Computerized Dynamic Posturography (for Nebraska Only)

Policy Number: CS023NE.R
Effective Date: April 1, 2025

Instructions for Use

Table of Contents **Page**

Related Policies
None

Application

This Medical Policy only applies to the State of Nebraska.

Coverage Rationale

Computerized dynamic posturography (CDP) testing, also called balance board testing or equilibrium platform testing (EPT), is unproven and not medically necessary for evaluating any condition including but not limited to balance disorders due to insufficient evidence of efficacy.

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
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)

Description of Services

Computerized dynamic posturography (CDP), also known as moving platform posturography or dynamic posturography, uses a platform device for evaluating a patient's ability to maintain balance. CDP has been used to measure a patient's ability to maintain balance under varying conditions, when the usual cues that one relies upon to remain upright (vision,

proprioception, and vestibular function) are manipulated. The goal of testing is to isolate vestibular symptoms to a specific cause that can often be treated. Standard diagnostic tests include electronystagmography and rotational chair tests, which evaluate eye movements, in response to a number of different stimuli including the position and rotation of the head.

Clinical Evidence

Overall, there is weak evidence in the peer-reviewed literature regarding the efficacy of CDP for evaluating vestibular and other disorders. There is a lack of well-designed trials to demonstrate the diagnostic utility of CDP compared with standard tests. Furthermore, there is insufficient evidence demonstrating consistent and beneficial effects of CDP testing on patient-relevant outcomes.

David and Shahnaz (2024) conducted a single-center randomized controlled trial with crossover comparing a rehabilitative CDP protocol, computerized vestibular retraining therapy (CVRT), to a home exercise program (HEP) in individuals with confirmed unilateral vestibular deficits (UVDs). There were 37 participants enrolled, of which, 20 were randomized to CVRT and 17 to HEP. Of the 17 participants randomized to HEP, 12 participants completed HEP and 11 completed the crossover. Outcomes measures included the sensory organization test (SOT), Dizziness Handicap Inventory (DHI) score, Activity-Specific Balance Confidence Scale (ABC), and Falls Efficacy Score-International (FES-I). Participants in the CVRT group completed 12 twice-weekly sessions of CVRT in a clinic and participants in the HEP group were given a validated exercise booklet that was reviewed and demonstrated by the principal investigator and were asked to perform the exercises twice daily for 6 weeks. After completion of HEP, participants completed assessments in the clinic and were invited to crossover to CVRT. The SOT composite score improved by 14.3 in the CVRT group while there was no significant change in the HEP group ($p = .04$). There was no difference between groups in the Static Equilibrium Score ($p = .84$). The dynamic equilibrium score improved by 20.0 after CVRT while there was no significant change after HEP ($p = .04$). Both groups demonstrated improvement in all 3 participant-reported measures. DHI improved by a mean of 11.8 points in the HEP group and 18.2 points in the CVRT group. ABC scale scores improved by a mean of 8.2 points in the HEP group and 15.1 points in the CVRT group. FES-I scores improved by a mean of 6.3 points in the HEP group and 6.6 in the CVRT group. These changes were not different between treatment groups (DHI: $p = .26$; ABC: $p = .36$; FES-I: $p = .96$). For those participants in the HEP group that completed the CVRT protocol in crossover, the SOT score improved after adding CVRT compared to baseline and post-HEP scores. Completing HEP alone was associated with improved DHI and FES-I. When adding CVRT, DHI and ABC had a significant improvement over HEP alone while there was no significant benefit for FES-I. Limitations included small number of participants, human error in randomization of one participant, lack of therapist supervision and customization of the control group, and higher withdrawal rate in the HEP group.

