Dynamic/Static Posturography

Wellmark Blue Cross and Blue Shield is an Independent Licensee of the Blue Cross and Blue Shield Association.

Medical Policy #: 02.01.08
Original Effective Date: December 2000
Reviewed: July 2022
Revised: July 2021

NOTICE: This policy contains information which is clinical in nature. The policy is not medical advice. The information in this policy is used by Wellmark to make determinations whether medical treatment is covered under the terms of a Wellmark member's health benefit plan. Physicians and other health care providers are responsible for medical advice and treatment. If you have specific health care needs, you should consult an appropriate health care professional. If you would like to request an accessible version of this document, please contact customer service at 800-524-9242.

Benefit determinations are based on the applicable contract language in effect at the time the services were rendered. Exclusions, limitations, or exceptions may apply. Benefits may vary based on contract, and individual member benefits must be verified. Wellmark determines medical necessity only if the benefit exists and no contract exclusions are applicable. This medical policy may not apply to FEP. Benefits are determined by the Federal Employee Program.

This Medical Policy document describes the status of medical technology at the time the document was developed. Since that time, new technology may have emerged, or new medical literature may have been published. This Medical Policy will be reviewed regularly and be updated as scientific and medical literature becomes available; therefore, policies are subject to change without notice.

DESCRIPTION

Complaints of imbalance are common in older adults and contribute to the risk of falling in this population and are a cause of death and disability in this population in the United States. Maintenance of balance is a complex physiologic process, requiring interaction of the vestibular, visual, and proprioceptive/somatosensory system, and central reflex mechanisms. Balance is also influenced by the general health of the individual (i.e., muscle tone, strength, range of motion). Therefore, identifying and treating the underlying balance disorder can be difficult. Commonly used balance function tests (e.g., electronystagmography, rotational chair tests) attempt to measure the extent and site of a vestibular lesion but do not assess the functional ability to maintain balance.

Dynamic posturography, also known as computerized dynamic posturography (CDP) tests an individual's balance control in situations intended to isolate factors that affect balance in everyday experiences.

Computerized dynamic posturography (CPD) aims to provide quantitative information on an individual's functional ability to maintain balance. The individual, wearing a harness to prevent falls, stands on an enclosed platform surrounded by a visual field. By altering the angle of the platform or shifting the visual field, the test assesses movement coordination and the sensory organization of visual, somatosensory, and vestibular information relevant to postural control. The individual undergoes six different testing situations designed to evaluate the vestibular, visual, and proprioceptive/somatosensory components of balance. Sway-referencing involves making instantaneous computer-aided alterations to the platform or visual surround to coincide with changes in body position produced by sway. The purpose of sway-referencing is to cancel out accurate feedback from somatosensory or visual systems that are normally involved in maintaining balance. In the first 3 components of the test, the support surface is stable, and visual cues are either present, absent or sway-referenced. In tests 4 to 6, the support surface is sway-referenced to the individual, and visual cues are either present, absent, or sway-referenced. In tests 5 and 6, the only accurate sensory cues available for balance are vestibular cues. Results of computerized dynamic posturography (CDP) have been used to determine what type of information (i.e., visual, vestibular, proprioceptive) can and cannot be used to maintain balance. Computerized dynamic posturography (CDP) cannot diagnose pathology or be used to localize the site of a lesion.

Static posturography is the ability to maintain balance on a fixed platform, with eyes open and/or closed and can show three main patterns:

- Weight-bearing asymmetries
- An increase in sway path reflecting unsteadiness
- A small limit of stability beyond which the measure center of pressure (CoP) cannot move further without causing a loss of balance, i.e., impaired coordination between posture and movement

In general terms, the tests measure an individual's balance (as measured by a force platform to calculate the movement of the individual's center of mass) while visual and somatosensory cues are altered. These tests vary by whether eyes are open or closed, the platform is fixed or sway-referenced, and whether the visual surround is fixed or sway-referenced. Posturography provides quantitative information on the degree of imbalance present but is not intended to diagnosis specific types of balance disorders.

