

**PERFORMANCE-BASED MEASUREMENTS
CHAIR STANDS, 20-METER WALK, RAPID STEP-UPS AND MAXIMAL STEP
LENGTH**

TABLE OF CONTENTS

1.	Background and rationale	3
2.	Use of the stopwatch.....	3
3.	Safety issues and exclusions.....	4
4.	General considerations.....	4
4.1	Footwear.....	4
4.2	Approach to standardization.....	4
4.2.1	Instructions and encouragement.....	5
4.2.2	Demonstration	5
4.3	Scoring.....	5
4.3.1	Not attempted/refused.....	5
4.3.2	Attempted/unable to test.....	5
5.	20 METER WALK.....	6
5.1	Background and rationale	6
5.2	Equipment and supplies.....	6
5.3	Safety issues and exclusions.....	7
5.4	Description	7
5.4.1	Course set-up	7
5.5	Administration.....	7
5.6	Alert values/follow-up/reporting to participants	9
6.	CHAIR STANDS.....	9
6.1	Background and rationale	9
6.2	Equipment and supplies.....	9
6.3	Safety issues and exclusions.....	9
6.4	Participant and exam room preparation.....	9
6.5	Single chair stand: description	10
6.6	Single chair stand: administration.....	10
6.7	Repeated chair stands: description	11
6.8	Repeated chair stands: administration.....	11
6.9	Alert values/Follow-up/Reporting to participants.....	12
7.	BALANCE TESTS: RAPID STEP UPS AND MAXIMAL STEP LENGTH.....	12
7.1	Background and rationale	12
7.2	Safety issues / exclusions for balance tests	13
7.3	RAPID STEP UP	14
7.3.1	Equipment and supplies.....	14
7.3.2	Exam room preparation	15
7.3.3	Description	15
7.4	Administration.....	16
7.4.1	Right foot.....	16
7.4.2	Left foot	17
7.5	MAXIMAL STEP LENGTH.....	17
7.5.1	Equipment and supplies.....	17
7.5.2	Exam room preparation	18
7.5.3	Course set up.....	18
7.5.4	Description	20
7.5.5	Administration.....	20
7.5.5.1	Right foot.....	20

**Performance-Based Measurements: Chair Stands, 20-meter Walk,
Rapid Step-ups and Maximal Step Length**

MOST

Operations Manual

Chapter 3L, page 2

7.5.5.2	Left foot	22
8.	Alert values/follow-up/reporting to participants	22
9.	Quality assurance	23
9.1	Training and certification	23
9.2	Certification requirements	23
9.3	Quality assurance checklist	23
10.	Data collection forms.....	26

1. Background and rationale

Direct assessments of physical performance have become standard measurements in epidemiological studies in the elderly. These assessments generally tap multiple domains of physiological performance, including lower extremity strength, balance, coordination, and flexibility. The assessment techniques used in MOST have been derived from several previous studies, are reliable when performed in a standardized fashion, and are well tolerated by elderly participants.

Four performance-based measurements are discussed in this manual: repeated chair stands, 20-meter walk, rapid step-ups, and maximal step length.

2. Use of the stopwatch



The stopwatch will be used to measure the time it takes to complete a task from the beginning of the activity until the conclusion. Press the middle (mode) button to make sure you are in stopwatch mode. The display should read **0:0000**. To time the task, just press the right-hand button (labeled STA/STP) at the top of the stopwatch to begin, and press again when the task is completed. The time is digitally displayed on the stopwatch. To get the display to read **0:0000** again, press the left (lap) button. Time is displayed as minutes:seconds.hundredths of a second.

3. Safety issues and exclusions

There are no exclusions for the 20-meter walk or chair stands tests. However, if a participant is unable to do the tests, the form should be marked “Not attempted, unable” for that test.

A participant is excluded from the rapid step-up and maximal step length tests if they:

- have had bilateral knee replacements
- come to the clinic using a walker or crutches

Other exclusions will be based on an individualized assessment of impairments and safety concerns for each test. The examiner will ask questions, describe the tests, and as is necessary, discuss with the participant whether they should attempt that test given any physical problems or disabilities present. Inability or refusal to perform the test will be recorded on the data form.

