Balance Assessment Handbook

A Component of the Falls Toolkit

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This handbook should be used in conjunction with the Balance Assessment Video. The video is available in the Falls Toolkit Media Box on VHS and VCD formats.

PREFACE

This guide provides the narrative discussion designed to accompany the educational video that will standardize the Functional Rehabilitation Falls Team Assessment. The accompanying video-cassette demonstrates this assessment on a Falls Clinic patient from the James A. Haley Tampa Veterans' Hospital. The discussion following the video assessment provides rehabilitation therapists with a detailed explanation of sub-test administration and scoring (when applicable). The complete Tampa VA Physical Therapy Assessment has been provided as an example as it has been successfully used on all falls clinic patients since September 2001 to assist with team-based differential diagnosis of various pathologies that affect gait and balance.

This is a MODEL that has been successful in ONE clinic. Developers of this tool recognize the need to tailor the rehabilitation therapist assessment to the specific needs and goals of your falls clinic. Modification of the evaluation will be dependent on falls clinic team members' specialties, clinic resources (including time), general patient population / presentation and the manner in which each specific clinic decides to delegate various assessment elements among all its clinicians.

Please send all feedback regarding successful modifications you have made to optimize this assessment and maximize its diagnostic abilities to Stephanie Hart-Hughes via Outlook. This information will be shared throughout the entire program to assist other therapists.

***The Evidence-Based Fall Prevention Program would again like to thank Dr. Debra Rose for her collaboration in developing this tool. Dr. Rose is the co-director of the Center for Successful Aging at California State University in Fullerton, California.

✶ *Please note that the 8-ft Up-and-Go Test, Chair Stand Test and Arm Curl Test are part of the Senior Fitness Test developed by Roberta E. Rikli and C. Jessie Jones.*[1] **It is strongly recommended that this Senior Fitness Test manual be referred to for specific test administration instructions and norm-referenced data tables.** *The manual can be purchased at* http://www.humankinetics.com. *The backward release maneuver is used with permission of Dr. Rose.*✶

PART A: DESCRIPTION OF FUNCTIONAL ASSESSMENT SUB-TESTS

Section 1: Home Living Assessment

This information may be obtained from a patient questionnaire to optimize time. Quickly verify all reported environmental questionnaire data with the patient during the interview and any other data you feel pertinent to the assessment.

1. Home Living Environment:
    a. Physical Layout

__ Stairs inside home	__ Stairs to get into home	__ Clutter
__ Grab bars in bathroom	__ Throw rugs	__ Bright lighting
__ Bath chair or bench	__ Nonskid bath mats	__ Bathtub
__ Shower stall	__ Hand held showerhead	__ Nightlights
__ Raised toilet seat	__ Slick/slippery floors	__ Uneven ground
__ Electric cords on floor	__ Ramps	__ Hills around yard/grounds
__ Other:		

    b. Current Social Supports/Activity Level:
    c. ADL Independence:

Section 2: Observations/Deformities

This section may be used to chart any significant observations that may impact the patient's balance, gait and resulting function. Examples of information that may be included are posture, tremors, swelling, bruising, deformities or demonstration of pain behaviors.

2. Observation/Deformities:

Section 3: Shoe Assessment

Evaluate the patient's footwear for support, wearing of treads, etc. Be especially mindful of footwear in patients with diabetes (need for pressure-relieving insoles, presence of sharp edges and restrictive elastic). Request information on use of footwear in their home and provide education if this may be increasing their fall risk.

3. Shoe Assessment:

Section 4: Motor Assessment

Quick evaluation performed with note of any impairment in ROM and strength that may impact functional mobility. If any significant deficits are discovered, take the time to investigate further (e.g., manual muscle test if prominent ankle dorsiflexion weakness is noted).

4. Motor Status:

Section 5: Functional Strength Test

a. L/E: Chair Stand Test[1,2]:

Equipment/set-up: Straight backed chair without arms (seat height approximately 17"). Chair is placed against wall or heavy object (plinth) to prevent it from moving during test. A stopwatch is also required.

Starting Position: Patient sitting in middle of chair with back straight and feet on floor. Arms are crossed over chest.

Test Protocol: The participant is instructed to rise to a full stand and return back to a fully seated position after the signal "go" is given. They are encouraged to complete as many full stands as possible within a 30-second time limit. The examiner demonstrates the test for the patient and allows a practice trial of 1 to 2 repetitions to ensure correct form. One 30-second trial is performed and recorded.

