AmeriHealth Caritas
VIP Care Plus

Vestibular evoked myogenic potential testing

Clinical Policy ID: CCP.1461

Recent review date: 5/2024

Next review date: 9/2025

Policy contains: Cervical and ocular vestibular evoked myogenic potential; labyrinth disorders; VEMP; vestibular disorders; vestibular function testing.

AmeriHealth Caritas has developed clinical policies to assist with making coverage determinations. AmeriHealth Caritas' clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state- or plan-specific definition of "medically necessary," and the specific facts of the particular situation are considered, on a case by case basis, by AmeriHealth Caritas when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. AmeriHealth Caritas' clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. AmeriHealth Caritas' clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, AmeriHealth Caritas will update its clinical policies as necessary. AmeriHealth Caritas' clinical policies are not guarantees of payment.

Coverage policy

Vestibular evoked myogenic potential testing is clinically proven and, therefore, may be medically necessary to confirm the presence of superior canal dehiscence syndrome, when the results will impact treatment decisions (American Academy of Otolaryngology—Head and Neck Surgery [Bhattacharyya, 2017]; American Academy of Neurology [Fife, 2017]).

Limitations

All other indications for vestibular evoked myogenic potential testing are investigational/not clinically proven and, therefore, not medically necessary.

Alternative covered services

- Brainstem auditory evoked response.
- Caloric tests.
- Clinical examination.
- Diagnostic imaging (e.g., magnetic resonance imaging and computerized tomography).
- Electrocochleography.
- Electronystagmography.

- Otoacoustic emissions.
- Rotation tests.
- Videonystagmography.
- Other tests as indicated to help rule out causes of imbalance unrelated to the vestibular system.

Background

Vestibular disorders result from damage to the parts of the inner ear and brain that process the sensory information involved with controlling balance and eye movements (Vestibular Disorders Association, undated). Symptoms of vestibular disorders include vertigo and dizziness, imbalance and spatial disorientation, vision disturbance, hearing changes, cognitive and/or psychological changes, and other symptoms such as nausea and vomiting, motion sickness, and headaches.

Vestibular disorders are more common among the elderly, persons with diabetes, and persons with existing sensory disorders. They can adversely impact quality of life, activities of daily living and are associated with an increased risk of clinically significant outcomes (e.g., falls). In children, vestibular deficits can impair motor development and balance, and affect gaze stability that interferes with learning to read (Vestibular Disorders Association, undated).

Etiologies include disease or injury to these sensory processing areas, genetic or environmental conditions, or unknown reasons (Vestibular Disorders Association, undated). Causes of vestibular dysfunction can be classified as peripheral (affecting the vestibular system) or central (central nervous system proper). In adults, stroke and demyelinating diseases are the most common etiologies of central origin. Benign paroxysmal positional vertigo is the most common peripheral vestibular disorder and may account for up to 20% of vertigo presentations to dizziness clinics (Dougherty, 2022). In children, vestibular migraine, benign paroxysmal positional vertigo, and vestibular neuritis are the three most common forms (Gioacchini, 2014). Other vestibular disorders include labyrinthitis and vestibular neuritis, Ménière's disease, secondary endolymphatic hydrops, and perilymph fistula, superior canal dehiscence, acoustic neuroma, ototoxicity, enlarged vestibular aqueduct syndrome, and mal de débarquement (Vestibular Disorders Association, undated).

Assessment of vestibular disorders involves testing of auditory, visual, and somatosensory systems that absorb information, as well as the associated nerves and brain centers that process the information and direct the appropriate response. The otolithic organs of the vestibular system (the saccule and utricle) sense motion according to their orientation. Vestibular evoked myogenic potential, also known as click evoked potential, is a noninvasive test that provides specific information about saccule and otolith function. It uses skin surface electrodes to measure muscle activity evoked in response to acoustic stimuli. Computer technology amplifies the myogenic response, which is averaged and presented as a vestibular evoked myogenic potential (Dougherty, 2022).

There are two main types of vestibular evoked myogenic potential for evaluating vestibular disorders that measure saccular or utricular function . Cervical vestibular evoked myogenic potential uses electrodes placed on the sternocleidomastoid muscle and is presumed to reflect the vestibulo-collic (or sacculo-collic) reflex, while ocular vestibular evoked myogenic potential employs electrodes on the ocular muscles below the eye believed to reflect the vestibule-ocular (or utriculo-ocular) reflex (Dougherty, 2022).

Findings

For this policy, we identified one meta-analysis (Zhang, 2015), one systematic review addressing normal values for vestibular evoked myogenic potential (Meyer, 2015), and three evidence-based guidelines (Bhattacharyya, 2017; Fife, 2017; Lopez-Escamez, 2015). The growing body of evidence consists of primarily small,

observational studies assessing the diagnostic performance of vestibular evoked myogenic potential in persons with benign paroxysmal positional vertigo and, to a lesser extent, persons with Ménière's disease.