4. General considerations

4.1 Footwear

To eliminate the effect of different footwear on test performance these tests should be performed in comfortable walking shoes with minimal or no heels and non-slippery soles.

4.2 Approach to standardization

All four tests are administered by a certified examiner. Since motivation and level of understanding can have a significant impact on performance, the exams should be administered strictly according to the protocol and in the following sequence:

- Determine whether any exclusions of special test procedures apply.
- Explain the procedure to the study participant making sure that key points from the suggested script are conveyed.
- Demonstrate the procedure using suggested script.
- Ask the participant if they have any questions.
- Re-explain the procedure briefly using suggested script.
- Ask the participant to practice the procedure.
- Ask the participant to perform the procedure.
- Begin all timed procedures with the words, "Ready? Go!"

After the 20-meter walk, repeated chair stands, and maximal step length tests, ask the participant if they experienced pain during the test and if so, ask them to rate the pain.

4.2.1 Instructions and encouragement

Use the script provided to make sure that all key points are covered when you describe the test and how to perform it properly. You should not provide additional description or encouragement beyond the key points provided by the standard scripts.

If a participant questions the need for detailed verbal instruction, respond that you explain each test in detail since this is the best way to make sure that everyone does the test in a similar manner.

4.2.2 Demonstration

Demonstrate each test for the participant. Remind the participant not to begin to do the maneuver until after you have demonstrated it.

It is very important that the examiner demonstrate each exercise correctly. Experience has shown that participants follow more closely what the examiner does rather than what they say. If the exercise is demonstrated incorrectly, the participant following the example will do the exercise incorrectly and may be scored as “Unable” even though they may actually have been able to perform it correctly.

If the participant indicates that they do not understand the test, demonstrate it again rather than relying on repeated verbal instructions. Repeat the demonstration only once. If the participant still does not understand, go on to the next component of the test.

4.3 Scoring

4.3.1 Not attempted/refused

If a test is not attempted because the participant refuses or cannot understand the instructions, record “Participant refused.” If the examiner or participant deems the test unsafe or beyond the participant’s ability, for whatever reason, record “Not attempted/unable” on the scoring form. Record a reason why the test was not attempted on the Follow-up Clinic Visit Procedure Checklist (page 1 of the Follow-up Clinic Visit Workbook).

4.3.2 Attempted/unable to test

If a test is attempted but cannot be completed or scored, record “Attempted, unable.”

5. 20 METER WALK

5.1 Background and rationale

This is a modification of the short walk test used in many epidemiological and clinical studies.

5.2 Equipment and supplies

- Two fluorescent orange traffic cones
- Bright cloth tape
- Digital stop-watch



5.3 Safety issues and exclusions

There are no specific exclusions for the 20-meter walk. However, if a participant has impairments of gait, balance, or vision that may pose a risk of falling, discuss with the participant whether they can safely perform the test. If unable to do the walk, the form should be marked “not attempted/unable.”



5.4 Description

This test measures the time it takes for the participant to walk 20 meters at their usual walking pace along with the number of steps that they take to walk 20 meters on a standardized course.



5.4.1 Course set-up

For consistency between field centers, the walking course length will be 20 meters and should be laid out in an unobstructed, dedicated corridor. Fluorescent orange traffic cones should be used to indicate the beginning and end of the walk and should be placed beyond the start and finish line so that the participant does not slow down during the walk. Measuring from the center of each line, place the lines 20 meters apart. Cones should be carefully placed so that they do not create a tripping hazard for the participant. Place a 1/2 meter length of bright cloth tape across the floor to mark the start and end of the course. Participants are to walk in the clockwise direction.



5.5 Administration

a) Describe the 20-meter walk. Participant’s toes should slightly touch the starting line, without going over the starting line, at the start of the walk. Demonstrate how to walk past the cone, using the cone at the start.