Scoring: The score is the total number of stands executed correctly within 30 seconds. If the patient is more than half way up at the end of 30 seconds it is counted as a full stand. Results obtained with this test may be compared to age-related normative values listed in the Senior Fitness Test manual.[1]

Adaptations if Hand Use is Required: If the participant is unable to perform the task without use of hands during the practice trial, check "YES" for the "Use of hands required?" question on the assessment form. The test continues with the patient using the chair or their thighs to push off. If the participant uses their hands, their score **can not** be compared with age-related normative values published in the Senior Fitness Test manual.[1]

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5. Functional Strength Tests
a. L/E (Chair Stand Test):
- Use of hands required? __ YES   __ NO
- Number of repetitions completed in 30 seconds:

Section 5a: Chair Stand Test (Number of Stands)							
Sex \ Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Normal Range of Scores for Men*1	14-19	12-18	12-17	11-17	10-15	8-14	7-12
Normal Range of Scores for Women*1	12-17	11-16	10-15	10-15	9-14	8-13	4-11

*Normal range of scores is defined as the middle 50 percent of each age group. Scores above the range would be considered "above average" for the age group and those below the range would be "below average." Scores reprinted with permission of the authors.

b. U/E: Arm Curl Test[1]:

Equipment/set-up: Straight backed chair without arms (seat height approximately 17"). Dumbbells: 8 lbs for men and 5 lbs for women. A stopwatch is also required.

Starting Position: Patient sitting in middle of chair with back straight and feet on floor. The weight is held in their dominant hand (use other side if dominant hand is impaired and unable to maintain grasp). The arm is positioned with the elbow in extension by the side of the patient's torso, perpendicular with the floor. The wrist is initially positioned in neutral.

Test Protocol: The participant is requested to turn palm upwards (supinate forearm) while curling the arm through full range of motion and then return to full extension. In the downward position, the hand should have returned to the original starting position (wrist in neutral). The participant is encouraged to perform as many curls as possible within 30 seconds. The examiner demonstrates the test for the patient and allows a practice trial for 1 to 2 repetitions to ensure correct form. A 30-second trial is performed and recorded. Examiner positioning can be adjusted if the participant is unable to maintain their upper arm still against their body during the trial. If patient form is problematic, the therapist may either kneel or sit next to the patient (the side which they are holding the weight) and place their fingers on the anterior aspect of the participant's upper arm to stabilize it from moving and ensure full range of motion is achieved (patient's forearm should squeeze examiner's fingers).

Scoring: The score is the total number of curls executed correctly within 30 seconds. If the arm is more than half way up at the end of 30 seconds, it is counted as a curl. Results obtained with this test may be compared to age-related normative values listed in the Senior Fitness Test manual.[1]

Adaptations: If the patient is unable to hold the dumbbell due to a medical condition affecting the hand or wrist, a Velcro wrist weight may be used. If the patient is unable to perform one (1) repetition with the appropriate weight, a lighter one may be substituted (ensure you note the change on the assessment form). Remember, comparison with age-related normative values is only possible if the standard testing protocol is followed.

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5. Functional Strength Tests
b. U/E (Arm Curl Test):
- Arm used: __ Left   __ Right
- Weight:
      5lbs (Female): __
      8lbs (Male): __
- Number of repetitions completed in 30 seconds:

Section 5b: Arm Curl Test (Number of Curls)							
Sex \ Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Normal Range of Scores for Men*[1]	16-22	15-21	14-21	13-19	13-19	11-17	10-14
Normal Range of Scores for Women*[1]	13-19	12-18	12-17	11-17	10-16	10-15	8-13

*Normal range of scores is defined as the middle 50 percent of each age group. Scores above the range would be considered "above average" for the age group and those below the range would be "below average."
Scores reprinted with permission of the authors.

Section 6: Finger/Nose Test

Note movement quality, action tremors or targeting problems.

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6. Finger/Nose Test: (IT = intact, IM = Impaired)
    Right:
    Left:

Section 7: mCTSIB: Modified Clinical Test of Sensory Integration on Balance[3,4]

This test allows for preliminary assessment of how well a patient can integrate various senses with respect to balance and compensate when one or more of those senses are compromised.

Sensory system involvement is modulated within various conditions as follows:

- Condition 1: Three sensory systems available for balance (vision, vestibular, somatosensory).
- Condition 2: Vestibular and somatosensory available. Vision absent.
- Condition 3: Vestibular and vision available. Somatosensory compromised.
- Condition 4: Vestibular available. Vision absent, somatosensory compromised.

