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MEDICAL POLICY – 7.01.143

Responsive Neurostimulation for the Treatment of Refractory Focal Epilepsy

BCBSA Ref. Policy:	7.01.143	
Effective Date:	Nov. 1, 2025	RELATED MEDICAL POLICIES:
Last Revised:	Jan. 1, 2026	7.01.63 Deep Brain Stimulation
Replaces:	N/A	7.01.593 Vagus Nerve Stimulation

Select a hyperlink below to be directed to that section.

POLICY CRITERIA | DOCUMENTATION REQUIREMENTS | CODING
RELATED INFORMATION | EVIDENCE REVIEW | REFERENCES | HISTORY

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Introduction

Responsive neurostimulation (RNS) is a treatment that is used for focal epilepsy. (Focal epilepsy used to be called partial epilepsy.) The goal of RNS is to disrupt unusual electrical signals in the brain that trigger seizures. A stimulator is implanted and one or two wires are placed at the location in the brain where seizures start. When the unit detects patterns that could lead to a seizure, it sends electrical signals to interrupt a seizure before it begins. RNS may be an option when medications aren't able to control symptoms. This policy describes when RNS may be considered medically necessary.

Note: The Introduction section is for your general knowledge and is not to be taken as policy coverage criteria. The rest of the policy uses specific words and concepts familiar to medical professionals. It is intended for providers. A provider can be a person, such as a doctor, nurse, psychologist, or dentist. A provider also can be a place where medical care is given, like a hospital, clinic, or lab. This policy informs them about when a service may be covered.

Policy Coverage Criteria

Procedure	Medical Necessity
Responsive neurostimulation (RNS)	**Responsive neurostimulation (RNS) may be considered medically necessary for individuals with focal epilepsy who meet ALL of the following criteria:** • Are 18 years or older • Have a diagnosis of focal seizures with one or two well-localized seizure foci identified (as seen on EEG* or other diagnostic testing) • Have had an average of three or more disabling seizures (e.g., motor focal seizures, complex focal seizures, or secondary generalized seizures) per month over the prior three months • Are refractory to medical therapy (have failed ≥2 appropriate antiepileptic medications at therapeutic doses) • Are not candidates for focal resective epilepsy surgery (e.g., have an epileptic focus near the eloquent cerebral cortex; have bilateral temporal epilepsy) • Do not have contraindications for RNS device placement: ○ Three or more specific seizure foci **OR** ○ Presence of primary generalized epilepsy **OR** ○ Presence of a rapidly progressive neurologic disorder ***Note**: Electroencephalography (EEG) **Responsive neurostimulation (RNS) is considered investigational for all other indications.**

Documentation Requirements
The individual's medical records submitted for review for all conditions should document that medical necessity criteria are met. The record should include clinical documentation of: • Diagnosis/condition • History and physical examination documenting the severity of the condition, including seizure history • EEG report or other diagnostic testing report identifying one or two well localized seizure foci • Prior medical therapy that has failed

Documentation Requirements
• Contraindications to focal resective epilepsy surgery

Coding

Note: There is no specific code for the RNS procedure. The following CPT codes may be used in conjunction with this procedure

Code	Description
CPT	
61850	Twist drill or burr hole(s) for implantation of neurostimulator electrodes, cortical
61860	Craniectomy or craniotomy for implantation of neurostimulator electrodes, cerebral, cortical
61863	Twist drill, burr hole, craniotomy, or craniectomy with stereotactic implantation of neurostimulator electrode array in subcortical site (e.g., thalamus, globus pallidus, subthalamic nucleus, periventricular, periaqueductal gray), without use of intraoperative microelectrode recording; first array
61864	Twist drill, burr hole, craniotomy, or craniectomy with stereotactic implantation of neurostimulator electrode array in subcortical site (e.g., thalamus, globus pallidus, subthalamic nucleus, periventricular, periaqueductal gray), without use of intraoperative microelectrode recording; each additional array (List separately in addition to primary procedure)
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 2 or more electrode arrays
61889	Insertion of skull-mounted cranial neurostimulator pulse generator or receiver, including craniectomy or craniotomy, when performed, with direct or inductive coupling, with connection to depth and/or cortical strip electrode array(s) (new code effective 01/01/24)
61891	Revision or replacement of skull-mounted cranial neurostimulator pulse generator or receiver with connection to depth and/or cortical strip electrode array(s)
HCPCS	
C1767	Generator, neurostimulator (implantable), nonrechargeable
C1778	Lead, neurostimulator (implantable)

Code	Description
C1607	Neurostimulator, integrated (implantable), rechargeable with all implantable and external components including charging system (new code effective 01/01/26)
L8680	Implantable neurostimulator electrode, each
L8686	Implantable neurostimulator pulse generator, single array, non-rechargeable, includes extension
L8688	Implantable neurostimulator pulse generator, dual array, non-rechargeable, includes extension

Note: CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). HCPCS codes, descriptions and materials are copyrighted by Centers for Medicare Services (CMS).

