Dynamic Posturography

Policy Number: 2.01.02  Last Review: 7/2019

Policy
Blue Cross and Blue Shield of Kansas City (Blue KC) will not provide coverage for dynamic posturography. This is considered investigational.

When Policy Topic is covered
Not Applicable

When Policy Topic is not covered
Dynamic posturography is considered investigational.

Description of Procedure or Service

<table>
<thead>
<tr>
<th>Populations</th>
<th>Interventions</th>
<th>Comparators</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals:</td>
<td>Interventions of interest are:</td>
<td>Comparators of interest are:</td>
<td>Relevant outcomes include:</td>
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<tr>
<td>With suspected balance disorders</td>
<td>• Dynamic posturography</td>
<td>• Alternative approach to balance assessment or no balance assessment</td>
<td>• Test accuracy</td>
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</table>

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 diagnose specific types of balance disorders.

For individuals with suspected balance disorders who receive dynamic posturography, the evidence includes cross-sectional comparisons of results in patients with balance disorders and healthy controls and retrospective case series reporting outcomes for patients assessed with dynamic posturography as part of clinical care. Relevant outcomes are test accuracy and validity, symptoms, and morbid events. There are no generally accepted reference standards for dynamic posturography, which makes it difficult to determine how testing results can be applied to clinical care. There are no studies demonstrating the clinical utility of the test that would lead to changes in management that improve outcomes (eg, symptoms, function). The evidence is insufficient to determine the effects of the technology on health outcomes.
**Background**
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 interaction of the vestibular, visual, and proprioceptive/somatosensory system, and central reflex mechanisms. Balance is also influenced by the general health of the patient (ie, muscle tone, strength, range of motion). Therefore, identifying and treating the underlying balance disorder can be difficult. Commonly used balance function tests (eg, 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 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 (ie, 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 (ie, 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, 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).

Rationale
This evidence review was created in December 1995 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through December 9, 2018.

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.

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

Diagnostic 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 (eg, imaging studies that would not have been indicated based on clinical presentation alone) or immediate treatment.

Patients
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 (eg, electrocardiogram).
Interventions
The intervention includes a class of dynamic posturography tests. A number of tests have clearance from the 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.

Timing
The time frame of interest is months to approximately a year.

Setting
Patients with balance dysfunction being evaluated with dynamic posturography are generally seen in the outpatient setting. Testing may be conducted by audiologists, physical therapists, or technologists under the supervision of physicians.

Simplifying Test Terms
There are 3 core characteristics for assessing a medical test. Whether imaging, laboratory, or other, all medical tests must be:

- Technically reliable
- Clinically valid
- Clinically useful.

Because different specialties may use different terms for the same concept, we are highlighting the core characteristics. The core characteristics also apply to different uses of tests, such as diagnosis, prognosis, and monitoring treatment.

Diagnostic tests detect presence or absence of a condition. Surveillance and treatment monitoring are essentially diagnostic tests over a time frame. Surveillance to see whether a condition develops or progresses is a type of detection. Treatment monitoring is also a type of detection because the purpose is to see if treatment is associated with the disappearance, regression, or progression of the condition.

Prognostic tests predict the risk of developing a condition in the future. Tests to predict response to therapy are also prognostic. Response to therapy is a type of condition and can be either a beneficial response or adverse response. The term predictive test is often used to refer to response to therapy. To simplify terms, we
use prognostic to refer both to predicting a future condition or to predicting a response to therapy.

**Technically Reliable**
Assessment of technical reliability focuses on specific tests and operators and requires review of unpublished and often proprietary information. Review of specific tests, operators, and unpublished data are outside the scope of this evidence review, and alternative sources exist. This evidence review focuses on the clinical validity and 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).

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 (ie, 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.

A study by Ferrazzoli et al (2015) 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 (eg, 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: 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.

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 randomized controlled trial 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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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 a clinical intervention. Examples included studies conducted with PD patients\textsuperscript{18,19}, and assessment of patients with idiopathic normal pressure hydrocephalus before and after shunt surgery.\textsuperscript{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.\textsuperscript{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. 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 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 posturography, the evidence includes cross-sectional comparisons of results in patients with balance disorders and healthy controls and retrospective case series reporting outcomes for patients assessed with dynamic posturography as part of clinical care. Relevant outcomes are test accuracy and validity, symptoms, and morbid events. There are no generally accepted reference standards for dynamic posturography.
posturography, which makes it difficult to determine how testing results can be applied to clinical care. There are no studies demonstrating the clinical utility of the test that would lead to changes in management that improve outcomes (eg, symptoms, function). The evidence is insufficient to determine the effects of the technology on health outcomes.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements
The American Academy of Otolaryngology - Head and Neck Surgery and the Academy’s Foundation have issued 2 guidelines that mention dynamic posturography:

- A position statement on the evaluation or therapy of individuals with suspected balance or dizziness disorders, revised in September 2014, listed dynamic posturography as 1 of 4 medically indicated tests or evaluation tools.21.
- In 2008, in guidelines on the management of benign paroxysmal positional vertigo, computerized posturography was listed as 1 of 18 potential tools to consider for diagnosing this condition.22.

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials
A search of ClinicalTrials.gov in December 2019 did not identify any ongoing or unpublished trials that would likely influence this review.

REFERENCES

Billing Coding/Physician Documentation Information

92548 Computerized dynamic posturography

ICD-10 Codes

H81.01 Disorders of vestibular function code range
H81.93 Vertiginous syndromes in diseases classified elsewhere code range
H82.9 Vertiginous syndromes in diseases classified elsewhere code range
R42 Dizziness and giddiness (includes vertigo NOS)
## Additional Policy Key Words

N/A

## Policy Implementation/Update Information

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<th>Date</th>
<th>Description</th>
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<td>Policy reviewed and statement changed to investigational (change effective 8/1/05).</td>
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