus
G40.A09	Absence epileptic syndrome, not intractable, without status epilepticus
G40.A11	Absence epileptic syndrome, intractable, with status epilepticus
G40.A19	Absence epileptic syndrome, intractable, without status epilepticus
G40.409	Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus
G40.411	Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus
G40.419	Other generalized epilepsy and epileptic syndromes, intractable, without status epilepticus
G40.509	Epileptic seizures related to external causes, not intractable, without status epilepticus
G40.802	Other epilepsy, not intractable, without status epilepticus
G40.803	Other epilepsy, intractable, with status epilepticus
G40.804	Other epilepsy, intractable, without status epilepticus
G40.909	Epilepsy, unspecified, not intractable, without status epilepticus
G40.911	Epilepsy, unspecified, intractable, with status epilepticus

ICD-10-CM Code	Description
G40.919	Epilepsy, unspecified, intractable, without status epilepticus

Reviews, Revisions, and Approvals	Date	Approval Date
Deleted age criteria; background updated	09/13	10/13
Reviewed and references and coding updated	09/14	10/14
Combined with VNS for depression policy Added bipolar disorder to not medically necessary list Converted into new template, added ICD-10 codes	10/15	10/15
Added generalized seizures as medically necessary. Removed requirement for 4-6 seizures per month. Added requirement that VNS be performed with a FDA approved device. Changed depression and bipolar disorder to investigational, and also added obesity, headaches, cognitive impairment due to Alzheimer's, transcutaneous VNS/auricular transcutaneous electrical nerve stimulation, and AspireSR Model 106 as investigational. Added supporting background information.	09/16	10/16
Changed II. to apply to the listed conditions as well as others that were not mentioned. Coding updates. References reviewed and updated.	10/17	10/17
Changed "partial onset" to "focal onset" throughout to reflect seizure classification changes made by the International League Against Epilepsy in 2017. References reviewed and updated.	08/18	08/18

**References**

1. 2017 Revised Classification of Seizures. (2016, December 22). Retrieved from <https://www.epilepsy.com/article/2016/12/2017-revised-classification-seizures>
2. Agency for Healthcare Research and Quality: Evidence report technology assessment, number 77, management of treatment related epilepsy, May 2003.
3. A.T. Berg, B.G. Vickrey and F.M. Testa et al., How long does it take for epilepsy to become intractable? A prospective investigation, *Ann Neurol* 60 (2006), pp. 73–9.
4. Ben-Menachem E, Revesz D, Simon BJ, Silberstein S. Surgically implanted and non-invasive vagus nerve stimulation: a review of efficacy, safety and tolerability. *Eur J Neurol*. 2015 Sep; 22(9): 1260–1268.
5. Bauer S, Baier H, Baumgartner C, et al. Transcutaneous Vagus Nerve Stimulation (tVNS) for Treatment of Drug-Resistant Epilepsy: A Randomized, Double-Blind Clinical Trial (cMPsE02). *Brain Stimul*. 2016 May-Jun;9(3):356-63. Epub 2016 Jan 20.
6. Bishel MD: Apollo's Medical Review Criteria Guidelines for Managed Care: Vagus nerve stimulation (VNS) for the treatment of refractory seizures. Twelfth edition, 2013.
7. Boon P, Vonck K, van Rijckevorsel K, et al. A prospective, multicenter study of cardiac-based seizure detection to activate vagus nerve stimulation. *Seizure*. 2015 Nov;32:52-61. doi: 10.1016/j.seizure.2015.08.011. Epub 2015 Sep 21.
8. Center for Devices and Radiological Health (CDRH). P970003/S50. VNS Therapy System [premarket approval letter]. July 15, 2005b. Food and Drug Administration. Available at: [http://www.accessdata.fda.gov/cdrh\\_docs/pdf/P970003S050a.pdf](http://www.accessdata.fda.gov/cdrh_docs/pdf/P970003S050a.pdf). Accessed September 8, 2013.

