Brunel Balance Assessment

Indexing Metadata/Description

- **Outcome measure/test:** Brunel Balance Assessment
- **Synonyms:** Brunel Balance Scale, Brunel Balance Assessment Scale
- **Description/use**
  - The Brunel Balance Assessment (BBA) is a 12-item hierarchical ordinal scale to assess functional balance, specifically designed for use with patients who are post-stroke to assess the effectiveness of stroke physical therapy interventions\(^1\)
  - The BBA was designed to address limitations in other balance scales for use in the clinical setting
    - The BBA can be used with patients with a wider range of abilities as compared to timed walk tests and instrumented measures, which are suitable for only a narrow range of abilities\(^1,2\)
  - There are 3 sections and 12 items in the assessment: sitting (3 items), standing (3 items), and stepping (6 items)
  - Total score ranges from 0/12 (lowest) to 12/12 (highest)
  - Individuals can pass or fail each item
    - Individuals are given 3 chances to pass each item. When an individual is unable to pass after 3 tries, the test is complete\(^2\)
- **CPT codes**
  - 97001 Initial physical therapy evaluation
  - 97002 Physical therapy reevaluation
  - 97750 Physical performance test or measurement, with written report
- **Indications**
  - Impaired balance and functional mobility
  - At risk for falls
- **Population:** Stroke patients
- **ICD-10 codes**
  - I60-I69 Cerebrovascular diseases
    - I63 Cerebral infarction
    - I69 Sequelae of cerebrovascular disease
  - (ICD codes are provided for the reader’s reference, not for billing purposes)
- **G-Codes**
  - **Mobility G-code set**
    - G8978, Mobility: walking & moving around functional limitation, current status, at therapy episode outset and at reporting intervals
    - G8979, Mobility: walking & moving around functional limitation; projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    - G8980, Mobility: walking & moving around functional limitation, discharge status, at discharge from therapy or to end reporting
  - **Changing & Maintaining Body Position G-code set**
    - G8981, Changing & maintaining body position functional limitation, current status, at therapy episode outset and at reporting intervals
–G8982, Changing & maintaining body position functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
–G8983, Changing & maintaining body position functional limitation, discharge status, at discharge from therapy or to end reporting

• **Self Care G-code set**
  –G8987, Self care functional limitation, current status, at therapy episode outset and at reporting intervals
  –G8988, Self care functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  –G8989, Self care functional limitation, discharge status, at discharge from therapy or to end reporting

• **Other PT/OT Primary G-code set**
  –G8990, Other physical or occupational therapy primary functional limitation, current status, at therapy episode outset and at reporting intervals
  –G8991, Other physical or occupational therapy primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  –G8992, Other physical or occupational therapy primary functional limitation, discharge status, at discharge from therapy or to end reporting

• **Other PT/OT Subsequent G-code set**
  –G8993, Other physical or occupational therapy subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
  –G8994, Other physical or occupational therapy subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  –G8995, Other physical or occupational therapy subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

<table>
<thead>
<tr>
<th>G-code Modifier</th>
<th>Impairment Limitation Restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>0 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CI</td>
<td>At least 1 percent but less than 20 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CJ</td>
<td>At least 20 percent but less than 40 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CK</td>
<td>At least 40 percent but less than 60 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CL</td>
<td>At least 60 percent but less than 80 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CM</td>
<td>At least 80 percent but less than 100 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CN</td>
<td>100 percent impaired, limited or restricted</td>
</tr>
</tbody>
</table>

Source: https://www.cms.gov/

› **Similar tests** (3)
  • Modified Emory Functional Ambulation Profile
  • Dynamic Gait Index (DGI)
  • Community Balance and Mobility Scale
  • Mini-Balance Evaluation Systems Test (Mini-BESTest)
  • Berg Balance Scale (BBS)

› **Reimbursement**: Reimbursement will depend on insurance contract coverage. No specific special agencies are applicable for this assessment, and no specific issues or information regarding reimbursement has been identified

› **Test author(s)**: Tyson S(1,2)
Contraindications/precautions to test

- Patients undergoing this test are at increased risk for falls. Follow facility protocols for fall prevention and provide appropriate guarding/assistance to ensure the patient’s safety while administering this test.
- Locations where tester should stand/walk to give support for specific items are included in the instruction publication.
- This test should not be used if it cannot be completed safely or if the patient’s cognition or mental status prevents him or her from adequately following instructions.

Psychometric properties

- Reliability
  - Excellent test-retest reliability in chronic stroke\(^{(1)}\)
  - Excellent interrater reliability in chronic stroke (100% agreement)\(^{(1)}\)

- Validity
  - Excellent and significant correlation with the Motor Assessment Scale (sitting section), Berg Balance Scale, and Rivermead Mobility Index in chronic stroke (0.83, 0.97, and 0.95, respectively)\(^{(1)}\)
  - Predictive validity has been demonstrated in a cross-sectional study in the United Kingdom involving 102 patients admitted to hospital with weakness 2–4 weeks post stroke\(^{(4)}\)
    - The patients were assessed using the BBA during admission and the findings were compared to the Barthel Index and Rivermead Mobility Index at 3 months.
    - Initial balance disability, as measured by the BBA, was a strong predictor of function and recovery after stroke\(^{(4)}\)

- Internal consistency
  - Excellent internal consistency (Cronbach’s alpha = 0.93) in chronic stroke\(^{(1)}\)

