Medical Policy
Vagus Nerve Stimulation

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Policy Number: 474
BCBSA Reference Number: 7.01.20
NCD/LCD: National Coverage Determination (NCD) for Vagus Nerve Stimulation (VNS) (160.18)

Related Policies
• Meniscal Allografts and Other Meniscal Implants, #110
• Vagus Nerve Blocking Therapy for Treatment of Obesity, #644
• Spinal Cord and Dorsal Root Ganglion Stimulation, #472
• Responsive Neurostimulation for the Treatment of Refractory Partial Epilepsy, #716
• Transcranial Magnetic Stimulation as a Treatment of Depression, #297
• Deep Brain Stimulation, #473
• Outpatient Electroconvulsive Therapy, #319

Policy
Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity

Vagus nerve stimulation may be considered MEDICALLY NECESSARY as a treatment of medically refractory seizures.

Vagus nerve stimulation is considered INVESTIGATIONAL as a treatment of other conditions, including but not limited to depression, heart failure, upper-limb impairment due to stroke, essential tremor, headaches, fibromyalgia, tinnitus and traumatic brain injury.

Transcutaneous (nonimplantable) vagus nerve stimulation devices are considered INVESTIGATIONAL for all indications.

Medicare HMO BlueSM and Medicare PPO BlueSM Members

Medical necessity criteria and coding guidance can be found through the link below.

National Coverage Determinations (NCDs)

National Coverage Determination (NCD) for Vagus Nerve Stimulation (VNS) (160.18)
Note: To review the specific NCD, please remember to click “accept” on the CMS licensing agreement at the bottom of the CMS webpage.

Prior Authorization Information

Inpatient
- For services described in this policy, precertification/preauthorization IS REQUIRED if the procedure is performed inpatient.

Outpatient
- For services described in this policy, see below for situations where prior authorization might be required if the procedure is performed outpatient.

<table>
<thead>
<tr>
<th>Commercial Managed Care (HMO and POS)</th>
<th>Outpatient</th>
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<tbody>
<tr>
<td>Prior authorization is not required.</td>
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<tbody>
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<td>Prior authorization is not required.</td>
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CPT Codes / HCPCS Codes / ICD Codes

Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member’s contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.

Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.

The following codes are included below for informational purposes only; this is not an all-inclusive list.

The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity:

CPT Codes

<table>
<thead>
<tr>
<th>CPT codes:</th>
<th>Code Description</th>
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</thead>
<tbody>
<tr>
<td>61885</td>
<td>Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to a single electrode array</td>
</tr>
<tr>
<td>61886</td>
<td>Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to 2 or more electrode arrays</td>
</tr>
<tr>
<td>64553</td>
<td>Percutaneous implantation of neurostimulator electrodes; cranial nerve</td>
</tr>
<tr>
<td>64568</td>
<td>Incision for implantation of cranial nerve (eg, vagus nerve) neurostimulator electrode array and pulse generator</td>
</tr>
<tr>
<td>95976</td>
<td>Electronic analysis of implanted neurostimulator pulse generator/transmitter (eg, contact group[s], interleaving, amplitude, pulse width, frequency [Hz], on/off cycling, burst, magnet mode, dose lockout, patient selectable parameters, responsive neurostimulation, detection algorithms, closed loop parameters, and passive parameters) by physician or other qualified health care professional; with simple cranial nerve neurostimulator pulse generator/transmitter programming by physician or other qualified health care professional</td>
</tr>
<tr>
<td>95977</td>
<td>Electronic analysis of implanted neurostimulator pulse generator/transmitter (eg, contact group[s], interleaving, amplitude, pulse width, frequency [Hz], on/off cycling, burst, magnet mode, dose lockout, patient selectable parameters, responsive neurostimulation, detection algorithms, closed loop parameters, and passive parameters) by physician or other qualified health care professional; with complex cranial nerve neurostimulator pulse generator/transmitter programming by physician or other qualified health care professional</td>
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</tbody>
</table>
The following ICD Diagnosis Codes are considered medically necessary when submitted with the CPT codes above if medical necessity criteria are met:

**ICD-10 Diagnosis Codes**

<table>
<thead>
<tr>
<th>ICD-10-CM Diagnosis codes:</th>
<th>Code Description</th>
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<tbody>
<tr>
<td>G40.309</td>
<td>Generalized idiopathic epilepsy and epileptic syndromes, not intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.001</td>
<td>Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.009</td>
<td>Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, not intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.011</td>
<td>Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.019</td>
<td>Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.101</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.109</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.111</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.119</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, without status epilepticus</td>
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<tr>
<td>G40.201</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, with status epilepticus</td>
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<tr>
<td>G40.209</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, without status epilepticus</td>
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<td>G40.211</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, with status epilepticus</td>
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<tr>
<td>G40.219</td>
<td>Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.301</td>
<td>Generalized idiopathic epilepsy and epileptic syndromes, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.311</td>
<td>Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.319</td>
<td>Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.401</td>
<td>Other generalized epilepsy and epileptic syndromes, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.409</td>
<td>Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.411</td>
<td>Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.419</td>
<td>Other generalized epilepsy and epileptic syndromes, intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.501</td>
<td>Epileptic seizures related to external causes, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.509</td>
<td>Epileptic seizures related to external causes, not intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.801</td>
<td>Other epilepsy, not intractable, with status epilepticus</td>
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<tr>
<td>G40.802</td>
<td>Other epilepsy, not intractable, without status epilepticus</td>
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<tr>
<td>G40.803</td>
<td>Other epilepsy, intractable, with status epilepticus</td>
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<tr>
<td>G40.804</td>
<td>Other epilepsy, intractable, without status epilepticus</td>
</tr>
<tr>
<td>G40.811</td>
<td>Lennox-Gastaut syndrome, not intractable, with status epilepticus</td>
</tr>
<tr>
<td>G40.812</td>
<td>Lennox-Gastaut syndrome, not intractable, without status epilepticus</td>
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</tbody>
</table>
Description
Vagus nerve stimulation (VNS) was initially investigated as a treatment alternative in patients with medically refractory partial-onset seizures for whom surgery is not recommended or for whom surgery has failed. Over time, the use of VNS has expanded to include generalized seizures, and it has been investigated for a range of other conditions.

While the mechanisms for the therapeutic effects of VNS are not fully understood, the basic premise of VNS in the treatment of various conditions is that vagal visceral afferents have a diffuse central nervous system projection, and activation of these pathways has a widespread effect on neuronal excitability. An electrical stimulus is applied to axons of the vagus nerve, which have their cell bodies in the nodose and jugular ganglia and synapse on the nucleus of the solitary tract in the brainstem. From the solitary tract nucleus, vagal afferent pathways project to multiple areas of the brain. VNS may also stimulate vagal efferent pathways that innervate the heart, vocal cords, and other laryngeal and pharyngeal muscles, and provide parasympathetic innervation to the gastrointestinal tract.

Other types of implantable vagus nerve stimulators that are placed in contact with the trunks of the vagus nerve at the gastroesophageal junction are not addressed in this evidence review.

Summary
Stimulation of the vagus nerve can be performed using a pulsed electrical stimulator implanted within the carotid artery sheath. This technique has been proposed as a treatment for refractory seizures, depression, and other disorders. There are also devices available that are implanted at different areas of the vagus nerve. This evidence review also addresses devices that stimulate the vagus nerve transcutaneously.

