Assessment Protocols for Standardized Balance Tests

These are selected tests that are simple and quick yet are good indicators of falls risk and are good outcome measures. The first three tests are for static and dynamic balance, and leg strength that are good to use for brief performance screens. These take less than 5 minutes. All the balance measures can be used for measuring change in balance and have good psychometric properties. We include the test protocols, normative values, or risk cut points and a list of references.

GOOD BRIEF FALL SCREENING TESTS
1. TIMED UP AND GO TEST
2. SINGLE LEG STAND
3. SINGLE CHAIR RISE

OTHER BALANCE MEASURES USEFUL FOR ASSESSMENTS AND/OR OUTCOMES
4. TIMED CHAIR RISE x 5
5. CHAIR RISE # in 30 SEC
6. TANDEM STAND
7. 360° TURN PROTOCOL
8. FOUR SQUARE STEP TEST
9. ALTERNATE STEP TEST
10. TANDEM WALK TEST
PHYSICAL PERFORMANCE ASSESSMENTS FOR BALANCE AND FUNCTION

You will need a stop watch and masking tape. It is best to tell the client what the test measures, give instructions, and demonstrate each test. You may need to repeat if it is obviously they do not understand or were not giving it their best effort. These are all good tests for fall risk but performance is also influenced by pain, cognitive ability, and other medical conditions. You will need to interpret the results accordingly.

BRIEF FALL SCREENING TESTS

1. TIMED UP AND GO TEST
Description: The timed "Up & Go" test was developed as a brief screen for mobility and falls risk. It has good test-retest reliability and sensitivity and specificity for falls. The timed "Up & Go" test measures, in seconds, the time it takes for an individual to stand up from a standard arm chair (approximate seat height of 46 cm, arm height 65 cm), walk a distance of 3 meters (9.84 feet), turn, walk back to the chair, and sit down again. The participant wears his/her regular footwear and uses his customary walking aid (none, cane, or walker). No physical assistance is given.

Instruction:
Participants start with their back against the chair, their arms resting on the armrests, and their walking aid at hand if needed.

Instruction: When I say "go" I'd like you to stand up and walk as quickly as safely as possible to that line on the floor, turn, return to the chair, and sit down again.

Have the participant practice one trial to be sure they understand the procedure.

Start timing when you say go and stop when the participant sits down.

Use a stop-watch to time the performance and observe balance closely, especially at the turn.

If the participant does not perform the test correctly the first time (e.g., stops at the turn, does not sit down right away, or does not walk all of the way to the 3 meter mark) repeat the test.

Record time in seconds to tenths of a second and which assistive device was used, if any.

Cut Points for this test vary depending on population studied, but generally accepted as ≥ 14 sec

2. SINGLE LEG STANCE
Description: Balance ability during a single leg stance. Measures static standing ability (balance with feet fixed)

Instruction:
This test helps us to assess your standing balance. I want you to stand on one leg for as long as you can, or until I say stop. Watch while I demonstrate. (Demonstrate using chair/table/counter for initial support.)

You may choose either foot to stand on. You may hold you foot anywhere, but you may not brace your free leg on the standing leg. Place your arm by your sides and try not to move your feet or grab a support unless you need to gain your balance. Hold this position until I say stop. When you are ready, pick up one of your feet from the floor and hold it as long as you can.

Start timing when hand leaves the chair/table (if you are not using a support, start when the foot is lifted). Stop timing when their free foot touches the ground, their hand contacts the chair/table, their foot moved, or 30 seconds has passed.

Make sure you are close enough to guard the participant and they understand that they should put their foot down before they fall.

Record the time to a tenth of a second.
Cut point Less than 10 sec indicated balance impairment and less than 5 sec fall risk.

3. SINGLE CHAIR RISE
Description: Measures the ability of person to rise from a chair. Chair rise is a complex test requiring lower limb strength, range of motion, balance and is included in several risk assessment scales.

Equipment: Stop watch and standard height chair.
Tester Notes: Have the participant sit erect in a standard height chair with the chair back against the wall. You can use a chair with or without arms but the participants should not use their arms.

Instructions: I’d like you to fold your arms across your chest and stand up one time.

Record Yes or No, is able or not. *If the participant was NOT able* to get up without using arms do not perform the Repeated Chair Rise.

Cut Point = unable

OTHER BALANCE MEASURES USEFUL FOR ASSESSMENTS AND/OR OUTCOMES

4. TIMED REPEATED CHAIR RISE x 5 (SIT-to-STAND)
Description: Measures the ability of person to rise from a chair repeatedly. Repeated chair rise test requires lower limb strength, range of motion, balance, and endurance. For the sit-to-stand test with five repetitions subjects are asked to rise from a standard height (43 cm) chair without armrests, five times, as quickly as possible with their arms folded across their chest.

Equipment: Stopwatch and standard height chair.
Tester Notes: Check that the client can successful perform a single chair rise before you test repeated chair rise.

Instructions: I’d like you to fold your arms across your chest and when I say go, I want you to stand up and sit down as quickly as you can five times in row.

Record the time from the command “go” until the participant is in the final seated position, and the number of completed chair rises (0-5)

Cut point Greater than 15 sec indicator for fall risk

5. 30 SECOND CHAIR RISE - ALTERNATIVE TEST
Description: This chair rise test is a functional measure of lower body strength. This is an item from The Senior Fitness Test (Rikli and Jones 1999). The scores are compared to norms values for gender and age. This is a good test to performance as a group. Each person counts their stands while you time.

Instruction:
When I say go, I want you to stand up and sit down as quickly as you can until I tell you to stop. You don’t have to sit back in the chair completely, but you do have to make sure your buttocks contacts the chair. I am going to count how many times you can up in 30 seconds.