Dynamic/Static Posturography for Balance Dysfunction

Clinical Context and Test Purpose

The purpose of computerized dynamic/static posturography in individuals who have balance dysfunction is to inform a decision whether to pursue additional diagnostic workup (e.g., imaging studies that would not have been indicated based on clinical presentation alone) or immediate treatment.

Patients
The relevant population(s) of interest are individuals presenting with balance dysfunction or dizziness. It would be expected these individuals will have had an initial basic evaluation directed by symptoms that will have included a clinical examination and history, with appropriate vital signs and orthostatic blood pressure measurements, and may have had basic evaluations as directed by their symptoms (e.g., electrocardiogram).

Interventions
The intervention includes a class of dynamic posturography tests. A number of tests have clearance from the FDA. Individuals with balance dysfunction being evaluated with dynamic posturography are generally seen in the outpatient setting. Testing may be conducted by audiologists, physical therapists, or technologies under the supervision of physicians.

Comparators
Depending on the clinical presentation, individuals with balance dysfunction may be managed with clinical evaluation alone or with more intensive evaluations including vestibular functioning testing, which can be used to localize the cause of the dysfunction.

Outcomes
The outcomes of interest are to diagnose and treat the underlying condition correctly.

(2021) Hayes released an Evolving Evidence Review addressing the clinical validity and clinical utility of computerized dynamic posturography (CPD) for diagnosing vestibular disorders in adults compared with standard otoneurologic tests. Upon the review there were no clinical studies which met the inclusion criteria thus showing no support for using computerized dynamic posturography (CDP) for diagnosing vestibular disorders in the adult population. Upon reviewing systematic reviews, the evidence does not support any potential benefit or advantage to the effected individual because of low sensitivity and specificity in addition to an absence of information on clinical utility.

Clinically Valid
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

No studies were identified that evaluated the sensitivity and specificity of dynamic posturography for diagnosing any specific balance disorder compared with commonly accepted balance tests. There is no criterion standard test for measuring balance, which is a physiologic parameter. Absent a criterion standard comparison, the literature search sought to identify studies that systematically compared results of dynamic posturography and other balance tests in an appropriate individual population (i.e., individuals at increased risk of falling due to balance issues).

Several studies have used both dynamic posturography and another test to assess balance. For example, Fritz et al. (2015) assessed the correlation between dynamic and static

posturography and other measures of gait and balance dysfunction in 57 ambulatory patients with multiple sclerosis. Two dynamic posturography parameters and 4 static posturography parameters were measured. Walking velocity (the alternative test) was measured in 2 ways: (1) in a laboratory using the Optotrak Motion Capture System and (2) using the timed 25-foot walk test. In regression analysis, demographics, one of the dynamic posturography parameters (anteroposterior sway), and one of the static posturography parameters (eyes open, feet apart) explained 95.3% of the variance in walking velocity. A higher degree of anteroposterior sway, assessed using dynamic posturography, was significantly associated with higher walking velocity. Although the study found that dynamic posturography was associated with measures of walking velocity, the utility of this information regarding impact on patient management is uncertain.

(2015) A study by Ferrazzoli et al. compared dynamic posturography with the Berg Balance Scale score. The Berg Balance Scale is a 14-item tool that assesses performance on a variety of functional tasks, each rated 0-to-4 (maximal score, 56 points). Lower scores indicate higher fall risk. The study included 29 patients with Parkinson disease (PD) not complaining of balance problems and 12 healthy controls matched for age and sex. Scores on the Berg Balance Scale were significantly lower in PD patients than in controls ($p=0.002$). Similarly, results of body sway analysis assessed by posturography differed significantly between PD patients and controls. Specifically, compared with controls, PD patients had a higher standard deviation of body sway measurements in the eyes open ($p=0.005$) and in the eyes open counting ($p=0.020$) conditions. The standard deviation of PD patients was also higher than controls in posturography along the mediolateral axis in the eyes open condition ($p=0.019$), but results were similar in the eyes open counting condition. The authors suggested that posturography could be used to identify early balance disorders in PD patients before they develop clinical symptoms, and that rehabilitation programs could be developed to address specific balance issues. As discussed in the next section, there is a lack of prospective studies comparing health outcomes in patients managed with and without dynamic posturography.