Equipment/set-up: Foam pad (dense enough to avoid bottoming out) and a stopwatch required.

Starting Position: Patient stands with feet shoulder width apart and arms crossed over chest.

Protocol: A 30-second trial is timed using a stopwatch. Time is stopped during a trial and recorded if: a) patient deviates from initial crossed arm position, b) patient opens eyes during an "eyes closed" trial condition, or c) patient moves feet (takes a step) or requires manual assistance to prevent loss of balance. A trial is successful if the patient is capable of maintaining the starting position independently for a period of 30 seconds.

A maximum of three (3) trials are performed for all conditions. Trials are performed until the patient either: a) successfully maintains the starting position for an entire 30-seconds, or b) completes three, 30-second trials to the best of their ability.

Scoring:

- Conditions 1 thru 4: Record the time (in seconds) the patient was able to maintain the starting position (maximum of 30 seconds). Remember to record the times for all trials.

- Total Score =
Average Time Cond 1 + Average time Cond 2 + Average Time Cond 3 + Average Time Cond 4
(if > 1 trial required)   (if > 1 trial required)   (if > 1 trial required)   (if > 1 trial required)

7. Modified CTSIB
Proceed to next condition when one, 30-second trial is completed or all 3 trials are performed.
- Condition 1: Eyes open, firm surface
  - Total time: ___/30 sec
  - Total time: ___/30 sec
  - Total time: ___/30 sec   Mean score _____
- Condition 2: Eyes closed, firm surface
  - Total time: ___/30 sec
  - Total time: ___/30 sec
  - Total time: ___/30 sec   Mean score _____
- Condition 3: Eyes open, foam surface
  - Total time: ___/30 sec
  - Total time: ___/30 sec
  - Total time: ___/30 sec   Mean score _____
- Condition 4: Eyes closed, foam surface
  - Total time: ___/30 sec
  - Total time: ___/30 sec
  - Total time: ___/30 sec   Mean Score _____

TOTAL SCORE: ___/120 sec (mean score used for each condition if > 1 trial is performed)

Section 8: Multi-Directional Reach Test (MDRT)[5,6]

This test allows for analysis of the patient's voluntary postural control. It is used to evaluate how far patients are able and/or willing to lean away from a stable base of support in multiple directions.

Equipment/set-up: Yardstick

Starting Position: Position a yardstick at the level of the patient's acromion process. This may be achieved by affixing the yardstick to the wall. Placing the yardstick on a rolling IV pole with height adjustable clamp or a rolling mirror with Velcro is also an option that may facilitate test administration. Participant stands with feet shoulder width apart and arm raised to 90 degrees (parallel to floor, palm facing medially).

Protocol: The patient is instructed to reach as far forward as possible without letting their feet raise off the floor or their hand touch the yardstick. Location of the middle finger (in inches) is recorded. Trial distance (in inches) is obtained by subtracting the end number from the starting position number. Perform one (1) practice trial to ensure patient understanding of instructions followed by 1 trial that is recorded. Repeat similar protocol for reach backwards, left and right.

✷ *NOTE: True standardized test involves performance of one (1) practice attempt and three (3) trials. The mean of the three trials is recorded as the "distance reached" and the movement strategy that the participant used for each attempt is noted. The Tampa Falls Clinic has decided to perform only one practice and one trial due to time constraints and patient fatiguability.*✷

8. Multi-Directional Reach Test (MDRT)
- Forward Reach:
- Backward Reach:
- Lateral Reach Right:
- Lateral Reach Left:

Section 9: Backwards Release[3]

This maneuver enables the therapist to obtain preliminary information on the client's automatic postural control (involuntary).

Equipment/set-up: No specific equipment required.

Starting Position: Patient is asked to stand with feet shoulder width apart.

Protocol: Clinician places their hand between the patient's scapulae. Client is asked to "lean back against my hand." Once the patient is leaning backwards into the therapist's hand, the therapist unexpectedly removes the support. The amount of force created by the patient's lean should be sufficient to invoke a loss of balance that requires a change in the base of support (i.e., at least one backward step).

Scoring: Check on appropriate line if the patient is able to regain balance independently or requires physical assistance to do so. Note the number of steps taken by the patient if they are able to self-correct for imbalance created. "Unable to perform" option is available if the therapist feels that the maneuver is inappropriate (e.g., extreme anxiety) or unsafe (e.g., obesity) to be performed on a specific patient.