Related Information

N/A

Evidence Review

Description

Approximately one-third of individuals with epilepsy do not respond to typical first-line therapy with antiepileptic medications. Seizures that occur in these individuals are referred to as refractory or drug-resistant. In individuals with refractory epilepsy, combination antiepileptic therapy often results in increased risk of adverse events. Other nonpharmacologic treatment options are available, including surgical approaches, ketogenic diet, and responsive neurostimulation (RNS). One RNS device, the NeuroPace RNS System, has US Food and Drug Administration (FDA) approval for the treatment of refractory focal (formerly partial) epilepsy.

Background

Epilepsy Treatment

Medical Therapy for Focal Seizures

Focal seizures (previously referred to as partial seizures) arise from a discrete area of the brain and can cause a range of symptoms, depending on the seizure type and the brain area involved.

Standard therapy for seizures, including focal seizures, includes treatment with one or more various antiepileptic drugs (AEDs), which include newer AEDs, such as oxcarbazepine, lamotrigine, topiramate, gabapentin, pregabalin, levetiracetam, tiagabine, and zonisamide.[1] Currently, response to AEDs is less than ideal: one systematic review comparing newer AEDs for refractory focal epilepsy reported an overall average responder rate in treatment groups of 34.8%.[1] As a result, a substantial number of individuals do not achieve good seizure control with medications alone.

Surgical Therapy for Seizures

When a discrete seizure focus can be identified, seizure control may be achieved through resection of the seizure focus (epilepsy surgery). For temporal lobe epilepsy, a randomized controlled trial (RCT) demonstrated that surgery for epilepsy was superior to prolonged medical therapy in reducing seizures associated with impaired awareness and in improving quality of life.[2] Surgery for refractory focal epilepsy (excluding simple focal seizures) is associated with five-year freedom from seizure rates of 52%, with 28% of seizure-free individuals able to discontinue AEDs.[3] Selection of appropriate individuals for epilepsy surgery is important, because those with nonlesional extratemporal lobe epilepsy have worse outcomes after surgery than those with nonlesional temporal lobe epilepsy.[4] Some individuals are not candidates for epilepsy surgery if the seizure focus is located in an eloquent area of the brain or other region that cannot be removed without risk of significant neurologic deficit.

Neurostimulation for Neurologic Disorders

Electrical stimulation at one of several locations in the brain has been used as therapy for epilepsy, either as an adjunct to, or as an alternative to medical or surgical therapy. Vagus nerve stimulation (VNS) has been widely used for refractory epilepsy, following FDA approval of a VNS device in 1997 and two randomized controlled trials (RCTs) evaluating VNS in epilepsy.[5]

Although the mechanism of the VNS is not fully understood, VNS is thought to reduce seizure activity through activation of vagal visceral afferents with diffuse central nervous system projections, leading to a widespread effect on neuronal excitability.

Stimulation of other locations in the neuroaxis has been studied for a variety of neurologic disorders. Electrical stimulation of deep brain nuclei (deep brain stimulation [DBS]) involves the use of chronic, continuous stimulation of a target. It has been most widely used in the treatment of Parkinson disease and other movement disorders and has been investigated for treating epilepsy. DBS of the anterior thalamic nuclei was studied in an RCT, the Stimulation of the Anterior Nucleus of the Thalamus for Epilepsy trial, but DBS is not currently approved by FDA for stimulation of the anterior thalamic nucleus.[6] Stimulation of the cerebellar and hippocampal regions and the subthalamic, caudate, and centromedian nuclei have also been evaluated for the treatment of epilepsy.[5]

Responsive Neurostimulation for Epilepsy

RNS shares some features with DBS but is differentiated by its use of direct cortical stimulation and by its use in both monitoring and stimulation. The RNS system provides stimulation in response to detection of specific epileptiform patterns, while DBS provides continuous or intermittent stimulation at preprogrammed settings.