The evidence is insufficient to support vestibular evoked myogenic potential testing for evaluating vestibular disorders. There is a lack of consensus regarding normal values, definition of an abnormal vestibular evoked myogenic potential, standardization of testing protocols, and clinical application. Patient characteristics and aspects of the technique can influence test results, and guidelines differ on the value of vestibular evoked myogenic potential testing in persons with benign paroxysmal positional vertigo or Ménière's disease, despite being the most widely studied applications. While it may have value as part of the battery of other accepted vestibular function tests, the selection of patients for whom addition vestibular evoked myogenic potential test information may be beneficial has not been established, nor has its impact on patient management been studied.

A meta-analysis of 30 observational studies determined vestibular evoked myogenic potential testing alone was not sufficient for diagnosing Ménière's disease or delayed endolymphatic hydrops. The pooled sensitivity and specificity were 49% (95% confidence interval 46% to 51%) and 95% (94% to 96%), respectively. Larger, well-designed prospective studies are needed to clarify its promising role as a diagnostic or screening tool (Zhang, 2015).

A systematic review of 66 articles sought to describe normative data for 0.1-ms click-evoked and 500-Hz tone burst cervical vestibular evoked myogenic potential response. The research highlighted the effects of different testing factors on response parameters and the lack of standardization of normative data used in vestibular evoked myogenic potential studies, both of which can confound interpretation of study results (Meyer, 2015).

In 2017, the American Academy of Neurology updated their guideline on cervical and ocular vestibular evoked myogenic potential testing (Fife, 2017). The Academy now includes vestibular evoked myogenic potential testing in the battery of available tests for diagnosing superior canal dehiscence syndrome. The recommendations are based on limited, low quality evidence suggesting cervical vestibular evoked myogenic potential and cervical vestibular evoked myogenic potential thresholds are lower than normal and amplitudes are higher than normal, but substantial uncertainty exists in the research. The clinical utility of vestibular evoked myogenic potential for all other vestibular disorders remains unclear. No policy changes are warranted at this time.

In 2018, we added an update of the American Academy of Otolaryngology—Head and Neck Surgery guideline on benign paroxysmal positional vertigo (Bhattacharyya, 2017). The guideline mentions vestibular evoked myogenic potential testing among the battery of diagnostic tests that can be considered, particularly to differentiate superior canal dehiscence syndrome from benign paroxysmal positional vertigo. As with the American Academy of Neurology (Fife, 2017) recommendations, these recommendations are based on very limited evidence, and questions of its clinical value remain (Noij, 2018). No policy changes are warranted. The policy ID was changed from CP# 10.01.03 to CCP.1276.

In 2020, we added one new systematic review (Scarpa, 2019). The results of the systematic review highlight the potential of vestibular evoked myogenic potential testing for vestibular neuritis, Ménière's disease, and benign paroxysmal positional vertigo, but that a lack of normative thresholds for these conditions continues to hamper a defined clinical role for the test. The new information is consistent with the current policy, and no changes are warranted.

In 2021, we added no new relevant literature to the policy.

In 2022, we added one meta-analysis to the policy, which found that utricular dysfunction may be more predominant in benign paroxysmal positional vertigo compared with saccular dysfunction (Chen, 2020).

In 2023, we added one guideline and a new meta-analysis to the policy. No policy changes are warranted.

Ménière's disease is a clinical diagnosis based on patient-reported symptomatology and audiometric data. The American Academy of Otolaryngology—Head and Neck Surgery recommends against routine vestibular function testing to establish a diagnosis of Ménière's disease, as lower quality evidence suggests the harms of testing generally exceed the benefits. However, select patients who present with atypical symptoms or with difficulty determining the affected ear may benefit from vestibular testing, when the results will affect patient management, for example, when considering ablative interventions (Basura, 2020).

A meta-analysis of nine studies (n = 721) sought to establish the optimal cervical vestibular evoked myogenic potential threshold for detecting superior canal dehiscence syndrome, and to define the diagnostic characteristics based on that threshold. The included studies compared cervical vestibular evoked myogenic potential data to radiological and surgical findings in participants showing complex vertigo with signs and symptoms of superior canal dehiscence syndrome (Kim, 2022).

Overall, the diagnostic odds ratio, area under the summary receiver operating characteristic curve, sensitivity, and specificity were 32.8483, .879, .83, and .88, respectively. In subgroup analyses, although the sensitivity and specificity differed by normal hearing level threshold used (≤ 65 dB, 70 dB, 75 dB, 80 dB, and 85 dB), the differences were not significant among subgroups. Higher thresholds were associated with higher sensitivity but lower specificity. A threshold of 75 dB yielded the highest diagnostic accuracy, with moderate sensitivity (.75) and high specificity (.95). The quality of the evidence was low for sensitivity and very low for specificity, as risk of bias in the studies was high (Kim, 2022).