Script: “Now we want to measure your usual walking speed over this 20-meter course. You will start behind this line. When you have walked past the orange cone I want you to stop. Do not slow down until you have passed the cone.” **Demonstrate how to walk past the cone. Emphasize that the participant needs to walk past the orange cone before slowing down.**

“Now when I say ‘Go,’ I want you to walk at your usual walking pace. Any questions?”

b) To start the test, say,

Script: “Ready, Go.”

c) You will need to walk a few steps behind the participant. Begin timing and counting steps with the first footfall over the starting line and . . .

UAB: stop with the first footfall on or over the finish line.

U of I: stop with the first footfall over the finish line.

(Note difference between sites. We want the test to be administered the same way as it has in the past and there is one subtle difference between the sites. See above.)

d) When the participant reaches the 20-meter mark, push the right/hand STA/STP button on the stopwatch, and record the number of steps taken on the form (in field labeled “Trial 1”). You will need to carry the form on a clipboard.

e) Record the time it took to do the first 20-meter test on the 20-meter Walk data collection form in the Clinic Visit Workbook Reset the stopwatch and have the participant repeat the 20-meter walk by walking back in the other direction. Emphasize that the participant should again walk at their usual walking speed for the second portion of the test.

Script: “OK, fine. Now turn around and when I say ‘Go,’ walk back the other way at your usual walking pace. Be sure to walk past the cone before slowing down. Ready, Go.”

f) When the participant reaches the starting line, push the right/hand STA/STP button on the stop watch, and record the number of steps taken on the form (in data field labeled “Trial 2”).

g) Record the time it took to do the second 20-meter test on the 20-meter Walk data collection form in the Clinic Visit Workbook.

h) Ask the participant:

Script: “During this test, did you experience any pain in your joints or muscles?”

If participant says “yes,” record location of pain and whether the respondent reported pain in either knee.

i) Participant can use a walking aid, if needed, during the 20-meter walk. Record whether or not the participant was using a walking aid, such as a cane, during the 20-meter walk on the 20-meter Walk data collection form.

5.6 Alert values/follow-up/reporting to participants

These test results have no alert values and are not reported to the participant or physician.

6. CHAIR STANDS

6.1 Background and rationale

Single and multiple chair stands are commonly used tests of physical performance in epidemiological studies of older populations.

6.2 Equipment and supplies

- Digital stopwatch
- Standard chair: straight back, flat, level, firm seat; seat height 45 cm at front

6.3 Safety issues and exclusions

- Walking aids may not be used in the chair stand tests.
- The vast majority of participants should be able to attempt this test. Exclusion from the chair stands test will be based on an individualized assessment of impairments and safety concerns. The examiner will describe the chair stand test, and then discuss with the participant whether they can safely perform it given any physical problems or disabilities present. Refusal or inability to perform the test will be recorded on the data form. If the examiner or participant determines that it is not safe to perform the test, record “not attempted/unable.”

6.4 Participant and exam room preparation

If the participant is not wearing appropriate footwear, the test can be performed in bare feet. The standard chair should be placed on a nonslip surface (low pile carpeting works well) with the back of the chair against a wall for stability. There should be adequate room in front and on the sides of the chair for the examiner and the participant to maneuver freely.

6.5 Single chair stand: description

This is a test of ability to stand up from a standard chair without using arms. This task is also used to screen for the ability to do repeated chair stands. Walking aids such as canes, walker, or crutches may not be used.

A straight-backed chair without arms, with seat height of 45 cm, should be used for this test and placed against a wall for added stability. The participant's feet should be placed squarely on the floor in front of them. The participant should be seated in a position which allows them to place their feet on the floor with knees flexed to slightly greater than 90 degrees □ so that their heels are somewhat closer to the chair than the back of the knees.

6.6 Single chair stand: administration

1) During the test, the examiner may stand in front of the participant (with arms extended, if appropriate) for the participant's safety during the chair stands.

2) Describe the test.

Script: "This is a test of strength in your legs in which you stand up without using your arms."

3) Demonstrate the procedure.