Kamieniarz et al. (2021) conducted a cross-sectional study to quantify balance changes in early and moderate stage Parkinson's disease (PD) and compared the values to healthy controls (HC) using clinical assessments of balance and posturography. Study participants included 15 adults with early PD, 15 moderate PD and 15 age matched controls. PD participants were tested during the "ON period" of their usual antiparkinsonian medication (at least one hour after they took their medication) and none of the participants exhibited any dyskinesia or dystonia signs during testing. A clinical assessment was done, as well as clinical tests of balance on a force platform. The authors quantified the spatiotemporal parameters of the center of pressure (COP), the sample entropy and power spectral density (PSD) of the COP. The results showed the PSD of the COP differentiated PD-II from HC from 0-0.5 Hz and PD-II from PD-III from 0.5-1 Hz. Specifically, PD-II and PD-III manifested greater power than HC from 0-0.5 Hz, whereas PD-III exhibited greater power than PD-II and HC from 0.5-1.0 Hz ($p < 0.05$). However, there were no significant differences between PD-II and HC in all clinical tests and in spatiotemporal parameters of the COP ($p > 0.05$). Although the sample entropy was significantly lower in the PD groups ($p < 0.05$), entropy failed to differentiate PD-II from PD-III. The authors concluded that the low-frequency modulation of the COP in this small cohort differentiated early PD from HC and from moderate PD, and show that there are early balance deficits in PD. This study is limited by a small number of participants.

Pilkar et al. (2021) conducted a test validation study to evaluate the probability of a robotic, posturography-based fall-risk assessment to objectively measure the risk of falls in individuals with traumatic brain injury (TBI). Five individuals with chronic TBI performed the fall-risk assessment on Hunova - a commercial robotic platform for assessing and training balance. The single assessment considers multifaceted fall-driving components, including static and dynamic balance, sit-to-stand, limits of stability, responses to perturbations, gait speed, and history of previous falls and provides a composite score for risk of falls, called silver index (SI), a number between 0 (no risk) and 100 (high risk) based on a machine learning-based predictive model. The SI score for individuals with TBI was 66 ±32.1 (min: 32, max: 100) - categorized as medium-to-high risk of falls. The construct validity of SI outcome was performed by evaluating its relationship with clinical outcomes of functional balance and mobility (Berg Balance Scale [BBS], Timed-Up and Go [TUG], and gait speed) as well as posturography outcomes (Center of Pressure [CoP] area and velocity). The bivariate Pearson correlation coefficient, although not statistically significant, suggested the presence of linear relationships ($0.52 > r > 0.84$) between SI and

functional and posturography outcomes, supporting the construct validity of SI. Conventionally, the assessments of fall risks are based on questionnaires that might be deficient in objectivity, consistency, and accuracy. The authors found the preliminary evidence from this study suggested that it is reasonable to use SI for assessing the risk of falls in TBI individuals, however the study is limited by extremely small sample size and therefore, the results should be taken cautiously. Furthermore, this study did not address the clinical utility of the test in the care of patient with TBI.

A Hayes Evolving Evidence Review (2021, updated 2023) focused primarily on the clinical validity (in terms of diagnostic performance) and clinical utility (in terms of impact on diagnostic decision-making) of CPD for diagnosing vestibular disorders. There were no studies that met the inclusion criteria. There was one systematic review published in 1996 that did not indicate any potential benefit or advantage to the patient for diagnosing vestibular disorders. There were two guidelines identified but there was weak support for CDP for diagnosing vestibular disorders; this weak support was based on expert opinion rather than robust clinical studies.

Mallinson et al. (2019) analyzed 180 patients referred for chronic vestibular disease (persistent symptoms for more than one year) who received a full battery of vestibular assessments. The vestibular evoked myogenic potential (VEMP) results were correlated with CDP. CDP results were “normal” in 102 patients (57%), “nonspecifically abnormal” in 53 patients (29%) and showed a “vestibular abnormality pattern” in 25 patients (14%). The rate of VEMP abnormalities was the same in patients with normal CDP and those with abnormal CDP. In some patients, all assessments were abnormal, but in some patients only one assessment was abnormal, suggesting that these modalities measure different things. The authors concluded that the results show that CVEMP and OVEMP abnormalities do not correlate with CDP findings; as variables in chronically dizzy patients, they are independent of each other.

Ahmed et al. (2017) performed a study to evaluate the relation between gait parameters and postural stability in early and late stages of PD. Forty-one participants with PD were divided into two groups. Group A (n = 20) were considered early stage PD and group B (n = 21) were considered late stage ambulant PD. A control group (n = 18) consisted of eighteen healthy elderly subjects. The individuals were evaluated for postural stability by CDP device and gait analysis using an 8 m-camera Vicon 612 data capturing system set. The study results found postural instability in early PD and late PD groups with a significant decline of composite equilibrium score and Unified Parkinson Disease Rating Scale motor part score in early PD and late PD groups as compared with control group. The authors concluded that this suggests that particularly highly mobile PD patients benefit from visual feedback-based balance training in early PD and that CDP assists in the analysis of the functional aspects of the body imbalance, treatment and prognosis of PD. There was insufficient data for the long follow-up effect of visual feedback-based balance training for PD.