9. Fang J, Rong P, Hong Y, et al. Transcutaneous Vagus Nerve Stimulation Modulates Default Mode Network in Major Depressive Disorder. *Biol Psychiatry*. 2015 Apr 2. pii: S0006-3223(15)00274-7. doi: 10.1016/j.biopsych.2015.03.025.
10. Fisher RS, Afra P, Macken M, et al. Automatic Vagus Nerve Stimulation Triggered by Ictal Tachycardia: Clinical Outcomes and Device Performance-The U.S. E-37 Trial. *Neuromodulation*. 2016 Feb;19(2):188-95. doi: 10.1111/ner.12376. Epub 2015 Dec 13.
11. Guan G, Karsy M, Ducis K, Bollo RJ. Surgical strategies for pediatric epilepsy. *Translational Pediatrics*. 2016 Apr; 5(2): 55–66.
12. Hayes Clinical Research Response: AspireSR Model 106 (Cyberonics) for Vagus Nerve Stimulation. February 25, 2016.
13. Hayes Medical Technology Directory: Vagus nerve stimulation for depression. Lansdale, PA: Hayes, Inc. ©2006-2013 Winifred S. Hayes, Inc. October 15, 2013. Accessed August 14, 2018.
14. Hampel KG, Vatter H, Elger CE, et al. Cardiac-based vagus nerve stimulation reduced seizure duration in a patient with refractory epilepsy. *Seizure*.
15. Hayes Medical Technology Directory: Vagus nerve stimulation for epilepsy. June 9, 2014. Accessed August 13, 2018.
16. Hein E, Nowak M, Kiess O, et al. Auricular transcutaneous electrical nerve stimulation in depressed patients: a randomized controlled pilot study. *J Neural Transm (Vienna)*. 2013;120(5):821.
17. Holtzheimer PE. Unipolar depression in adults: Treatment with surgical approaches. In: *UpToDate*, Roy-Byrne PP (Ed), UpToDate, Waltham, MA. Accessed August 15, 2018.
18. Karceski S, Schachter SC. Vagus nerve stimulation therapy for the treatment of epilepsy. In: *UpToDate*, Pedley, TA (Ed), UpToDate, Waltham, MA. Accessed August 13, 2018.
19. Klinkenberg S, et al. Vagus nerve stimulation in children with intractable epilepsy: a randomized controlled trial. *Developmental Medicine and Child Neurology* 2012;54(9):855-61.
20. Kwan P, Brodie MJ. Early identification of refractory epilepsy, *N Engl J Med* 342 (2000), pp. 314–39.
21. Medical News Today: New FDA approved device offers hope to depressed patients, July 2005. <http://www.medicalnewstoday.com/printerfriendlynews.php?newsid=27968>
22. Medicare Coverage Database: Vagus Nerve Stimulation for Treatment of Seizures. 2007. Centers for Medicare and Medicaid. [http://www.cms.hhs.gov/mcd/viewncd.asp?ncd\\_id=160.18&ncd\\_version=2&basket=ncd%3A160%2E18%3A2%3AVagus+Nerve+Stimulation+for+Treatment+of+Seizures](http://www.cms.hhs.gov/mcd/viewncd.asp?ncd_id=160.18&ncd_version=2&basket=ncd%3A160%2E18%3A2%3AVagus+Nerve+Stimulation+for+Treatment+of+Seizures)
23. Morris GL, et al. Evidence-based guideline update: Vagus nerve stimulation for the treatment of epilepsy. *American Academy of Neurology*. August 28, 2013.
24. Panebianco M, Rigby A, Weston J, Marson AG. Vagus nerve stimulation for partial seizures. *Cochrane Database Syst Rev*. 2015 Apr 3;(4):CD002896.
25. Schachter SC. Overview of the management of epilepsy in adults. In: *UpToDate*, Pedley TA (Ed), UpToDate, Waltham, MA. Accessed August 13, 2018.
26. Sirven, JI. Evaluation and management of drug-resistant epilepsy. In: *UpToDate*, Garcia P (Ed), UpToDate, Waltham, MA. Accessed August 13, 2018.
27. U.S. Food and Drug Administration: Summary of safety and effectiveness data. July 15, 2005. [https://www.accessdata.fda.gov/cdrh\\_docs/pdf/P970003S050b.pdf](https://www.accessdata.fda.gov/cdrh_docs/pdf/P970003S050b.pdf)

28. Wilfong A. Seizures and epilepsy in children: Refractory seizures and prognosis. In: UpToDate, Nordli DR (Ed), UpToDate, Waltham, MA. August 16, 2018.

**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. The Health Plan 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. “Health Plan” means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan’s affiliates, as applicable.

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 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 Health Plan-level administrative policies and procedures.

This clinical policy is effective as of the date determined by the Health Plan. 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. The Health Plan 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. This clinical policy is not intended to recommend treatment for members. Members 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 the Health Plan has no control or right of control. Providers are not agents or employees of the Health Plan.

This clinical policy is the property of the Health Plan. Unauthorized copying, use, and distribution of this clinical policy or any information contained herein are strictly prohibited. Providers, members and their representatives are bound to the terms and conditions expressed

## CLINICAL POLICY

### Vagus Nerve Stimulation

herein through the terms of their contracts. Where no such contract exists, providers, members and their representatives agree to be bound by such terms and conditions by providing services to members and/or submitting claims for payment for such services.

**Note: For Medicaid members,** when state Medicaid coverage provisions conflict with the coverage provisions in this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

**Note: For Medicare members,** to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Articles should be reviewed prior to applying the criteria set forth in this clinical policy. Refer to the CMS website at <http://www.cms.gov> for additional information.

©2016 Centene Corporation. All rights reserved. All materials are exclusively owned by Centene Corporation 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 Centene Corporation. You may not alter or remove any trademark, copyright or other notice contained herein. Centene® and Centene Corporation® are registered trademarks exclusively owned by Centene Corporation.