Clinical Problem Solving 1: 
Using the Short Form Berg Balance Scale to Detect Change in Post Acute Stroke Patients

By Caroline Owen

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Purpose

1. To present the physical therapy evaluation of a stroke patient in an acute care hospital

2. To present evidence for the Short Form Berg Balance Scale’s ability to detect change in a male post acute stroke.
# The Patient: Demographics

<table>
<thead>
<tr>
<th>Age</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Occupation</td>
<td>Amazon warehouse</td>
</tr>
<tr>
<td>Living Situation</td>
<td>One story apartment, no stairs, lives with girlfriend who is able to provide intermittent care</td>
</tr>
<tr>
<td>Tobacco</td>
<td>Current smoker, pack/day</td>
</tr>
<tr>
<td>Prior Level of Function</td>
<td>Sedentary, Independent with all mobility</td>
</tr>
<tr>
<td>Past Medical History</td>
<td>Hypertension, CAD with MIx3, HDL, Type II Diabetes, Arthritis</td>
</tr>
<tr>
<td>BMI</td>
<td>31.1</td>
</tr>
</tbody>
</table>
The Patient: Admission Findings

- Presented to ER after 4 days of falling towards one side and having speech difficulties.

- Vitals:  
  - BP: 179/94  
  - HR: 97  
  - RR: 17  
  - SpO2: 95%

- Speech/Language: Mild dysarthria and unable to write

- Coordination: Dysmetria noted in UE and LE, ataxic gait

- Strength, sensation and reflexes all normal

- Imaging: Head CT revealed R Cerebellar stroke and 90% occlusion of left Internal Carotid Artery
The Patient: Physical Therapy Evaluation

- Sensation, ROM and strength (5/5) all normal
- Behavior:
  - Unpredictable
- Coordination:
  - Toe Taps: R and L Impaired
  - Heel to Shin: R and L Impaired
- Mobility
  - Supine to sit → min assist required
  - Sit to stand → min assist required
  - Bed to chair → min assist required
The Patient: Physical Therapy Evaluation

- Balance:
  - Berg Balance Scale Short Form: fall risk 10/28

- Gait training:
  - 200 ft with a rolling walker and CGA
    - multiple lateral missteps and consistently veering to the right
The Patient: Goals

- Supine to sit → complete independence
- Sit to stand → complete independence
- Bed to chair → complete independence
- Ambulate → independent with rolling walker for 200 ft
The Patient: Physical Therapy Interventions

- **AROM:**
  - Ankle pumps, LAQ, Hip flexion x 10 reps
- **Durable Medical Equipment**
  - Rolling walker recommended
## Short Form Berg Balance Test

<table>
<thead>
<tr>
<th>Task</th>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting to Standing</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Standing Unsupported – eyes closed</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Reach forward with outstretched arm</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Pick up object from floor</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Look behind over shoulders</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Standing in tandem</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Single Leg Standing</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>10</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Less than 23 = Risk for Falling
The Patient: Prognosis

Fair

Negative Factors
• Due to 6 co-morbidity risk factors
• Unwillingness to change lifestyle
• 3 previous MI
• 90% occlusion of left Internal Carotid Artery – Surgical intervention required

Positive Factors
• Noted improvement since first visit
• Family support
The Patient: Outcome

- Continue skilled acute PT
- Reevaluate patient after angioplasty and stent placement
- Progress towards safe discharge to home health therapy with the use of a rolling walker
The Short Form Berg Balance Scale

Designed to measure functional balance, primarily in standing, in older adults in the clinical setting

- Ability to maintain seven functional positions for a given amount of time
- Graded from 0, 2 or 4
  - 0 – unable to perform task
  - 2 – modifies task or unable to maintain for full time
  - 4 – able to perform task for full amount of time
- Score below 23 is risk for falling
# Short Form Berg Balance Test

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Less than 23 = Risk for Falling
Clinical Question

For a 61 year old male post cerebellar stroke, is the short Form Berg Balance Scale the best measure to detect change in functional balance in an acute care setting?
A Prospective Study of the Responsiveness of The Original and The Short Form Berg Balance Scale in People With Stroke

• Purpose: Examine the responsiveness of the Berg Balance Scale and its short form

• Prospective cohort: Repeated-measurements design

14 vs. 7 Item Berg Balance Scale

<table>
<thead>
<tr>
<th>Berg Balance Scale</th>
<th>Short Berg Balance Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 14 functional tasks</td>
<td>• 7 functional tasks</td>
</tr>
<tr>
<td>▫ 1 sitting, 13 standing</td>
<td>▫ 7 standing</td>
</tr>
<tr>
<td>• Five point ordinal scale from 0-4</td>
<td>• Three point scale rating 0, 2 or 4</td>
</tr>
<tr>
<td>• 15-20 min to complete</td>
<td>▫ 4</td>
</tr>
<tr>
<td></td>
<td>• 7-10 min to complete</td>
</tr>
</tbody>
</table>
Methods