- Ceiling/floor effects
  - Floor effects have not been established\(^{(5)}\) but a comparison of the BBA to the BBS and the Mini-BESTest found that the BBA had ceiling effects in mild stroke but was effective for moderate and severe stroke\(^{(7)}\)

Time to complete test:
Approximately 10 minutes\(^{(5)}\)

Potential complications/adverse effects

- Patients undergoing this test are at increased risk for falls.
- Patients with impairments in cognition or mental status may be unable to follow the test commands appropriately.
- The BBA is a relatively new tool, with all psychometric testing done by the same research group, so reproducibility of the results is not known\(^{(2)}\)

Test preparation/materials required

- There is a 21-page instruction manual with specific instructions on how to administer and score each item\(^{(2)}\)
- A scoring chart includes the tasks listed in hierarchical order and spaces to record scores (or pass/fail) of up to 3 attempts of each task item\(^{(2)}\)
- Equipment needed includes a plinth (or suitable seating), a stopwatch, a 1-meter ruler on an adjustable height stand, a 5-meter walkway marked on the floor, 2 perching stools (or walking frames or chairs), and a step-up block or 7.5–10cm high step\(^{(2)}\)

Test procedure

- There are 3 sections to the BBA: sitting, standing, and stepping. The entire scale can be administered at the same time, or it can be administered in sections\(^{(6)}\)
- Because the scale is hierarchical, testing does not have to start at the beginning, but can start at a level that is reasonable for the specific patient\(^{(2)}\)
  - For example, if a patient is ambulatory, it is okay to assume he or she can pass all the sitting tests, so the patient would start with standing or stepping tests.
  - The patient performs each subsequent test in order until he or she gets to the level that is the limit of his or her abilities.
  - If a patient is unable to achieve the identified minimal level for a task within 3 tries, the testing ends.
- Sitting tests\(^{(2)}\)
  - Timed supported sitting—Subject passes if he or she can keep balance for 30 or more seconds with upper limb support but without assistance from the tester.
  - Static sitting balance—Subject performs 3 or more lifts of sound arm in 15 seconds.
Dynamic sitting balance—The subject is asked to reach forward as far as possible to move his or her limits of stability within the base of support. Distance reached is measured.

• Standing tests\(^{(2)}\)

– Supported standing—Subject passes if he or she can keep balance for 30 seconds or more with or without support and without assistance from the tester
– Standing arm raise—Subject lifts sound arm as many times as possible in 15 seconds. A pass is 3 or more arm lifts
– Standing forward reach test—Subject reaches forward ≥ 5 cm without upper limb support or assistance from the tester. If subject reaches less than 5 cm and/or if the subject requires upper limb support or assistance of the tester, the test is considered a fail

• Stepping tests\(^{(2)}\)

– Timed step-standing—Subject keeps his or her balance for at least 30 seconds while standing in a stepping position with the sound foot in front
– Walking with an aid—Subject walks 5 meters in 1 minute or less without assistance but may use a walking aid
– Weight shift—In a step-standing position, subject transfers weight on and off the weak leg at least 3 times in 15 seconds
– Walking without an aid—Subjects walks 5 meters in 1 minute or less
– Tap test—Subject places sound foot on and off a step or block as many times as possible
– Step-up test—Subject steps up onto and off a block or step, leading with weak leg

• Standardized instructions and standardized measurement parameters and landmarks are identified in the instruction publication\(^{(2)}\)

Test scoring/interpretation

• Evaluation of clinical interpretation of the BBA is limited\(^{(2)}\)

• An increase in level attained on a repeated test indicates improved functional balance
  – Progress may also be measured by a change in the objective scores used to determine the level (e.g., distance reached) even when a patient is unable to progress to the next level\(^{(2)}\)

• G-code modifiers with associated BBA scores
  – CH—12
  – CI—10-11
  – CJ—8-9
  – CK—6-7
  – CL—4-5
  – CM—1-3
  – CN—0

Test follow-up

• An advantage of the BBA is that it can be repeated frequently as the patient progresses in mobility\(^{(6)}\)
  – The BBA can be used across the entire continuum of care\(^{(6)}\)

Coding Matrix

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Published meta-analysis</td>
</tr>
<tr>
<td>SR</td>
<td>Published systematic or integrative literature review</td>
</tr>
<tr>
<td>RCT</td>
<td>Published research (randomized controlled trial)</td>
</tr>
<tr>
<td>R</td>
<td>Published research (not randomized controlled trial)</td>
</tr>
<tr>
<td>C</td>
<td>Case histories, case studies</td>
</tr>
<tr>
<td>G</td>
<td>Published guidelines</td>
</tr>
<tr>
<td>RV</td>
<td>Published review of the literature</td>
</tr>
<tr>
<td>RU</td>
<td>Published research utilization report</td>
</tr>
<tr>
<td>QI</td>
<td>Published quality improvement report</td>
</tr>
<tr>
<td>L</td>
<td>Legislation</td>
</tr>
<tr>
<td>PGR</td>
<td>Published government report</td>
</tr>
<tr>
<td>PFR</td>
<td>Published funded report</td>
</tr>
<tr>
<td>PP</td>
<td>Policies, procedures, protocols</td>
</tr>
<tr>
<td>X</td>
<td>Practice exemplars, stories, opinions</td>
</tr>
<tr>
<td>GI</td>
<td>General or background information/texts/reports</td>
</tr>
<tr>
<td>U</td>
<td>Unpublished research, reviews, poster presentations or other such materials</td>
</tr>
<tr>
<td>CP</td>
<td>Conference proceedings, abstracts, presentation</td>
</tr>
</tbody>
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References


