

# Berg Balance Scale: Reference Guide

Outcomes Committee Resource created by Barber Prosthetics Clinic: Malena Rapaport (BKin, MSc) and Rachel Bader (BSc)

## Introduction

The Berg Balance Scale is a generic outcome measure that is used to assess balance<sup>1</sup>. It is considered the gold standard for measuring fall risk in older adults<sup>21</sup>. The test consists of 14-items each scored on a scale from 0 (unable to do or requires assistance) to 4 (completes independently)<sup>1</sup>. Tasks range from sitting to standing and increase in difficulty to standing on one foot.

**Establishing author:** Katherine Berg, 1989

**Data Type:** Ordinal

**Measurement Type:** Performance-based

**Assessment Type:** Observer

## Required Resources

**Time:** 15-20 minutes

**Personnel:** 1 person

**Equipment:** stopwatch, two chairs - one with arm rests and one without, measuring tape or ruler, object to pick up off floor (ex. Pen or towel), step stool

**Space:** clinic room

**Cost:** free to administer

## Test Administration

Explain to patient that the goal is to remain balanced while performing each of the 14 tasks. The choice of which leg to stand on or distance to reach are determined by the patient.

1. Read instructions given for each item and ask patient to perform each task
2. Record the lowest response category that applies for each item
  - a. Note that points should be deducted if (a) time or distance requirements are not met, (b) the patient needs assistance or supervision or (c) the patient touches an external support while performing a task
3. Sum score from each of the 14 items to determine total score (maximum = 56)

## Psychometric Properties

The Berg Balance Scale has been tested in several populations including traumatic and acquired brain injury, community dwelling elderly, multiple sclerosis (MS), Parkinson’s disease (PD), spinal cord injury (SCI), stroke and lower limb amputees (LLA).

Outcome measure	Reliability			Validity	Responsiveness		Normative Data
	Test-Retest	Inter-rater	Intra-rater		MDC	Floor/Ceiling Effect	
BBS	yes	yes	yes	yes	yes	yes	yes

**Reliability.** Good intra and inter-rater reliability (ICC > 0.9), test-retest reliability (ICC = 0.96), and internal consistency (alpha = 0.94-0.96) were found in the MS population<sup>2,3,4,6</sup>. Moderate to good test-retest reliability (ICC=0.5), excellent inter-rater reliability (ICC=0.87-0.88) and acceptable internal consistency (alpha=0.77) were found in the elderly community population<sup>7,13</sup>. Good test-retest (ICC=0.92) and inter-rater reliability (ICC=0.97) was found in individuals with balance disorders<sup>8</sup>. Excellent inter-rater reliability (ICC=0.94) as well as acceptable internal consistency (alpha=0.83) were found in community-dwelling individuals with LLA<sup>9</sup>. Good inter-rater, intra-rater and test-retest reliability exists (ICC=0.95-0.98, ICC=0.97 and ICC=0.88-0.98, respectively) in the stroke population<sup>15,16</sup>.

**Validity.** In the MS population, acceptable criterion, convergent and construct validity (p>0.7) were found with the Timed-Up and Go test (TUG), posture and gait component of the International Co-operative Ataxia Rating Scale (ICARS), Scale for the Assessment and Rating of Ataxia (SARABal) and Expanded Disability Status Scale (EDSS). As well, moderate concurrent validity (r=0.5-0.79) was present with Dynamic Gait Index (DGI), TUG and Hauser Deambulation Index (DI), weak concurrent validity (r=0.48) with the Activity-Specific Balance Confidence (ABC) and no correlation with the Dizziness Handicap Inventory (DHI)<sup>2,5</sup>. In community-dwelling individuals with LLA, the BBS demonstrated high convergent validity with the ABC (r=0.63), Prosthesis Evaluation Questionnaire (PEQ-MS) (r=0.58), 2MWT (r=0.68) and L-test (r=-0.8)<sup>9</sup>. Excellent person and item validity were also found in this population<sup>11</sup>. In community-dwelling older adults, good construct validity was established with the TUG test (p=-0.53) and data supports criterion validity, predictive criterion validity and construct validity with Fugl-Meyer (FM-B) and Barthel Index (BI)<sup>12, 22</sup>. In the stroke population, excellent correlation has been found with the Function Reach Test (p=0.78) and the BI (r=0.80-0.94) and adequate to excellent correlation with FM-B (r=0.62-0.94)<sup>16, 17</sup>. In the Parkinson’s disease population, the BBS was found to have good content validity and construct validity (r=0.63) with the ABC<sup>18, 19</sup>.

**Responsiveness.** In the MS population, MDC values ranged from 3-7<sup>2,3,4,6</sup>. The BBS was found to have low sensitivity to distinguish between fallers and non-fallers, high specificity and no ceiling effects found in the MS population<sup>5</sup>. In the elderly community, sensitivity and specificity were found to be 74% and 72% respectively, and the MDC was found to be 5<sup>11,13</sup>. In individuals with balance disorders, the MDC was found to be 7 and the sensitivity and specificity were 77% and 97%, respectively. In the stroke population, the MDC was 5.8 and both floor and ceiling effects were found<sup>16,17</sup>. In the PD population, sensitivity and specificity are 0.72 and 0.75, respectively,

and the MDC was found to be 5<sup>19</sup>. Ceiling effects were found in healthy elderly community dwelling individuals, community dwelling individuals with LLA and those with PD<sup>9,13,19</sup>.

## Interpretation

Population Norms	Mean score (range)	SD	Number in sample	Age mean (range)
MS <sup>2</sup> with CA secondary to MS	46.05 (5-56)	10.93	60	50 (21-65)
MS <sup>3</sup> relapse-remitting or secondary progressive	48 (28-56)	7.5	25	41.7 ± 12.5
MS <sup>4</sup> Stable	46	12.4	24	51.8 ± 7.9
MS <sup>6</sup> relapse remitting/primary/secondary progressive	50	2.3-5.36	17	43.3 (30-57)
Elderly <sup>7</sup>	47.2	10	122	76 ± 9
Community-dwelling individuals with LLA <sup>9</sup> uni TT, TF, bilateral, dysvascular/traumatic /infection/congenital	51 (32-56)	5	30	54 ± 12
Community-dwelling individuals with LLA <sup>10</sup> uni/bilateral ankle, TT and TF, mixed etiology	*broken down by activity level (4-56)	/	5	53 ± 15.7
Community dwelling adults <sup>12</sup> with functional limitations	50.5	5	111	75.9 ± 7
Community dwelling adults - Taiwan <sup>13</sup>	53.3	4.1	268	73.4 ± 5.2
Community dwelling adults <sup>14</sup>	41.3 (25-55)	9	26	85.3 ± 4.9 (74-92)
Stroke <sup>15</sup> 6-46 months post stroke	52	4.3	50	58 ± 6
Stroke <sup>17</sup> Taiwanese population 14 days after stroke	22.3	22.2	123	69.3 ± 11.2

<b>SCI – ASIA D<sup>20</sup></b>	<b>47.9</b>	<b>10.7</b>	<b>32</b>	<b>47.9 ± 12.8</b>
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## Limitations

There is currently no common interpretation of BBS scores for all populations. The BBS may not be suited for highly functional and healthy individuals as ceiling effects were found in several different populations (LLA, community-dwelling, stroke, and PD).

## Documentation in Clinical Notes

Example: Today when assessed with the Berg Balance Scale, the patient scored a 26. This is an increase of 6 points since their last assessment. According to population norms, this value is greater than the MDC, therefore static balance has improved since the last assessment.

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