Hebert and Manago (2017) performed a study to determine the reliability and discriminant validity of the computerized dynamic posturography sensory organization test (CDP-SOT) in people with multiple sclerosis (MS). The CDP-SOT was performed on 30 participants with MS. A 2-week–interval, repeated-measures design was implemented to investigate test-retest reliability of the CDP-SOT and the ability of the CDP-SOT to discriminate between participants with lower versus higher disability. The CDP-SOT had excellent reliability for composite scores. Composite scores were significantly greater in the lower-disability group versus the higher-disability group at session 1 (70.89 vs. 48.60) and session 2 (74.82 vs. 48.85). The authors concluded that the CDP-SOT is a reliable measure of balance and accurately differentiates disability status in people with MS. A study limitation identified was the recognition that smaller sample sizes can lead to large variances in measures, prohibiting valid minimal detectable change analyses. Larger longitudinal studies investigating clinically meaningful changes in CDP-SOT scores due to the natural course of MS and in response to treatment need to be conducted. Furthermore, this study did not address the clinical utility of the test in the care of patient with MS.

A single-center, retrospective review was conducted by Morisod et al., (2018) to look for a specific posturographic pattern among patients diagnosed with chronic subjective dizziness (CSD) and to visualize improvement after vestibular rehabilitation. The study included 114 patients who underwent CDP. Sixty-two percent of the assessment posturographies were abnormal. The most affected sub-items were limit of stability and composite score of sensory organization tests. In the 42 patients who had vestibular rehabilitation and a post rehabilitation posturography, the proportion of abnormal posturography significantly dropped from 79% to 33%. The authors concluded that patients with CSD have a high rate of abnormal posturography, but without a specific pattern. The findings of this study need to be validated by well-designed studies. Furthermore, this study did not address the clinical utility of the test.

A study was conducted by Buster et al. (2016) which compared CDP scores from individuals with TBI to controls to determine if CDP could differentiate between the two groups and determine if there was a learning effect associated with testing that could be used to guide evaluation of baseline balance. Ten ambulatory individuals with a history of severe TBI and 10 individuals without participated in three CDP sessions (24-72 hours apart). Participants performed the Berg Balance Test, Dynamic Gait Index and three trials of a standardized balance assessment during each session. Dynamic Movement Analysis (DMA) scores were recorded for each test. Individuals with TBI scored 93% higher (i.e., reflecting

poorer balance) than the control group. The group with TBI exhibited 6.6-times more variability compared to the control group. A learning effect was detected in the group with TBI on the first day of testing. The authors concluded that the CDP system detected balance differences between individuals with TBI and controls and given the documented learning effect, the best of three trials should be used to accurately assess baseline scores. The significance of this study is limited by small sample size and short follow-up period. Furthermore, this study did not address the clinical utility of the test in the care of patient with TBI.

Smoot et al. (2015) conducted a feasibility study with ten children; five with autism spectrum disorder (ASD) and five with typical development (TD) using posturography to monitor changes following vestibular input. Each child participated in a 10 min vestibular swing activity with pre- and post-intervention evaluations under four different sensory testing conditions. Sway ranges, mean sway velocity, sway root mean square (RMS), and sample entropy were calculated from center of pressure (COP) data. All five children with ASD demonstrated decreased mean sway velocity in the eyes open/flat plate condition post-intervention. Four of the five children with ASD demonstrated an increase in RMS and a decrease in anterior/posterior sample entropy post-intervention in the eyes closed, foam pad condition and eyes open, flat plate condition, respectively. The authors concluded that using posturography with sensory integration warrants further investigation. This is an uncontrolled study with a small sample size. Due to limited studies, small sample sizes, and weak study designs, there is insufficient evidence to conclude that CDP is useful for evaluating any condition. Further clinical trials demonstrating the clinical usefulness of CDP are needed.