Vagus Nerve Stimulation
For individuals who have seizures refractory to medical treatment who receive vagus nerve stimulation (VNS), the evidence includes randomized controlled trials (RCTs) and multiple observational studies. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The RCTs have reported significant reductions in seizure frequency for patients with partial-onset seizures. The uncontrolled studies have consistently reported large reductions in a broader range of seizure types in
both adults and children. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have treatment-resistant depression who receive VNS, the evidence includes an RCT, nonrandomized comparative studies, and case series. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The RCT only reported short-term results and found no significant improvement in the primary outcome. Other available studies are limited by small sample sizes, potential selection bias, and lack of a control group in the case series. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Other Conditions**
For individuals who have chronic heart failure who receive VNS, the evidence includes RCTs and case series. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The RCTs evaluating chronic heart failure did not show significant improvements in the primary outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have upper-limb impairment due to stroke who receive VNS, the evidence includes a single pilot study. Relevant outcomes are symptoms, change in disease status, and functional outcomes. This pilot study has provided preliminary support for improvement in functional outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have other neurologic conditions (eg, essential tremor, headache, fibromyalgia, tinnitus, autism) who receive VNS, the evidence includes case series. Relevant outcomes are symptoms, change in disease status, and functional outcomes. Case series are insufficient to draw conclusions regarding efficacy. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Transcutaneous Vagus Nerve Stimulation**
For individuals with cluster headaches who receive transcutaneous VNS to prevent cluster headaches, the evidence includes1 RCT. Relevant outcomes are symptoms, change in disease status, quality of life and functional outcomes. One RCT for prevention of cluster headache showed a reduction in headache frequency but did not include a sham treatment group. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals with cluster headache who receive noninvasive transcutaneous VNS (nVNS) to treat acute cluster headache, the evidence includes RCTs. Relevant outcomes are symptoms, change in disease status, quality of life and functional outcomes. The Non-invasive Neurostimulation of the Vagus Nerve With the GammaCore Device for the Treatment of Cluster Headache (ACT1) and A Randomized, Multicentre, Double-blind, Parallel, Sham-controlled Study of GammaCore®, a Non-invasive Neurostimulator Device for the Acute Relief of Episodic and Chronic Cluster Headache (ACT2) RCTs compared nVNS to sham for treatment of acute cluster headache in patients including both chronic and episodic cluster headache. In ACT1, there was no statistically significant difference in the overall population in the proportion of patients with pain score of 0 or 1 at 15 minutes into the first attack and no difference in the proportion of patients who were pain-free at 15 minutes in 50% or more of the attacks. In the episodic cluster headache subgroup (n=85) both outcomes were statistically significant favoring nVNS although the interaction p-value was not reported. In ACT2, the proportion of attacks with pain intensity score of 0 or 1 at 30 minutes was higher for nVNS in the overall population (43% vs. 28%, p=0.05) while the proportion of attacks that were pain-free at 15 minutes was similar in the 2 treatment groups in the overall population (14% vs. 12%). However, a statistically significantly higher proportion of attacks in the episodic subgroup (n=27) were pain-free at 15 minutes in the nNVS group compared to sham (48% vs. 6%, p<0.01). These studies suggest that people with episodic and chronic cluster headaches may respond differently to acute treatment with nVNS. Studies designed to focus on episodic cluster headache are needed. Quality of life and functional outcomes have not been reported. Treatment periods ranged from only 2 weeks to 1 month with extended open-label follow-up of up to 3 months. There are few adverse events of nVNS and they are mild and transient. The evidence is insufficient to determine the effects of the technology on health outcomes.
For individuals with migraine headache who receive nVNS to treat acute migraine headache, the evidence includes 1 RCT. Relevant outcomes are symptoms, change in disease status, quality of life and functional outcomes. One RCT has evaluated nVNS for acute treatment of migraine with nVNS in 248 patients with episodic migraine with/without aura. There was not a statistically significant difference in the primary outcome of the proportion of participants who were pain-free without using rescue medication at 120 minutes (30% vs. 20%; p = 0.07). However, the nVNS group had a higher proportion of patients with decrease in pain from moderate or severe to mild or no pain at 120 minutes (41% vs. 28%; p=0.03) and a higher proportion of patients who were pain-free at 120 for 50% or more of their attacks (32% vs. 18%; p=0.02). There are few adverse events of nVNS and they are mild and transient. Quality of life and functional outcomes were not reported and the double-blind treatment period was 4 weeks with an additional 4 weeks of open-label treatment. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals with chronic migraine headache who receive nVNS to prevent migraine headache, the evidence includes 2 RCTs. Relevant outcomes are symptoms, change in disease status, quality of life and functional outcomes. The Non-Invasive Neurostimulation of the Vagus Nerve With the GammaCore Device for the Prevention of Chronic Migraine; nVNS: noninvasive transcutaneous vagus nerve stimulation (EVENT) RCT was a feasibility study of prevention of migraine that was not powered to detect differences in efficacy outcomes. It does not demonstrate the efficacy of nVNS for prevention of migraine. The Randomized, Multicentre, Double-blind, Parallel, Sham-controlled Study of gammaCore®, a Non-invasive Vagal Nerve Stimulator (nVNS), for Prevention of Episodic Migraine (PREMIUM) RCT was a phase 3, multicenter, sham-controlled RCT including 341 randomized participants with a 12-week double-blind treatment period. The results of PREMIUM demonstrated that nVNS was not statistically significantly superior to sham, with respect to the outcomes of reduction of at least 50% in migraine days from baseline to the last 4 weeks, reduction in number of migraine days from baseline to the last 4 weeks or acute medication days. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have other neurologic, psychiatric, or metabolic disorders (eg, epilepsy, depression, schizophrenia, noncluster headache, impaired glucose tolerance) who receive transcutaneous VNS, the evidence includes RCTs and case series for some of the conditions. Relevant outcomes are symptoms, change in disease status, and functional outcomes. The RCTs are all small and have various methodologic problems. None showed definitive efficacy of transcutaneous VNS in improving patient outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Policy History**

<table>
<thead>
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<tr>
<td>1/2019</td>
<td>Clarified coding changes.</td>
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<tr>
<td>6/2018</td>
<td>BCBSA National medical policy review. No changes to policy statements.</td>
</tr>
<tr>
<td>5/2015</td>
<td>New references added from BCBSA National medical policy.</td>
</tr>
<tr>
<td>6/2014</td>
<td>Updated Coding section with ICD10 procedure and diagnosis codes, effective 10/2015.</td>
</tr>
<tr>
<td>12/2013</td>
<td>Removed the HCPCS codes (L8680-LL8689) as they do not meet the intent.</td>
</tr>
<tr>
<td>10/2013</td>
<td>Removed CPT codes 64569, 64570 as these CPT codes do not apply to the policy.</td>
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Information Pertaining to All Blue Cross Blue Shield Medical Policies
Click on any of the following terms to access the relevant information:

Medical Policy Terms of Use
Managed Care Guidelines
Indemnity/PPO Guidelines
Clinical Exception Process
Medical Technology Assessment Guidelines

References


64. Grazzi, LL, Egeo, GG, Calhoun, AA, McClure, CC, Liebler, EE, Barbanti, PP. Non-invasive Vagus Nerve Stimulation (nVNS) as mini-prophylaxis for menstrual/menstrually related migraine: an open-label study.. NA. PMID 27699586