Development of the RNS system arose from observations related to the effects of cortical electrical stimulation for seizure localization. It has been observed that electrical cortical stimulation can terminate induced and spontaneous electrographic seizure activity in humans and animals.[7] Individuals with epilepsy may undergo implantation of subdural monitoring electrodes for the purposes of seizure localization, which at times have been used for neurostimulation to identify eloquent brain regions. Epileptiform discharges that occur during stimulation for localization can be stopped by a train of neighboring brief electrical stimulations.[8]

In tandem with the recognition that cortical stimulation can stop epileptiform discharges was the development of fast pre-ictal seizure prediction algorithms. These algorithms interpret electrocorticographic data from detection leads situated over the cortex. The RNS process thus includes electrocorticographic monitoring via cortical electrodes, analysis of data through a proprietary seizure detection algorithm, and delivery of electrical stimulation via both cortical and deep implanted electrodes in an attempt to halt a detected epileptiform discharge.

One device, the NeuroPace RNS System, is currently approved by FDA and is commercially available.

Responsive Neurostimulation for Seizure Monitoring

Although the intent of the electrocorticography component of the RNS system is to provide input as a trigger for neurostimulation, it also provides continuous seizure mapping data (chronic unlimited cortical electrocorticography) that may be used by practitioners to evaluate individuals' seizures. In particular, the seizure mapping data have been used for surgical planning of individuals who do not experience adequate seizure reduction with RNS placement. Several studies have described the use of the RNS in evaluating seizure foci for epilepsy surgery[9] or for identifying whether seizure foci are unilateral.[10,11]

This policy does not further address use of RNS exclusively for seizure monitoring.

Summary of Evidence

For individuals with refractory focal epilepsy who receive RNS, the evidence includes an industry-sponsored RCT, which was used for FDA approval of the NeuroPace RNS System, as well as several published follow-up analyses. Relevant outcomes are symptoms, morbid events, quality of life, and treatment-related mortality and morbidity. The RCT was well-designed and well-conducted; it reported that RNS is associated with improvements in mean seizure frequency in individuals with refractory focal epilepsy, with an absolute difference in change in seizure frequency of about 20% between groups; however, the percentage of treatment responders with at least a 50% reduction in seizures did not differ from sham control. Overall, the results suggested a modest reduction in seizure frequency in a subset of individuals. The number of adverse events reported in the available studies is low, although the data on adverse events were limited because of small study samples. Generally, individuals who are candidates for RNS are severely debilitated and have few other treatment options, so the benefits are likely high relative to the risks. In particular, individuals who are not candidates for resective epilepsy surgery and have few treatment options may benefit from RNS. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Ongoing and Unpublished Clinical Trials

A currently ongoing trial that might influence this review are listed in **Table 1**.

Table 1. Summary of Key Trials

NCT No.	Trial Name	Planned Enrollment	Completion Date
Ongoing			
NCT02403843[a]	RNS System Post-Approval Study in Epilepsy	375	Jan 2026
NCT04839601[a]	RNS System RESPONSE Study	200	December 2027

NCT: national clinical trial

[a] Denotes industry-sponsored or cosponsored trial

Practice Guidelines and Position Statements

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the policy conclusions.

Guidelines or position statements will be considered for inclusion if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

No relevant clinical practice guidelines were identified.

Medicare National Coverage

There is no national coverage determination.

Regulatory Status

In November 2013, the NeuroPace RNS System (NeuroPace) was approved by the FDA through the premarket approval process for the following indication[12].

> The RNS System is an adjunctive therapy in reducing the frequency of seizures in individuals 18 years of age or older with partial onset seizures who have undergone diagnostic testing that localized no more than two epileptogenic foci, are refractory to two or more antiepileptic medications, and currently have frequent and disabling seizures (motor partial

seizures, complex partial seizures and/ or secondarily generalized seizures). The RNS System has demonstrated safety and effectiveness in patients who average three or more disabling seizures per month over the three most recent months (with no month with fewer than two seizures). and has not been evaluated in patients with less frequent seizures.

FDA product code: PFN.