**Inclusion Criteria**

- Diagnosis: cerebral hemorrhage, cerebral infarction, other
  - First onset of a CVA
  - Stroke within 14 days before admission (confirmed by CT/MRI)
  - Ability to follow commands
  - Ability to give consent

**Exclusion Criteria**

- Subsequent stroke during follow up
- Major disease during follow up
Methods

- Patients were assessed with the Berg Balance Scale at 14, 30 and 90 days post stroke by an occupational therapist
- The score of the short form was determined by the data collected on the original scale

<table>
<thead>
<tr>
<th>Days After Stroke</th>
<th>Patients Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>226</td>
</tr>
<tr>
<td>30</td>
<td>202</td>
</tr>
<tr>
<td>90</td>
<td>168</td>
</tr>
</tbody>
</table>
Results
Results

- Standard error is greater for the short form
- Therefore, the confidence interval is smaller for the original
- The original Berg Balance Scale is a better tool to detect change
Limitations

• Findings limited to acute and sub acute patients with strokes
• Only a few patients deteriorated during the 90 day follow up
• The short form scores were derived from the original scale
Analysis and Comparison of the Psychometric Properties of Three Balance Measures for Stroke Patients

- **Purpose:** To determine the reliability, validity and responsiveness of three widely used post stroke balance measures from 14-180 days.

- **Prospective cohort study**
- **Compared 3 clinical balance measures:**
  - Berg Balance Scale
  - Fugl-Meyer test
  - Postural Assessment Scale for Stroke Patients

Methods

**Inclusion Criteria**

- Diagnosis: cerebral hemorrhage, cerebral infarction, other
  - First CVA without other major disease
  - Stroke within 14 days before admission
  - Ability to follow commands
  - Ability to give consent

**Exclusion Criteria**

- Subsequent stroke during follow up
- Major disease during follow up
  - Lived >40 miles from hospital
Methods

• 123 stroke patients
• Balance measures taken 14, 30, 90 and 180 days after onset

Measured:
• Inter-rater reliability
• Validity
• Degree of Responsiveness
Results

- **Validity:** Good
- **Reliability:** Good
- **Responsiveness:**
  - First 90 Days → moderate to high
  - 90-180 days → poor
  - Postural Assessment Scale for Stroke Patients was more responsive in the early acute stroke phase
- **BBT showed significant floor (14 days) and ceiling (90 and 180 days) effects**
Results

Responsiveness of the 3 Balance Measures at Different Stages of Stroke Recovery

<table>
<thead>
<tr>
<th>DAS</th>
<th>n</th>
<th>ES</th>
<th>BBS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PASS</td>
<td>FM-B</td>
</tr>
<tr>
<td>14–30</td>
<td>110</td>
<td>0.89</td>
<td>0.82</td>
</tr>
<tr>
<td>30–90</td>
<td>93</td>
<td>0.64</td>
<td>0.63</td>
</tr>
<tr>
<td>90–180</td>
<td>80</td>
<td>0.31</td>
<td>0.33</td>
</tr>
<tr>
<td>14–90</td>
<td>93</td>
<td>1.07</td>
<td>1.06</td>
</tr>
<tr>
<td>14–180</td>
<td>80</td>
<td>1.12</td>
<td>1.14</td>
</tr>
</tbody>
</table>

ES >0.8 is large, 0.5 to 0.8 is moderate, and 0.2 to 0.5 is small.
Limitations


- Intra-rater reliability not examined
For a 61 year old male post cerebellar stroke, is the short Form Berg Balance Scale the best measure to detect change in functional balance in an acute care setting?

No.
Application

Study 1: Original Berg Balance Scale vs. Short
  • Concluded the original is better at measuring change

Study 2: Berg Balance Scale vs. Other Balance Measures
  • During the acute phase of recovery in the hospital, the BBS was not as responsive as other measures examined.
Limitations in Application

- First measure taken at 14 days
- Diagnosis may have excluded this patient from the study
- Other disease may have excluded this patient from the study
Application

How would this change management of this pt?

• If using as a measure of change?
  ▫ The original Berg Balance Scale > short form
  ▫ Postural Assessment Scale > Original Berg balance Scale

• Evaluation of fall risk?
  ▫ Use Short Berg Balance Scale
Questions?
References


Methods

- Data analyzed to determine both the group and individual responsiveness
- Group- Effect size and standardized response mean were used at a 95% confidence interval
- Individual – calculated the significant change of each subject
- Both used the paired t test to relate the scores of the original and short versions