Other published literature on dynamic posturography has assessed fall risk in older individuals and other populations. For example, Whitney et al (2006) retrospectively reviewed 100 charts of individuals referred to a balance and falls clinic with a vestibular diagnosis using dynamic posturography. Patients who reported multiple falls over 6 months had lower initial scores on the Sensory Organization Test than those who reported one or no falls.

Additional studies have used dynamic posturography as a research tool to study balance (e.g., in older adults, PD patients, knee osteoarthritis patients); these studies were not designed to evaluate the clinical validity of dynamic posturography. Dynamic posturography has also been considered a control technique in studies evaluating other novel methods of assessing balance. For example, Alahmari et al. (2014) assessed the reliability and validity of a balance rehabilitation device and compared findings with dynamic posturography using the EquiTest.

Section Summary
Describing the diagnostic performance of dynamic/static posturography in terms of sensitivity and specificity is difficult given the lack of a true criterion standard for measuring balance. The available studies comparing dynamic/static posturography with other types of clinical measures of balance have suggested the posturography results correlate with those measures; however, whether dynamic/static posturography can be used as a diagnostic test is unknown.

Clinically Useful
A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if individuals receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Direct evidence of clinical utility is provided by studies that have compared health outcomes for individuals managed with and without the test. Because these are intervention studies, the preferred evidence would be from randomized controlled trials.

Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility.

No randomized or nonrandomized controlled studies were identified that compared health outcomes in individuals when treatment decisions were made with and without the results of dynamic posturography.

Several retrospective studies have described a customized exercise program based on results of a complete medical and neuro-otologic history and physical examination that included platform posturography. However, the contribution of dynamic posturography to the overall assessment and customization of the exercise program is unclear. In particular, the reports did not describe how (or whether) the exercise programs were modified based on specific deficits identified by platform posturography. Customized vestibular rehabilitation programs can be devised with a standard battery of tests. These retrospective reports were also limited by selection bias and lack of follow-up. Moreover, while these studies showed that individualized therapy could improve patient outcomes, no controlled trials have assessed whether individually customized therapy programs are more effective than generic vestibular exercises.

Also, other related studies have included the use of posturography in the assessment of individuals after clinical intervention. Examples included studies conducted with Parkinson disease (PD) individuals.

Section Summary
Direct evidence of how dynamic/static posturography can be used to improve outcomes is lacking. Absent direct evidence for a diagnostic test, a chain of evidence can sometimes

be identified to demonstrate improvement in health outcomes. However, in the case of dynamic/static posturography, the chain of evidence about clinical validity and how the test would be used in practice is uncertain; therefore, no inferences can be made about clinical utility.

Summary of Evidence
For individuals with suspected balance disorders who receive dynamic/static posturography, the evidence includes cross-sectional comparisons of results in individuals with balance disorders and healthy controls, and retrospective case series reporting outcomes for individuals assessed with dynamic/static posturography as part of clinical care. There are no generally accepted reference standards for dynamic/static posturography, which makes it difficult to determine how the results can be applied in clinical care. There are no studies demonstrating the clinical utility of dynamic/static posturography that would lead to change in management that improve outcomes (e.g., symptoms and function). The evidence is insufficient to determine the effects of this technology on net health outcomes.