References

1. Costa J, Fareleira F, Ascenção R, et al. Clinical comparability of the new antiepileptic drugs in refractory partial epilepsy: a systematic review and meta-analysis. Epilepsia. Jul 2011; 52(7): 1280-91. PMID 21729036
2. Wiebe S, Blume WT, Girvin JP, et al. A randomized, controlled trial of surgery for temporal-lobe epilepsy. N Engl J Med. Aug 02 2001; 345(5): 311-8. PMID 11484687
3. de Tisi J, Bell GS, Peacock JL, et al. The long-term outcome of adult epilepsy surgery, patterns of seizure remission, and relapse: a cohort study. Lancet. Oct 15 2011; 378(9800): 1388-95. PMID 22000136
4. Noe K, Sulc V, Wong-Kisiel L, et al. Long-term outcomes after nonlesional extratemporal lobe epilepsy surgery. JAMA Neurol. Aug 2013; 70(8): 1003-8. PMID 23732844
5. Fridley J, Thomas JG, Navarro JC, et al. Brain stimulation for the treatment of epilepsy. Neurosurg Focus. Mar 2012; 32(3): E13. PMID 22380854
6. Fisher RS. Therapeutic devices for epilepsy. Ann Neurol. Feb 2012; 71(2): 157-68. PMID 22367987
7. Kossoff EH, Ritzl EK, Politsky JM, et al. Effect of an external responsive neurostimulator on seizures and electrographic discharges during subdural electrode monitoring. Epilepsia. Dec 2004; 45(12): 1560-7. PMID 15571514
8. Anderson WS, Kossoff EH, Bergey GK, et al. Implantation of a responsive neurostimulator device in patients with refractory epilepsy. Neurosurg Focus. Sep 2008; 25(3): E12. PMID 18759613
9. DiLorenzo DJ, Mangubat EZ, Rossi MA, et al. Chronic unlimited recording electrocorticography-guided resective epilepsy surgery: technology-enabled enhanced fidelity in seizure focus localization with improved surgical efficacy. J Neurosurg. Jun 2014; 120(6): 1402-14. PMID 24655096
10. King-Stephens D, Mirro E, Weber PB, et al. Lateralization of mesial temporal lobe epilepsy with chronic ambulatory electrocorticography. Epilepsia. Jun 2015; 56(6): 959-67. PMID 25988840
11. Spencer D, Gwinn R, Salinsky M, et al. Laterality and temporal distribution of seizures in patients with bitemporal independent seizures during a trial of responsive neurostimulation. Epilepsy Res. Feb 2011; 93(2-3): 221-5. PMID 21256715
12. Food and Drug Administration. Summary of Safety and Effectiveness Data: RNS System 2013; **https://www.accessdata.fda.gov/cdrh_docs/pdf10/P100026b.pdf**. Accessed May 7, 2025.
13. Fisher RS, Cross JH, French JA, et al. Operational classification of seizure types by the International League Against Epilepsy: Position Paper of the ILAE Commission for Classification and Terminology. Epilepsia. Apr 2017; 58(4): 522-530. PMID 28276060
14. Kwan P, Arzimanoglou A, Berg AT, et al. Definition of drug resistant epilepsy: consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia. Jun 2010; 51(6): 1069-77. PMID 19889013
15. Xue-Ping W, Hai-Jiao W, Li-Na Z, et al. Risk factors for drug-resistant epilepsy: A systematic review and meta-analysis. Medicine (Baltimore). Jul 2019; 98(30): e16402. PMID 31348240