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9. Backwards release:
      __: Steadies self independently
            • Number of steps taken:
      __: Requires physical assistance not to fall
      __: Unable to perform

WARNING!
This test is dangerous. Do not perform this test if you will be unable to catch the patient or if the test is inappropriate in any way.

Section 10: 8 ft Up and Go Test[1,7]

Equipment/set-up: Place a chair (approximately 17 inches in height) against a wall or firm object for safety to prevent it from sliding backwards. Place a cone on the floor exactly 8 ft away (distance measured is from the front edge of the chair to the back edge of the cone). Ensure a minimum of 4 ft of clearance beyond the cone to allow for turning room. A stopwatch is also required.

Starting Position: Patient is seated in the chair with hands on thighs and feet flat on the floor.

Protocol: Patient is instructed that on the signal "go," they are to rise from the chair (pushing off of thighs or chair is permitted), walk "as quickly as possible" around the cone and return to a seated position in the chair. The participant is told that they will be timed and should therefore walk as quickly as possible but not to run. Following a demonstration, the patient is allowed one practice trial followed by two test trials.

Scoring: The clinician begins the timer when the "go" signal is given (even if the patient has not begun to move) and stops the time at the exact instant that the participant's buttocks contacts the chair following the walk segment. Note the scores of both test trials to the 1/10th second yet the faster of the two times is recorded on the assessment form for evaluation purposes. Results obtained with this test may be compared to age-related normative values listed in the Senior Fitness Test manual.[1]

Adaptation: Use of an assistive device is permitted if required (remember to mark what type of device the patient used on the evaluation form) yet does not allow for comparison with age related, normative values from the Senior Fitness Test. Be sure to retest the patient using the same device on following visits. Additional trials can be administered without a device or a different type of device if appropriate.

✶ *Score > 8.5 seconds is associated with high fall-risk in community-dwelling older adults.* ✶

10. 8 Feet Up & Go:

Section 10: 8 Feet Up & Go (in Seconds)							
Sex \ Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Normal Range of Scores for Men*[1]	5.6 - 3.8	5.9 - 4.3	6.2 - 4.4	7.2 - 4.6	7.6 - 5.2	8.9 - 5.5	10.0 - 6.2
Normal Range of Scores for Women*[1]	6.0 - 4.4	6.4 - 4.8	7.1 - 4.9	7.4 - 5.2	8.7 - 5.7	9.6 - 6.2	11.5 - 7.3
*Normal range of scores is defined as the middle 50 percent of each age group. Scores above the range would be considered "above average" for the age group and those below the range would be "below average." Scores reprinted with permission of the authors.							

Section 11: Gait Speed Test[8]

Equipment/Set-up: Mark off a 15 ft (4.57m), unobstructed course on the ground with the use of black carpenter's tape. An additional 2 ft is marked at either end of the course to allow for subject acceleration/deceleration. A stopwatch is also required.

Starting Position: Patient is set-up in a standing position at the beginning of the course.

Protocol: Patients are asked to walk across the course at their "usual, comfortable speed." Time is started when the subject's foot crosses the black tape line indicating the end of the course. One practice trial is performed prior to testing to ensure patient understanding of the task. Two timed walks are performed with the fastest of both trials recorded on the sheet.

Scoring: The fastest of both trials is recorded on the score sheet. Gait speed may be calculated by dividing the patient's timed score in seconds by 4.57. Van Swearingen and Branch[9] noted 72% sensitivity and 74% specificity of gait speed for recognizing the risk of recurrent falls in frail older adults, including a cutoff score of 0.56 m/s for risk of recurrent falls.

Adaptation: Use of the patient's habitual assistive device is permitted.

11. Gait speed (time in seconds over 15 foot distance):

Section 12: Observational Gait

Gait Deviations:

Use the check-off list to record any gait deviations observed. Deviations not listed may be entered in the "other" section.

Current use of Assistive Devices:

This information may be obtained from the Patient Questionnaire to optimize time. Quickly verify all reported questionnaire data with patient during interview and record use of devices in check boxes provided.