Practice Guideline and Position Statements

American Academy of Otolaryngology – Head and Neck Surgery
The American Academy of Otolaryngology – Head and Neck Surgery have issued a position statement and a guideline that mentions dynamic posturography:

- (2017) The practice guideline for *benign paroxysmal positional vertigo* listed computerized posturography was listed as 1 of 19 interventions considered for diagnosing this condition. (*Accessed June 2022*)
- (2014) A position statement on the *evaluation or therapy of individuals with suspected balance or dizziness disorders* listed dynamic posturography as 1 of 4 medically indicated tests or evaluation tools. (*Accessed June 2022*)

Regulatory Status
The NeuroCom EquiTest® is a dynamic posturography device that received 510(k) marketing clearance from the U.S. Food and Drug Administration (FDA). Other dynamic posturography device makers may include but are not limited to Micromedical Technology, Metitur, and Vestibular Technologies.

PRIOR APPROVAL

Not applicable.

POLICY

Posturography is considered **investigational** for all indications including, but not limited to all of the following:

- Dynamic Posturography
- Static Posturography

Overall, there is weak evidence in the peer-reviewed literature regarding the efficacy of dynamic/static posturography for individuals with suspected balance disorders. There are no generally accepted reference standards for dynamic/static posturography, which makes it difficult to determine how the results can be applied in clinical care. There are no studies demonstrating the clinical utility of dynamic/static posturography that would lead to change in management that improve outcomes (e.g., symptoms and function). The evidence is insufficient to determine the effects of this technology on net health outcomes.

PROCEDURE CODES AND BILLING GUIDELINES

To report provider services, use appropriate CPT* codes, Alpha Numeric (HCPCS level 2) codes, Revenue codes, and/or ICD diagnosis codes.

- 92548 Computerized dynamic posturography sensory organization test (CDP-SOT), 6 conditions (i.e., eyes open, eyes closed, visual sway, platform sway, eyes closed platform sway, platform and visual sway), including interpretation and report;
- 92549 Computerized dynamic posturography sensory organization test (CDP-SOT), 6 conditions (i.e., eyes open, eyes closed, visual sway, platform sway, eyes closed platform sway, platform, and visual sway), including interpretation and report; with motor control test (MCT) and adaptation test (ADT)

SELECTED REFERENCES

- Furman JM. Role of posturography in the management of vestibular patients. 1995; 112:8-15.
- Allum JHJ, Shepard NT. An overview of the clinical use of dynamic posturography in the differential diagnosis of balance disorders. Journal of Vestibular Research 1999; 9:223-252.
- Evans, MK, Krebs DE. Posturography does not test vestibulospinal function. Otolaryngol Head Neck Surg. 1999 Feb;120(2):164-73.
- Ruckenstein MJ, Shepard NT. Balance Function Testing; A rational approach. Otolaryngologic Clinics Of North America; Vol.33; No.3; Jun 2000
- Amin M, Girardi M, Konrad HR, Hughes L. A comparison of electronystagmography results with posturography findings from the Balance trak 500. Otol Neurol. 2002 Jul; 23(4):488-93.
- Morgan SS, Beck WG, Dobie RA. Can posturography identify malingerers? Otol Neurol 2002 Mar; 23(2):214-7
- ECRI Institute. Dynamic Posturography for Balance Disorders. Plymouth Meeting (PA): ECRI Institute: 2007 March 20. 9p. [ECRI custom hotline response].
- Ebersbach, G & Gunkel, M. Posturography reflects clinical imbalance in Parkinson's disease. Mov Disord. 2010 Dec 13. [Epub ahead of print]

