

NHANES 1999–2000 Data Release
Revised February 2005
Balance Examination (BAX)

Description

Balance disorders constitute a major Public Health concern, especially for older persons, an increasing segment of the U.S. general population. For example, balance disorders are causally related to the some 200,000 hip fractures that occur annually in Americans over the age of 65. The objectives of the Balance Component are to obtain accurate prevalence data on balance problems among a sample of U.S. adults, to examine the relationship between balance problems and specific covariates such as certain medical conditions and indicators of health status, and to help characterize normal and disordered balance and spatial perception.

The NHANES 1999–2000 Balance Component consisted of two parts:

1. A pre-exam screening questionnaire: This is a series of questions to identify conditions which would constitute either practical or safety exclusions to performing Balance testing. Please note that more extensive survey questions relating to balance problems are contained in the BAQ section of the NHANES household survey questionnaire.
2. Balance Testing: This part consisted of a modified Romberg Test of Standing Balance on Firm and Complaint Support Surfaces. (1)

Eligible Sample and Component-Specific Exclusions:

The 1999–2000 Balance Component tested a 1/2 sample of U.S. adults ages 40–69 years. Subjects were excluded from the Balance testing protocol if at the time of the exam, they felt unable to stand on their own, were then currently having dizziness sufficient to cause unsteadiness, weighed over 275 lbs, had a waist circumference either too small or too large to accommodate proper fitting of any standard-sized safety gait belt, if they needed a leg brace in order to stand unassisted, or had an amputation of their feet or legs. In addition subjects who were totally blind or visually impaired sufficiently to require assistance in finding the exam room were disqualified.

Examination Protocol

The Romberg Test of Standing Balance on Firm and Compliant Support Surfaces examines

the ability of the examinee to stand unassisted under four test conditions, ordered in increasing level of difficulty. In Test Condition 1, the subject stands making use of all the sensory inputs that contribute to balance—the central vestibular system, vision, and proprioception (leg muscle position sense). Test Condition 2 tests balance when only vestibular and proprioceptive information is available (the subject closes the eyes to eliminate visual input). In Test Condition 3, the subject must maintain balance on a foam-padded surface, which reduces the proprioceptive input, leaving only visual and vestibular cues. Finally, in Test Condition 4 (also using a foam pad) the eyes are again closed (visual input is removed) and the subject's ability to maintain balance is tested using only the vestibular system.

All Balance Testing was scored on a pass/fail basis, with Test Conditions 1 and 2 conducted for a total of 15 seconds, and Test Conditions 3 & 4 conducted for 30 seconds each. Test failure was defined as 1) a subject needing to open the eyes in an eyes-closed Test Condition (#2 or #4), 2) the subject moved the arms or feet in order to achieve stability, or 3) the subject began to fall or required MEC Technician intervention to maintain balance.

In the standard Balance Testing protocol, each subject is eligible for an initial test and one re-test in order to pass a specific Test Condition. Within each Test Condition, the protocol for retesting is the same as for the primary examination. Because each successive Test Condition from 1 to 4 is progressively more difficult than the Condition preceding it, the Balance Testing Component is ended whenever a subject fails to pass a Test Condition.

Balance testing was conducted with the utmost consideration for subject safety. The examining MEC Technician stood immediately to the side of the participant prepared to stabilize the subject by the use of a safety gait belt should significant unsteadiness occur. Also, the examination was conducted in a small exam room, with well padded walls and floor.

The complete NHANES Balance Examination Procedures Manual is located at <http://www.cdc.gov/nchs/data/nhanes/ba.pdf>

Survey Staff & Quality Control Procedures

The NHANES Health Technicians were professionally trained in the Modified Romberg Testing protocol by an expert consultant in Balance and Vestibular disorders. In addition, Audiologic consultants from the National Institute of Occupational Safety & Health (NIOSH) provided performance monitoring of each Technician on a regular basis. Also, NCHS staff visited the MECs approximately twice per year to observe the Balance examinations and verify Compliance with standard testing procedures. Finally, MEC Health Technicians received annual retraining and updates by the NIOSH consultants. Exclusion rates and outcome statistics for the examination component were continually monitored according to Technician and MEC, and retraining was conducted as necessary to maintain test quality.

Data Processing and Editing

All of the Balance Data were collected using automated data collection methods. A consulting NIOSH Audiologist performed data reviews. In addition, a computerized data review and editing process was utilized to check for logical inconsistencies in the data and technician errors, as well as to cross-check other issues affecting data quality. Back-end edits of the data were performed as necessary when errors were detected.

Analytic Notes

Data analysts should ideally be familiar with Balance and Vestibular disorders, or have a specialist available for consultation. The systematic differences in testing length (15 seconds for Conditions 1 & 2; 30 seconds for Conditions 3 & 4) may also need to be taken into account in the analysis of the data.

Because the 1999–2000 Balance Examination was conducted on a ½ sample of U.S. adults ages 40–69 years, the standard NHANES full sample MEC examination weights cannot be used for statistical analysis. For analysis of the 1999–2000 Balance data, special Balance Sub-Sample 2-Year MEC weights were created and are provided along with the 1999–2000 Balance Examination data file.

References

1. Weber PC, Cass SP. Clinical assessment of postural stability. *Am J Otol.* 1993;14:566-9.