16. Neuropace, Inc. RNS(R) System Physician Manual for the RNS(R) Neurostimulator Model RNS-320. Revised November 2024. **https://www.neuropace.com/wp-content/uploads/2021/02/neuropace-rns-system-manual-320.pdf**. Accessed May 7, 2025.
17. Morrell MJ, King-Stephens D, Massey AD, et al. Responsive cortical stimulation for the treatment of medically intractable partial epilepsy. Neurology. Sep 27 2011; 77(13): 1295-304. PMID 21917777
18. Heck CN, King-Stephens D, Massey AD, et al. Two-year seizure reduction in adults with medically intractable partial onset epilepsy treated with responsive neurostimulation: final results of the RNS System Pivotal trial. Epilepsia. Mar 2014; 55(3): 432-41. PMID 24621228
19. Loring DW, Kapur R, Meador KJ, et al. Differential neuropsychological outcomes following targeted responsive neurostimulation for partial-onset epilepsy. Epilepsia. Nov 2015; 56(11): 1836-44. PMID 26385758
20. Meador KJ, Kapur R, Loring DW, et al. Quality of life and mood in patients with medically intractable epilepsy treated with targeted responsive neurostimulation. Epilepsy Behav. Apr 2015; 45: 242-7. PMID 25819949
21. Nair DR, Laxer KD, Weber PB, et al. Nine-year prospective efficacy and safety of brain-responsive neurostimulation for focal epilepsy. Neurology. Sep 01 2020; 95(9): e1244-e1256. PMID 32690786
22. Skrehot HC, Englot DJ, Haneef Z. Neuro-stimulation in focal epilepsy: A systematic review and meta-analysis. Epilepsy Behav. May 2023; 142: 109182. PMID 36972642
23. Shi J, Lu D, Wei P, et al. Comparative Efficacy of Neuromodulatory Strategies for Drug-Resistant Epilepsy: A Systematic Review and Meta-Analysis. World Neurosurg. Jan 2025; 193: 373-396. PMID 39321920

History

Date	Comments
01/13/15	New Policy. Policy created with literature review through June 30, 2014 and review of clinical input. Responsive neurostimulation may be considered medically necessary for refractory partial epilepsy when criteria are met. Reformatted the policy guidelines for improved clarification.
07/01/16	Annual Review, approved on June 14, 2016. Policy updated with literature review through February 9, 2016; references 12 and 16-20 added. Policy statements unchanged.
07/01/17	Annual Review, approved on June 22, 2017. Policy updated with literature review through February 23, 2017; reference 19 added. Removed CPT codes 61880 and 61888. Policy statements unchanged.
07/01/18	Annual Review, approved June 22, 2018. Policy updated with literature review through February 2018; no references added. Policy statements unchanged. Term "partial epilepsy" changed to "focal epilepsy" throughout text and title to be consistent with current terminology. Removed CPT codes 95970 and 95971.
04/01/19	Minor update, added Documentation Requirements section.

Date	Comments
07/01/19	Annual Review, approved June 4, 2019. Policy updated with literature review through February 2019; no references added. Policy statements unchanged.
04/01/20	Delete policy, approved March 10, 2020. This policy will be deleted effective July 2, 2020, and replaced with InterQual criteria for dates of service on or after July 2, 2020.
07/02/20	Delete policy.
11/01/20	Policy reinstated effective February 5, 2021, approved October 13, 2020. Policy updated with literature review through February, 2020; no references added. Policy statements unchanged.
07/01/21	Annual Review, approved June 1, 2021. Policy updated with literature review through March 8, 2021; references added. Policy statements unchanged. Added HCPC codes C1767 and C1778.
07/01/22	Annual Review, approved June 13, 2022. Policy updated with literature review through January 17, 2022; no references added. Policy statements unchanged.
07/01/23	Annual Review, approved June 12, 2023. Policy updated with literature review through March 2, 2023; no references added. Outdated references and clinical input removed. Title changed to replace the term "partial epilepsy" with "focal epilepsy" to reflect current terminology. Minor editorial refinements to policy statements; intent unchanged. Changed the wording from "patient" to "individual" throughout the policy for standardization.
01/01/24	Coding update. Added new CPT codes 61889 and 61891.
07/01/24	Annual Review, approved June 24, 2024. Policy updated with literature review through February 22, 2024; reference added. Policy statements unchanged.
09/11/24	Minor update to related policies. 7.01.20 was replaced with 7.01.593 Vagus Nerve Stimulation.
07/01/25	Annual Review, approved June 23, 2025. Policy updated with literature review through February 21, 2025; reference added. Policy statements unchanged.
11/01/25	Interim Review, approved October 13, 2025. Add clarifying edit to policy statement Have a diagnosis of focal seizures with one or two well-localized seizure foci identified "(as seen on EEG or other diagnostic testing)" Policy intent unchanged.
01/01/26	Coding update. Added new HCPCS code C1607, effective January 1, 2026.

Scope: Medical policies are systematically developed guidelines that serve as a resource for Company staff when determining coverage for specific medical procedures, drugs or devices. Coverage for medical services is subject to the limits and conditions of the member benefit plan. Members and their providers should consult the member benefit booklet or contact a customer service representative to determine whether there are any benefit limitations applicable to this service or supply. This medical policy does not apply to Medicare Advantage.