In 2024, we found no newly published, relevant findings to add to the policy. We changed coverage for vestibular evoked myogenic potential testing to medically necessary based on American Academy of Neurology recommendations that vestibular evoked myogenic potential testing may serve a complementary role in conjunction with temporal bone computed tomography and clinical history in diagnosing superior canal dehiscence syndrome (Fife, 2017), as well as recommendations from the American Academy of Otolaryngology—Head and Neck Surgery (Bhattacharyya, 2017).

References

On March 22, 2024, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were "Vestibule, Labyrinth/diagnosis" (MeSH), "Vestibular Evoked Myogenic Potentials" (MeSH), "Labyrinth Diseases/diagnosis" (MeSH), and "vestibular evoked myogenic potential." We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

Basura GJ, Adams ME, Monfared A, et al. Clinical practice guideline: Ménière's disease. *Otolaryngol Head Neck Surg*. 2020;162(2_suppl):S1-s55. Doi: 10.1177/0194599820909438.

Bhattacharyya N, Gubbels SP, Schwartz SR, et al. Clinical practice guideline: Benign paroxysmal positional vertigo (Update). *Otolaryngol Head Neck Surg*. 2017;156(3_suppl):S1-S47. Doi: 10.1177/0194599816689667.

Chen G, Dai X, Ren X, et al. Ocular vs. cervical vestibular evoked myogenic potentials in benign paroxysmal positional vertigo: A systematic review and meta-analysis. *Front Neurol*. 2020;11:596494. Doi: 10.3389/fneur.2020.596454.

Dougherty JM, Carney M, Hohman MH, Emmady PD. Vestibular dysfunction. *Statpearls*. StatPearls Publishing LLC.; 2022. National Library of Medicine website: https://www.ncbi.nlm.nih.gov/books/NBK558926/. Last updated August 29, 2022.

Fife TD, Colebatch JG, Kerber KA, et al. Practice guideline: Cervical and ocular vestibular evoked myogenic potential testing: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*. 2017;89(22):2288-2296. Doi: 10.1212/wnl.0000000000004690. Reaffirmed 2021.

Gioacchini FM, Alicandri-Ciufelli M, Kaleci S, Magliulo G, Re M. Prevalence and diagnosis of vestibular disorders in children: A review. *Int J Pediatr Otorhinolaryngol.* 2014;78(5):718-724. Doi: 10.1016/j.ijporl.2014.02.009.

Kim DH, Kim SW, Kim SH, Jung JH, Hwang SH. Usefulness of cervical vestibular-evoked myogenic potentials for diagnosing patients with superior canal dehiscence syndrome: A meta-analysis. *Otol Neurotol*. 2022;43(2):146-152. Doi: 10.1097/mao.0000000000003430.

Lopez-Escamez JA, Carey J, Chung WH, et al. Diagnostic criteria for Meniere's disease. *J Vestib Res*. 2015;25(1):1-7. Doi: 10.3233/ves-150549.

Meyer N, Vinck B, Heinze B. cVEMPs: A systematic review and meta-analysis. *Int J Audiol.* 2015;54(3):143-151. Doi: 10.3019/14992027.2014.971468.

Noij KS, Wong K, Duarte MJ, et al. Audiometric and cVEMP thresholds show little correlation with symptoms in superior semicircular canal dehiscence syndrome. *Otol Neurotol.* 2018;39(9):1153-1162. Doi: 10.1097/MAO.0000000000001910.

Scarpa A, Gioacchini FM, Cassandro E, et al. Clinical application of cVEMPs and oVEMPs in patients affected by Ménière's disease, vestibular neuritis and benign paroxysmal positional vertigo: A systematic review. *Acta otorhinolaryngologica Ital.* 2019;39(5):298-307. Doi: 10.14639/0392-100x-2104.

Vestibular Disorders Association. About vestibular disorders. http://vestibular.org/understanding-vestibular-disorder. Undated.

Zhang S, Leng Y, Liu B, et al. Diagnostic value of vestibular evoked myogenic potentials in endolymphatic hydrops: A meta-analysis. *Sci Rep.* 2015;5:14951. Doi: 10.1038/srep14951.

Policy updates

10/2016: initial review date and clinical policy effective date: 4/2017

11/2018: Policy references updated. Policy ID changed.

11/2019: Policy retired.

4/2020: Policy reactivated. Policy references updated.

5/2021: Policy references updated.

5/2022: Policy references updated.

5/2023: Policy references updated.

5/2024: Policy references updated. Coverage modified.