- Pang MY, Lam FM, Wong GH, et al. Balance performance in head-shake computerized dynamic posturography: aging effects and test-retest reliability. Phys Ther. 2011 Apr;91(4):598.
- Balaguer Garcia R, Pitarch Corresa S, Baydal Bertomeu JM, Morales Suarez-Varela MM. Static posturography with dynamic tests. Usefulness of biomechanical parameters in assessing vestibular patients. Acta Otorrinolaringol Esp. 2012 Sep-Oct;63(5):332-8.
- Ganesan M, Pasha SA, Pal PK, Yadav R, Gupta A. Direction specific preserved limits of stability in early progressive supranuclear palsy: a dynamic posturographic study. Gait Posture. 2012 Apr;35(4):625-9.
- NeuroCom. Computerized Dynamic Posturography (CDP).
- American Academy of Otolaryngology-Head and Neck Surgery Foundation.Position Statement: Posturography.
- Bhattacharyya N, Baugh RF, Orvidas L, et al. American Academy of Otolaryngology-Head Neck, Surgery Foundation Clinical practice guideline: benign paroxysmal positional vertigo. Otolaryngol Head Neck Surg. 2008;139(5 Suppl 4):S47-81.
- Pang MY, Lam FM, Wong GH, et al. Balance performance in head-shake computerized dynamic posturography: aging effects and test-retest reliability. Phys Ther. Feb 2011;91(2):246-253. PMID 21148260
- Whitney SL, Roche JL, Marchetti GF, et al. A comparison of accelerometry and center of pressure measures during computerized dynamic posturography: a measure of balance. Gait Posture. Apr 2011;33(4):594-599. PMID 21333541
- Fritz NE, Newsome SD, Eloyan A, et al. Longitudinal relationships among posturography and gait measures in multiple sclerosis. Neurology. May 19 2015;84(20):2048-2056. PMID 25878185
- Ganesan M, Pasha SA, Pal PK, et al. Direction specific preserved limits of stability in early progressive supranuclear palsy: a dynamic posturographic study. Gait Posture. Apr 2012;35(4):625-629. PMID 22225854
- Lee JM, Koh SB, Chae SW, et al. Postural instability and cognitive dysfunction in early Parkinson's disease. Can J Neurol Sci. Jul 2012;39(4):473-482. PMID 22728854
- Pierchala K, Lachowska M, Morawski K, et al. Sensory Organization Test outcomes in young, older and elderly healthy individuals - preliminary results. Otolaryngol Pol. Jul 2012;66(4):274-279. PMID 22890532
- Biggan JR, Melton F, Horvat MA, et al. Increased load computerized dynamic posturography in prefrail and nonfrail community-dwelling older adults. J Aging Phys Act. Jan 2014;22(1):96-102. PMID 23416307
- Ferrazzoli D, Fasano A, Maestri R, et al. Balance dysfunction in Parkinson's disease: the role of posturography in developing a rehabilitation program. Parkinsons Dis. 2015;2015:520128. PMID 26504611
- Alahmari KA, Marchetti GF, Sparto PJ, et al. Estimating postural control with the balance rehabilitation unit: measurement consistency, accuracy, validity, and