Record the number of stands completed in 30 seconds from “go” command

Cut Point Generally less than 10 is an indication of poor leg strength. As yet there is no fall risk for this test.
6. TANDEM STANCE

Description: Assesses static balance narrow base of support. For clients who cannot perform the single leg stance, use the TS test for an outcome measure. It is a very responsive measure.

Tester Information: Participants should wear tennis shoes or shoes with low or no heels. Describe the stance to the resident as you demonstrate it. Stress that if the resident feels it would be unsafe to try, to tell you. If the activity is not being done properly, demonstrate it again or repeat instructions. Guard the participant for balance loss.

Stand next to the client to help him/her into the position. Make sure you have a table or chair that the client can use for support. Supply just enough support to the client's arm to prevent loss of balance. Start timing when support is released. Stop after 30 seconds or when the participant steps out of position.

Instructions: “This test will help us assess your balance during standing.

First I will show you the movement then I want you to try it. ‘I would like you to stand with the heel of one foot in front of and touching the toes of the other foot for 30 seconds. Keep your arms by your sides and try not to shift your feet. Hold this position until I say stop.’

Record the time held to the nearest tenth of a second. If clients refuse, mark 0 time and indicate they refused.

Cut point unable to TS for 10 sec is fall risk indicator

7. 360° TURN PROTOCOL

Description: A measure of dynamic balance. The participant turns in a complete circle 360 degrees. You can test to either direction but each trial is only one complete turn. The 360 and walking speed are highly correlated so you can which to use for dynamic balance.

Tester Notes:
Place a piece of masking tape on the floor for a starting position.

The participant stands with arms at his/her side and feet comfortably apart and pointing straight ahead at the tape.

Start timing from the word GO and stop when the participant's shoulders are square facing you again. Have the participant do two trials. The participant may turn in either direction.

Instructions:
When I say go, I want you to turn around at your normal pace making sure to go in a complete circle and take steps as you turn. Make sure you end up facing me.

I'll show you (demonstrate the turn). You choose which direction you want to turn.

When I say ‘go’ start turning. Ready, go.

Record the time for both trials to the nearest tenth of a second

Cut Point >3.8 sec is indicator of fall risk
8. FOUR SQUARE STEP TEST

Description: A higher order complex task assessing dynamic balance. This is a good test for more advance balance skills and has a strong cognitive component.

Tester Notes:
1. Place four canes (1/2 inch pvc pipe, 35 inch length with a 4-way connector works well) on the ground to form four squares.

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2. Participants start in square one facing square two. Participants step forward into square two, sideways to square three, backwards to square four, sideways into one, and then reverse the sequence - sideways into four, forward, sideways, and backwards to one. The sequence is 1,2,3,4,1,4,3,2,1.

3. Instructions are to complete the sequence as fast as possible without touching the canes, both feet must make contact with the floor in each square, and to try to stay facing forward during the entire sequence.

4. The sequence is demonstrated and participants are allowed one practice trial then time two trials. The best time is recorded. Participants wear their usual shoes and are allowed to turn their body to negotiate the canes if necessary, but should try to face forward at all times. Mistrials occur if the participant cannot complete the sequence, loses balance or steps on a cane. One mistrial is allowed.

Special Instructions: Participants may lose balance, make sure you are guarding. You can cue the participants through the practice, but they should do the subsequent trials without cueing. The most common error is not reversing the sequence at box one.

Participant Instructions: We are going to do a stepping test to check your balance. This is what I want you to do: Demonstrate sequence and verbalize sequence while you are demonstrating. Try to complete the sequence as fast as possible without touching the sticks. Both your feet should make contact with the floor in each square. If possible, face forward during the entire sequence. First I would like you practice one time. One practice trial is completed to ensure the subject knows the sequence.

Record time from when the first foot contacts the floor in square 2 to when the last foot comes back to touch the floor in square1. Two FSST are completed with the best time taken as the score.

Cut point for falls risk >15sec

9. ALTERNATE STEP TEST

Description: The alternate-step test (AST) is a modified version of the Berg Balance Test stool-stepping task. It involves weight shifting and provides a measure of lateral stability. This test involves alternatively placing the entire left and right feet (shoes removed) as fast as possible onto a step 18 cm high and 40 cm deep.

Instruction: I want you to place you feet on this step alternating R and L feet. I'll show you (demonstrate).

Record: The time taken to complete eight steps, alternating between the left and right feet.

Cut point ≥ 10s RR =2.3 (CI 1.4, 3.5) LR =1.57, Sensitivity/specificity, 69/56.

Alternative is to count the number of steps in 10 sec
10. TANDEM WALK TEST

Description: Tandem gait is a high demand activity requiring careful control of both center of mass movement (head, trunk, pelvis) and the successive re-establishment of a stable, narrow base of support. Compared to normal gait, the tandem walk test tends to be more specific to impairments affecting balance.

Instruction: There are two ways of conducting this test and evidence for clear cut points for falls risk are not well established. Clients are required to walk heel to toe along a 10-foot line as quickly as possible without errors. Errors included not walking heel to toe, stepping off the gait line, and losing balance. I want you to walk along this line heel to toe without stepping off the line as quickly as possible, it's like a sobriety test.

Record: You can measure performance time and number of errors for three trials and average across trials. Counting errors is tricky and not very reliable. An alternative is to ask clients to take 4 steps and score it as able or unable.

REFERENCES

Timed Up and Go Test


Timed Chair Stands


30 sec Chair Stand


Single Limb Stand


Tandem and Semi-Tandem Stance


Walking Speed


360 Degree Turn


Four Square Step Test
Alternate Step Test