Palm et al. (2014) performed a study where twenty subjects performed tests on the Biodex Stability System at all 13 stability levels. Overall stability index, medial-lateral stability index, and anterior-posterior stability index scores were calculated, and data were analyzed using analysis of variance and linear regression analysis. A decrease in platform stability from the static level to the second least stable level was associated with a linear decrease in postural control. The overall stability index scores were 1.5 ±0.8 degrees (static), 2.2 ±0.9 degrees (level 8), and 3.6 ±1.7 degrees (level 2). The slope of the regression lines was 0.17 for the men and 0.10 for the women. The authors concluded that a linear correlation was demonstrated between platform stability and postural control. Limitations include non-randomization and small sample size.

Clinical Practice Guidelines

American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS)

In a 2014 position statement, AAO-HNS recognizes that the following tests or treatments are medically indicated and appropriate in the evaluation or treatment of persons with suspected balance or dizziness disorders:

- Computerized static platform posturography
- Computerized dynamic platform posturography
- Dynamic (or moving) platform posturography
- Static platform posturography
- A 2017 clinical practice guideline for benign paroxysmal positional vertigo lists computerized posturography as one of the potential tools to consider for diagnosing this condition (Bhattacharyya, 2017).

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Devices for testing vestibular dysfunction are captured in the FDA 510(k) database under Product Code LXV (Vestibular Analysis Apparatus), IKN (Electromyograph, Diagnostic) and/or Product Code KHX (Force-Measuring Platforms). Note that devices in product categories LXV and KHX are Class I, 510(k) exempt devices. Devices in product category IKN are class II devices which are also 510(k) exempt. Although many manufacturers have voluntarily submitted product information via the 510(k) process, it is not a requirement. All manufacturers are, however, required to register their establishment and submit a “Device Listing” form; these records can be viewed in the Device Listing Database. Refer to the following website for more information: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPCD/classification.cfm. (Accessed November 6, 2024)

References

Ahmed M, Mosalem D, Alfeeli A, et al. Relationship between gait parameters and postural stability in early and late Parkinson's disease and visual feedback-based balance training effects. Open Access Maced J Med Sci. 2017 Apr 15; 5(2):207-214.

American Academy of Otolaryngology - Head and Neck Surgery (AAO-HNS) [Internet]. Posturography position statement. Revised September 20, 2014.

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.

Buster TW, Chernyavskiy P, Harms NR, et al. Computerized dynamic posturography detects balance deficits in individuals with a history of chronic severe traumatic brain injury. Brain Inj. 2016;30(10):1249-55.

David EA, Shahnaz N. Vestibular rehabilitation using dynamic posturography: Objective and patient-reported outcomes from a randomized trial. Otolaryngol Head Neck Surg. Published online July 6, 2024.

Hayes, Inc. Hayes Evolving Evidence Review. Computerized dynamic posturography (CDP) for diagnosis of vestibular disorders. Lansdale, PA: Hayes, Inc.; August 09, 2021.

Hebert JR, Manago MM. Reliability and validity of the computerized dynamic posturography sensory organization test in people with multiple sclerosis. Int J MS Care. 2017 May-Jun;19(3):151-157.

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.

Palm HG, Lang P, Strobel J, et al. Computerized dynamic posturography: the influence of platform stability on postural control. Am J Phys Med Rehabil. 2014 Jan;93(1):49-55.

Pilkar R, Veerubhotla A, Ehrenberg N. Objective evaluation of the risk of falls in individuals with traumatic brain injury: feasibility and preliminary validation. Annu Int Conf IEEE Eng Med Biol Soc. 2021 Nov;2021:4658-4661.

Smoot Reinert S , Jackson K, Bigelow, K. Using posturography to examine the immediate effects of vestibular therapy for children with autism spectrum disorders: A feasibility study. Phys Occup Ther Pediatr. 2015;35(4):365-80.

Policy History/Revision Information

Date	Summary of Changes
11/01/2025	• Created state-specific policy version for the state of Nebraska (no change to coverage guidelines)
04/01/2025	**Supporting Information** • Updated *Clinical Evidence* and *References* sections to reflect the most current information • Archived previous policy version CS023.Q

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal, state or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

UnitedHealthcare may also use tools developed by third parties, such as the InterQual® criteria, to assist us in administering health benefits. The UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.