

Medical Policy



Title: Dynamic Posturography

Professional / Institutional
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Populations	Interventions	Comparators	Outcomes
Individuals: • With suspected balance disorders	Interventions of interest are: • Dynamic posturography	Comparators of interest are: • Alternative approach to balance assessment or no balance assessment	Relevant outcomes include: • Test accuracy • Test validity • Symptoms • Morbid events

DESCRIPTION

Dynamic posturography tests a patient’s balance control in situations intended to isolate factors that affect balance in everyday experiences. Posturography provides quantitative information on the degree of imbalance present but is not intended to diagnosis specific types of balance disorders.

OBJECTIVE

The objective of this evidence review is to determine whether the use of dynamic posturography as an adjunctive diagnostic tool improves the net health outcome in individuals with suspected balance disorders.

BACKGROUND**Balance Disorders**

Complaints of imbalance are common in older adults and contribute to the risk of falling in this population. Falls are an important cause of death and disability in this population in the United States. Maintenance of balance is a complex physiologic process, requiring the interaction of the vestibular, visual, and proprioceptive/somatosensory system, and central reflex mechanisms. Balance is also influenced by the general health of the patient (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.

Role in Diagnosis

Dynamic posturography aims to provide quantitative information on a patient's functional ability to maintain balance. The patient, 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 patient undergoes 6 different testing situations designed to evaluate the vestibular, visual, and proprioceptive/somatosensory components of balance. In general terms, the test measures an individual's balance (as measured by a force platform to calculate the movement of the patient'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. 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 have been used to determine what type of information (i.e., visual, vestibular, proprioceptive) can and cannot be used to maintain balance. Dynamic posturography cannot be used to localize the site of a lesion.

Posturography tests a patient's balance control in situations intended to isolate factors that affect balance in everyday experiences. Balance can be rapidly assessed qualitatively by asking the patient to maintain a steady stance on a flat or compressible surface (i.e., foam pads) with the eyes open or closed. By closing the eyes, the visual input into balance is eliminated. Use of foam

pads eliminates the sensory and proprioceptive cues. Therefore, the only vestibular input is available when standing on a foam pad with eyes closed.

REGULATORY STATUS

In 1985, the NeuroCom EquiTest® (NeuroCom International, Portland, OR; now Clackamas, OR), a dynamic posturography device, was cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. Other dynamic posturography device makers include Vestibular Technologies (Cheyenne, WY) and Medicapteurs (Balma, France). Companies that previously manufactured dynamic posturography devices include Metitur (Jyvaskyla, Finland) and Micromedical Technology (Chatham, IL). FDA product code: LXV.

POLICY

Dynamic posturography is considered **experimental / investigational**.

Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

RATIONALE

This evidence review has been updated regularly with searches of the PubMed database. The most recent literature update was performed through December 13, 2022.

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

Promotion of greater diversity and inclusion in clinical research of historically marginalized groups (e.g., People of Color [African-American, Asian, Black, Latino and Native American]; LGBTQIA (Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual); Women; and People with Disabilities [Physical and Invisible]) allows policy populations to be more reflective of and findings more applicable to our diverse members. While we also strive to use inclusive language related to these groups in our policies, use of gender-specific nouns (e.g., women, men, sisters, etc.) will continue when reflective of language used in publications describing study populations. This review was informed by a 1996 TEC Assessment, which concluded that the evidence was insufficient to determine whether dynamic posturography distinguished between peripheral and central vestibular dysfunction.¹

DYNAMIC POSTUROGRAPHY**Clinical Context and Test Purpose**

The purpose of dynamic posturography in patients 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.

Population

The relevant population of interest is patients presenting with balance dysfunction or dizziness. It would be expected that these patients 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 U.S. Food and Drug Administration. The specific maneuvers may be operator dependent.

Comparators

Depending on the clinical presentation, patients with balance dysfunction may be managed with clinical evaluation alone or with more intensive evaluations including vestibular function 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. The time frame of interest is months to approximately a year.

Study Selection Criteria

For the evaluation of clinical validity of dynamic posturography, studies that meet the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard
- Patient/sample clinical characteristics were described
- Patient/sample selection criteria were described.

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).

Review of Evidence

We did not identify any studies 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 patient 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.² 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.