comparison with dynamic posturography. Arch Phys Med Rehabil. Jan 2014;95(1):65-73. PMID 24076084
- Izquierdo-Renau M, Perez-Soriano P, Ribas-Garcia V, et. al. Intra and intersession repeatability and reliability of the S-Plate(R) pressure platform. Gait Posture. Dec 02 2016;52:224-226. PMID 27936441
- UpToDate. Evaluation and Dizziness in Children and Adolescents. Theresa Walls M.D., MPH, Stephen J. Teach M.D., MPH. Topic last updated May 26, 2015.
- UpToDate. Meniere Disease. Howard S. Moskowitz M.D, PhD, Elizabeth A. Dinces M.D., Topic last updated May 22, 2017.
- UpToDate. Evaluation of the Patient with Vertigo. Joseph M. Furman M.D., PhD, Jason JS Barton M.D, PhD, FRCPC. Topic last updated June 10, 2015.
- American Academy of Otolaryngology-Head and Neck Surgery. Position Statement: Posturography.
- Bhattacharyya N, Baugh RF, Orvidas L, et. al. Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update). Otolaryngology – Head and Neck Surgery 2017, Vol. 156(3S) S1-S47.
- Buatois S, Gueguen R, Gauchard GC, et al. Posturography and risk of recurrent falls in healthy non-institutionalized persons aged over 65. Gerontology. Aug 2006;52(6):345-352. PMID 16905886
- Girardi M, Konrad HR, Amin M, et al. Predicting fall risks in an elderly population: computer dynamic posturography versus electronystagmography test results. Laryngoscope. Sep 2001;111(9):1528-1532. PMID 11568601
- Sinaki M, Lynn SG. Reducing the risk of falls through proprioceptive dynamic posture training in osteoporotic women with kyphotic posturing: a randomized pilot study. Am J Phys Med Rehabil. Apr 2002;81(4):241-246. PMID 11953540
- Whitney SL, Marchetti GF, Schade AI. The relationship between falls history and computerized dynamic posturography in persons with balance and vestibular disorders. Arch Phys Med Rehabil. Mar 2006;87(3):402-407. PMID 16500176
- Lim KB, Lee HJ. Computerized posturographic measurement in elderly women with unilateral knee osteoarthritis. Ann Rehabil Med. Oct 2012;36(5):618-626. PMID 23185725
- Lundin F, Ledin T, Wikkelso C, et al. Postural function in idiopathic normal pressure hydrocephalus before and after shunt surgery: A controlled study using computerized dynamic posturography (EquiTest). Clin Neurol Neurosurg. Sep 2013;115(9):1626-1631. PMID 23489444
- Samy HM. Dizziness, Vertigo and Imbalance. Medscape Updated March 13, 2017
- Neurocom's SMART EquiTest Computerized Dynamic Posturography.
- Bronstein AM. Pavlou M. Neurological Rehabilitation. Handbook of Clinical Neurology. 2013. Science Direct
- Kamieniarz A, Michalska J, Marszałek W, et al. Detection of postural control in early Parkinson's disease: Clinical testing vs. modulation of center of pressure. PLoS One. 2021 Jan 12;16(1):e0245353.

- Mallinson A, Kuijpers A, Van Zwieten, G et al. Computerized dynamic posturography does not detect measured CVEMP and OVEMP abnormalities. Gait & Posture 67 (2019) 248–250.
- Morisod B, Mermod M, Maire R. Posturographic pattern of patients with chronic subjective dizziness before and after vestibular rehabilitation. J Vestib Res. 2018;27(5-6):305-311.
- Hayes, Inc. Hayes Evolving Evidence Review. Computerized dynamic posturography (CDP) for diagnosis of vestibular disorders. Lansdale, PA: Hayes, Inc.; August 2021.
- McDonnell, Michelle N, and Susan L Hillier. "Vestibular rehabilitation for unilateral peripheral vestibular dysfunction." The Cochrane database of systematic reviews vol. 1 CD005397. 13 Jan. 2015, doi:10.1002/14651858.CD005397.pub4

POLICY HISTORY

Date	Reason	Action
July 2022	Annual Review	Policy Renewed
July 2021	Annual Review	Policy Revised
July 2020	Annual Review	Policy Revised
July 2019	Annual Review	Policy Renewed
July 2018	Annual Review	Policy Revised
July 2017	Annual Review	Policy Renewed
July 2016	Annual Review	Policy Renewed
August 2015	Annual Review	Policy Revised
September 2014	Annual Review	Policy Renewed
October 2013	Annual Review	Policy Renewed
December 2012	Annual Review	Policy Renewed
December 2011	Annual Review	Policy Renewed
December 2010	Annual Review	Policy Renewed

New information or technology that would be relevant for Wellmark to consider when this policy is next reviewed may be submitted to:

Wellmark Blue Cross and Blue Shield
Medical Policy Analyst
PO Box 9232
Des Moines, IA 50306-9232

*CPT® is a registered trademark of the American Medical Association.