12. Observational gait:

  • Deviations observed

        ( ) No significant deviations observed

        ( ) Trunk lateral lean

        ( ) Forward trunk flexion

        ( ) Hip hiking

        ( ) Hip circumduction

        ( ) Scissoring

        ( ) Trendelenburg   R ___ L ___

        ( ) Knee hyperextension R ___ L ___

        ( ) Foot drop   R ___ L ___

        ( ) Ataxic gait pattern

        ( ) Antalgic gait pattern

        ( ) Festinating

        ( ) Shuffling

        ( ) Decreased gait speed

        ( ) Widened base of support

        ( ) OTHER:

  • Current use of assistive device(s):

	INDOORS	OUTDOORS	ON BUS	SHOPPING
___ **Orthotics/Shoes**				
___ **Cane**				
___ **Walker-Wheels**				
___ **Brace**				
___ **W/C**				
___ **Elec W/C-Scooter**				
___ **Prosthesis**				
___ **"Cruise Furniture"**				

Section 13: Clinical Impression

Allows for narrative to hypothesize on etiology of falls according to physical evaluation performed.

13. Clinical Impression:

Section 14: Physical Therapy Recommendations

List any recommendations that arise from your evaluation (exercise program, equipment, etc.).

14. Physical Therapy Recommendations:

Part B: The Assessment Form

Part B: Assessment Form

Physical Therapy Assessment

1. Home Living Environment:
   a. Physical Layout

   __ Stairs inside home   __ Stairs to get into home __ Clutter

   __ Grab bars in bathroom __ Throw rugs   __ Bright lighting

   __ Bath chair or bench   __ Non-skid bath mats   __ Bathtub

   __ Shower stall   __ Hand held showerhead __ Nightlights

   __ Raised toilet seat   __ Slick/slippery floors   __ Uneven ground

   __ Electric cords on floor   __ Ramps   __ Hills around yard/grounds

   __ Other:

   b. Current Social Supports/Activity Level:

   c. ADL Independence:

2. Observation/Deformities:
3. Shoe Assessment:
4. Motor Status:
5. Functional Strength Tests:
   a. L/E (Chair Stand Test):

   • Use of hands required?   __ YES   __ NO

   • Number of repetitions completed in 30 seconds:

   b. U/E (Arm Curl Test):

   • Arm used: __ Left   __ Right

   • Weight:

      5lbs (Female): __

      8lbs (Male): __

   • Number of repetitions completed in 30 seconds:

6. Finger/Nose: (IT = intact, IM = Impaired)
   Right:

   Left:

7. Modified CTSIB: proceed to next condition when one, 30-second trial is completed or all three trials are performed.
   • Condition 1: Eyes open, firm surface

   • Total time: ___/30 sec

- Total time: ___/30 sec

- Total time: ___/30 sec   Mean score _____

- Condition 2: Eyes closed, firm surface

  - Total time: ___/30 sec

  - Total time: ___/30 sec

  - Total time: ___/30 sec   Mean score _____

- Condition 3: Eyes open, foam surface

  - Total time: ___/30 sec

  - Total time: ___/30 sec

  - Total time: ___/30 sec   Mean score _____

- Condition 4: Eyes closed, foam surface

  - Total time: ___/30 sec

  - Total time: ___/30 sec

  - Total time: ___/30 sec   Mean score _____

  TOTAL SCORE: ___/120sec (mean score used for each condition if > 1 trial is performed)

8. Reach in 4 directions test.
   - Forward Reach:

   - Backward Reach:

   - Lateral Reach Right:

   - Lateral Reach Left:

9. Backwards release:
   __: Steadies self independently

   - Number of steps taken:

   __: Requires physical assistance not to fall

   __: Unable to perform

10. 8 feet Up & Go:
11. Gait speed: (time in seconds over 15 foot distance)
12. Observational gait:
    - Deviations observed

      ( ) No significant deviations observed

      ( ) Trunk lateral lean

      ( ) Forward trunk flexion

      ( ) Hip hiking

( ) Hip circumduction

( ) Scissoring

( ) Trendelenburg   R ___ L ___

( ) Knee hyperextension   R ___ L ___

( ) Foot drop   R ___ L ___

( ) Ataxic gait pattern

( ) Antalgic gait pattern

( ) Festinating

( ) Shuffling

( ) Decreased gait speed

( ) Widened base of support

( ) OTHER:

• Current use of assistive device(s):

	INDOORS	OUTDOORS	ON BUS	SHOPPING
___ **Orthotics/Shoes**				
___ **Cane**				
___ **Walker-Wheels**				
___ **Brace**				
___ **W/C**				
___ **Elec W/C-Scooter**				
___ **Prosthesis**				
___ **"Cruise Furniture"**				

13. Clinical Impression:

14. Physical Therapy Recommendations:

REFERENCES

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