Clinical Policy: Vagus Nerve Stimulation

Reference Number: LA.CP.MP.12 Coding Implications
Date of Last Revision: ~~9/22~~09/23 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.[1] ~~-~~ VNS has recently been introduced and approved by the Food and Drug Administration (FDA) as an adjunctive therapy for treatment-resistant major depression.[2]

Policy/Criteria

I. It is the policy of Louisiana Healthcare Connections that~~-~~ vagus nerve stimulation~~-~~ (VNS) is **medically necessary** in ~~patients~~members/enrollees 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~~one 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, is opposed to, or has failed epilepsy surgery;
D. Request is for an ~~Food and Drug Administration~~ FDA approved device.

II. It is the policy of Louisiana Healthcare Connections that the safety and efficacy of VNS therapy has not been proven for any other conditions, including but not limited to the following:

A. Refractory (treatment resistant) major depression or bipolar disorder;
~~B. Obesity;~~
~~C.~~B. Headaches;
~~D.~~C. Cognitive impairment associated with Alzheimer's disease~~.~~;
~~E.~~D. Addiction;
~~F.~~E. Anxiety Disorders;
~~G.~~F. Autism;
~~H.~~G. Eating Disorders;
~~I.~~H. Cancer;
~~J.~~I. Crohn's Disease;
~~K.~~J. Essential trauma;
~~L.~~K. Fibromyalgia;
~~M.~~L. Heart failure;
~~N.~~M. Impaired glucose tolerance/pre-diabetes;
~~O.~~N. Inflammation;
~~P.~~O. Overweight and obesity;
~~Q.~~P. Obsessive-compulsive disorder;
~~R.~~Q. Panic disorder;
~~S.~~R. Post-traumatic stress disorder;

~~T.~~S. Prader-Willi Syndrome;
~~U.~~T. Sjogren's Syndrome;
~~V.~~U. Rheumatoid arthritis;
~~W.~~V. Schizophrenia;
~~X.~~W. Sleep disorders;
~~Y.~~X. Stroke;
~~Z.~~Y. Tinnitus;
~~AA.~~Z. Tourette's syndrome;
~~BB.~~AA. Traumatic brain injury.

III. It is the policy of Louisiana Healthcare Connections that the current research does not support the use of the following types of VNS therapy over other currently available alternatives, due to the lack of large, high-quality studies supporting their use:
A. Aspire SR Model 106 (Cyberonics) for VNS;
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.~~.~~[3] The surgery is performed primarily by a neurosurgeon over approximately 45 to 90 minutes 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~~. There is a small risk of infection, along with additional surgical risks that include inflammation or pain at the ~~hospital overnight following surgery.~~incision site, damage to nearby nerves and nerve constriction.[37]

Focal (Partial) Seizures
Several studies have been done evaluating the safety and efficacy~~–~~ of vagus nerve stimulation (VNS) 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 ~~to30~~to 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. ~~1~~ Side effects in both studies were similar and included hoarseness and occasional shortness of breath.[1]

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.[4]

Generalized seizures
Study results suggest VNS may be effective for generalized epilepsy. However, case series and observational studies constitute the majority of available evidence. Although VNS is not currently approved by the Food and Drug Administration (FDA) 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.[1] The National Institute for Health and Care Excellence (NICE) recommends VNS for focal and generalized seizures as an adjunctive therapy in patients who are refractory to antiseizure medications and who are not suitable for resective surgery.[5,6] Additionally, the Scottish Intercollegiate Guidelines Network (SIGN) guidelines recommend VNS for epilepsy in patients unsuitable for resective surgery without stipulating seizure type.[7]

Depression
VNS was FDA-approved for treatment of 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. Two randomized controlled trials (RCTs) of VNS for depression found no benefit, and one of these RCTsRCTSs had outcomes comparable for active and sham treatment (response rates of 15 vs.versus 10 percent). In addition, there is a lack of thorough safety data for the use of VNS in depression.[2]

Other Investigational Indications
Ongoing research efforts continue to investigate the role of VNS for the treatment of a variety of indications, including but not limited to cognitive deficits in 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.[14,15,38,39]

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 implantable VNS device 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.[8,9]

A few small, preliminary studies and case reports have evaluated the AspireSR Model 106, and have shown positive results[8] results.[8,9,10] 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 (non-implantable) Vagus Nerve Stimulation
Transcutaneous vagus nerve stimulation (tVNS) has been proposed as a noninvasive alternative to implantable VNS for a variety of indications, including, but not limited to epilepsy, major depression, post-traumatic stress syndrome (PTSD), chronic tinnitus, and headaches. Currently, there are two main ways to apply tVNS. One is to apply stimulation on the ear and the other is cervical noninvasive VNS, superficially applying stimulation in the vicinity of the vagus nerve using a specially designed device, (e.g., gammaCore, Phoenix). Noninvasive auricular 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. Although no randomized studies have been done in patients with epilepsy, it appears promising in one pilot study.[11] Small studies have shown positive results with tVNS for the treatment of depression.[12,13] Additional, larger, peer-reviewed studies, with longer follow-up are necessary to determine the long-term safety and efficacy of transcutaneous VNS for depression.

gammaCore ~~Sapphire™~~Sapphire™ (ElectroCore, LLC) is a hand-held prescription device that is placed externally on the side of the neck in the vicinity of the vagus nerve to deliver a low voltage electric signal to the nerve's afferent fibers.[14] gammaCore has received FDA approval for the treatment of both episodic cluster and migraine headaches and more recently for the prevention of cluster headaches (CH). gammaCore is under investigation for the treatment of post-traumatic stress syndrome (PTSD).[40] gammaCore delivers up to 30 stimulations in a 24-hour period, each lasting ~~2~~two minutes. The patient controls the intensity level. Once the maximum daily number of treatments has been reached, the device will not deliver any more treatments until the following 24-hour period. A gammaCore refill card is used to load the device with days of therapy based on a healthcare provider's prescription.[14]