A study by Ferrazzoli et al. (2015) compared dynamic posturography with the Berg Balance Scale score.³ 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 ($p=.002$). 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 ($p=.005$) and in the eyes open counting ($p=.020$) conditions. The standard deviation of PD patients was also higher than controls in posturography along the mediolateral axis in the eyes open condition ($p=.019$), 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.^{4,5,6,7} 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.⁷ Patients who reported multiple falls over 6 months had lower initial scores on the Sensory Organization Test than those who reported 1 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.^{8,9,10,11,12} 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.¹³

Section Summary: Clinically Valid

Describing the diagnostic performance of dynamic 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 posturography with other types of clinical measures of balance have suggested that posturography results correlate with those measures; however, whether dynamic 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 patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Direct Evidence

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

No randomized or nonrandomized controlled studies were identified that compared health outcomes in patients when treatment decisions were made with and without the results of dynamic posturography. A 2009 RCT was identified, but it used dynamic posturography as an outcome measure, rather than as a tool for making treatment decisions; thus conclusions cannot be drawn from it on the impact of posturography on patient management.¹⁴

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.^{15,16} However, the contribution of dynamic posturography to the overall assessment and customization of the exercise program by the Badke group 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.¹⁷ 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 patients after clinical intervention. Examples included studies conducted with individuals with PD^{18,19} and assessment of patients with idiopathic normal pressure hydrocephalus before and after shunt surgery.²⁰ For instance, Nocera et al (2009) used posturography to evaluate the effectiveness of a home-based exercise program on postural control for 10 patients with PD.¹⁹ The 10 patients and 10 healthy age-matched controls were assessed with dynamic posturography before and after the 10-week intervention. Dynamic posturography was not used to select patients for the intervention or to individualize the intervention.

Chain of Evidence

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.

Section Summary: Clinically Useful

Direct evidence of how dynamic posturography can be used to improve outcomes is lacking. In the absence of 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 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.

SUPPLEMENTAL INFORMATION

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

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' 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.

The American Academy of Otolaryngology-Head and Neck Surgery

In a position statement adopted in 2007 and revised in 2014, the American Academy of Otolaryngology-Head and Neck Surgery recognized computerized dynamic platform posturography and dynamic (or moving) platform posturography as medically indicated and appropriate tools in the evaluation or therapy of certain persons with suspected balance or dizziness disorders.²¹

In 2017, updated guidelines on the management of benign paroxysmal positional vertigo were published; posturography is not mentioned.²²

U.S. Preventive Services Task Force Recommendations

Not applicable.

Ongoing and Unpublished Clinical Trials

A search of ClinicalTrials.gov in December 2022 did not identify any ongoing or unpublished trials that would likely influence this review.

CODING

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. This may not be a comprehensive list of procedure codes applicable to this policy.

Inclusion or exclusion of a procedure, diagnosis or device code(s) 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 of these services as it applies to an individual member.

The code(s) listed below are medically necessary ONLY if the procedure is performed according to the "Policy" section of this document.

CPT/HCPCS	
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
92700	Unlisted otorhinolaryngological service or procedure

REVISIONS	
01-30-2014	Policy added to the bcbsks.com web site.
02-04-2015	Updated Description section.
	Updated Rationale section.
	Updated References section.
06-10-2016	Updated Description section.
	Updated Rationale section.
	In Coding section: <ul style="list-style-type: none"> ▪ Added CPT code 92700. ▪ Added coding bullet.
	Updated References section.
03-15-2017	Updated Description section.
	Updated Rationale section.
	Updated References section.
03-14-2018	Updated Description section.
	Updated Rationale section.
	Updated References section.
03-27-2019	Updated Description section.
	Updated Rationale section.
	Updated References section.
01-01-2020	In Coding section: <ul style="list-style-type: none"> ▪ Added CPT Code: 92549 ▪ Revised CPT Code: 92548
	Updated Description section.
	Updated Rationale section.
04-16-2021	Updated Rationale section.
	Updated References section.
	Updated References section.
07-15-2021	In Coding section:

REVISIONS	
	<ul style="list-style-type: none"> ▪ Replaced "92700" with "92700" in the fourth bullet point
03-23-2022	Updated Description Section
	Updated Rationale Section
	Updated Coding Section <ul style="list-style-type: none"> ▪ Removed Coding Bullets CPT code 92700 will be denied as experimental / investigational if billed for the following tests: <ul style="list-style-type: none"> ○ Vestibular Evoked Myogenic Potentials (VEMP) ○ Video Head Impulse Test (VHIT) ○ Saccades Test ○ Gans Sensory Organization Test (SOP)
	Updated References Section
03-28-2023	Updated Description Section.
	Updated Rationale Section.
	Updated Coding Section <ul style="list-style-type: none"> ▪ Removed ICD-10 Diagnoses box
	Updated References Section.

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