In the randomized PRESTO study, noninvasive vagus nerve stimulation (nVNS.) was superior to sham in the treatment of episodic migraine for pain freedom at 30 minutes and 60 minutes after the first treated attack.[15] In both the ACT1 and ACT2 trials, nVNS was superior to sham therapy in episodic CH but not in chronic CH.[15] ~~Another~~[2,15] Another 2020 randomized, double-blind, sham-controlled clinical trial showed when comparing nVNS with sham, no statistically significant differences were found with regards to the primary endpoint of pain freedom at 120 minutes, although differences were found with various secondary endpoints and post hoc analysis.[16]

Preliminary clinical trials of nVNS in various primary headache disorders are encouraging, but, for future studies, it is important to conduct large, properly blinded and controlled trials by independent researchers.[14] Additionally, most studies nVNS devices enrolled participants who did not respond sufficiently to oral drug treatment; thus, the role of neurostimulation in an average population of migraine patients remains unknown.[17]

The Phoenix is a transcutaneous auricular vagus nerve stimulation (tVNS) system in development for the treatment of post-traumatic stress disorder symptoms by delivering electrical stimulation to the pinna of the ear using a proprietary soft silicone conductive earbud connected to a programmable handheld control device. The control software uses an adaptive response algorithm and has multiple treatment modes to allow adjustment of stimulation parameters to customize treatment for individual members. There are no published studies reporting on the use of the Phoenix transcutaneous auricular vagus nerve stimulation (tVNS) system for treatment of PTSD. Published evidence is limited to a preliminary feasibility trial that validated the increase in parasympathetic nerve activity with tVNS during a tilt test and a startle response test. Results from larger published randomized trials that compare the Phoenix tVNS system to usual care in patients with PTSD are required to demonstrate safety and effectiveness for the treatment of PTSD.[40]

The American Headache Society position statement on integrating new migraine treatments into clinical practice note that empirically validated behavioral treatments with Grade A evidence for the prevention of migraine, including cognitive behavioral therapy, biofeedback, and relaxation therapies, should be considered in the management of migraine. These modalities may also be used alone or in addition to pharmacologic treatment. They note further that several noninvasive devices have been developed and approved by the FDA for the treatment of patients with migraines (i.e., single-pulse transcranial magnetic stimulation, electrical trigeminal nerve stimulation and nVNS.)).[18] Patients who prefer nondrug therapies, and those who have failed to respond to, have contraindications to, or poor tolerability with pharmacotherapy may be candidates for neuromodulation.[19]

Per UpToDate, "There are several promising but unproven methods using neurostimulation to treat medically refractory cluster headache, including sphenopalatine ganglion stimulation, occipital nerve stimulation, noninvasive VNS, and deep brain stimulation. All are investigational and require further study to confirm long-term benefit and safety."[15]

Removal of Implant

Removal of a vagus nerve stimulator may become necessary due to device malfunction, unbearable side effects, signs of infections, or a lack of efficacy. The device 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.[36]

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 20192022, 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 that Support Coverage Criteria

CPT® Codes	Description
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
61888	Revision or removal of cranial neurostimulator pulse generator or receiver
64553	Percutaneous implantation of neurostimulator ~~electrodes~~electrode array; cranial nerve
64568	~~Incision for~~Open 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

HCPCS Codes that Support Coverage Criteria

HCPCS Codes	Description
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~~implantable neurostimulator, replacement only

HCPCS Codes that Do Not Support Coverage Criteria

HCPCS Codes	Description
K1020*	Noninvasive vagus nerve stimulator

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

~~ICD-10-CM Code~~	~~Description~~
~~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~~
~~G40.211~~	~~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~~
~~G40.311~~	~~Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus~~
~~G40.319~~	~~Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus~~
~~G40.A11~~	~~Absence epileptic syndrome, intractable, with status epilepticus~~
~~G40.A19~~	~~Absence epileptic syndrome, 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~~
~~G40.803~~	~~Other epilepsy, intractable, with status epilepticus~~
~~G40.804~~	~~Other epilepsy, intractable, without status epilepticus~~
~~G40.813~~	~~Lennox-Gastaut syndrome, intractable, with status epilepticus~~
~~G40.814~~	~~Lennox-Gastaut syndrome, intractable, without status epilepticus~~

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Converted corporate to local policy.	08/15/2020	
Added new HCPCs code K1020 to a new table of HCPCS codes that do not support coverage criteria. "Experimental/investigational" verbiage replaced with descriptive language in policy statement II and III.	2/22	4/10/22

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Changed "review date" in the header to "date of last revision" and "date" in the revision log header to "revision date." Background updated with additional study on nVNS for migraine headaches. References reviewed and updated. Added "and may not support medical necessity" to coding implications. Reviewed by specialist.		
Annual review. Added opposition to surgery as a possibility and removed "resective" in I.C. Additional minor rewording with no clinical significance made in Criteria section. Background updated with no impact on criteria. References reviewed and updated.	9/22	
Annual review completed. Removed II.B. "Obesity". Additional minor rewording with no clinical significance. Background updated; moved "*Removal of implant*" section to background. ICD-10 Diagnosis code table removed. References reviewed and updated. External specialist reviewed. Note for non-covered codes added.	09/23	

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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 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.~~member/enrollees. This clinical policy is not intended to recommend treatment for ~~members. Members~~member/enrollees. Member/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~~member/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~~member/enrollees and their representatives agree to be bound by such terms and conditions by providing services to ~~members~~member/enrollees and/or submitting claims for payment for such services.