Script: "Fold your arms across your chest, like this, and stand when I say 'Go,' keeping your arms in this position. OK?"

4) Ask the participant to stand.

Script: "Ready, Go!"

If the arms unfold, or the participant puts one or both hands down on the chair to push up, remind them to keep their arms folded snugly across their chest and ask them to repeat the chair stand.

It is OK for the participant to move part-way forward in the chair before standing, but knees and hips should be flexed to approximately 90 degrees before standing.

5) If the participant cannot rise without using arms, say.

Script: "OK. Try to stand up using your arms to push off."

6) Score as follows:

If the participant attempted but was unable to arise even using their arms, score as "Attempted, unable to stand."

If the participant uses arms to stand up, score as "Rises using arms."

If they stood up all the way without using arms, score as "Stands without using arms." Go on to Repeated Chair Stands.

6.7 Repeated chair stands: description

This is a test of lower extremity strength in which the participant stands up from a seated position five times as quickly as possible. The time it takes to stand five times is recorded.

6.8 Repeated chair stands: administration

- 1) If the participant can arise from the chair without using arms, attempt the five stands.

Script: "This time, I want you to stand up five times as quickly as you can keeping your arms folded across your chest."

- 2) Demonstrate the test.

Cross your arms over your chest and then rise as quickly as you can while emphasizing "full standing position," and sit while emphasizing "all the way down."

Script: "When you stand up, come to a full standing position each time, and when you sit down, sit all the way down each time. I will demonstrate two chair stands to show you how it is done."

Rise two times as quickly as you can, counting as you stand up each time.

- 3) Begin the test

Script: "When I say 'Go,' stand five times in a row, as quickly as you can, without stopping. Stand up all the way, and sit all the way down each time."

"Ready, Go!"

Start timing as soon as the participant begins to stand from the chair. Count: "1, 2, 3, 4, 5" as the participant stands up each time. Stop timing at the fifth stand.

- 4) If the participant is unable to complete the chair stands correctly (e.g., is not coming to a full stand), stop the procedure, repeat the demonstration, wait 1 minute, and begin the procedure again.

5) If the participant stops before completing five stands, confirm that they cannot continue by asking:

Optional script: "Can you continue?"

If they say yes, continue timing. Otherwise, stop the stopwatch.

6) Score as follows:

Record score.

If participant attempted but was unable to complete five stands without using their arms, score as "Attempted, unable to complete," and record the number completed without using arms.

If all five chair stands were completed, record:

- the number of seconds, to a hundredth of a second, required to complete five stands

7) Ask the participant:

Script: "During this test did you experience any pain in your joints or muscles?"

If "yes" record where the pain was located and if the participant reported pain in either knee.

6.9 Alert values/Follow-up/Reporting to participants

These test results have no alert values and are not reported to the participant or physician.

7. BALANCE TESTS: RAPID STEP UPS AND MAXIMAL STEP LENGTH

7.1 Background and rationale

These two simple tests of balance performance mimic the postural demands of balance recovery tasks that are associated with falls. These tests also involve both weight shift and single limb support, postural perturbations that are potential factors in both falls and knee instability. Performance on such tests reflects the functioning of multiple neuromuscular and sensory systems that may be impaired in knee OA and other conditions, and that may be influenced by knee pain and biomechanical function of the knee.

7.2 Safety issues / exclusions for balance tests

Exclusions for both tests:

- bilateral knee replacements
- any above-ankle amputation
- using walker or crutches during clinic visit
- unable to safely perform the test without use of a cane
- fails balance screen (30-second stand)

Screening procedures:

If the participant reports typically using a cane around the home or when they go out, note this on data collection form. Then describe and demonstrate the rapid step up and maximal step length tests and ask the participant if they feel they can safely complete the tests without using their cane.

- If “no,” DO NOT administer either test and record “Not attempted/unable” on the form.
- If “yes,” test the participant’s balance safety by asking them to stand with feet together and eyes open for 30 seconds. Perform both tests (without cane) if they pass the balance screen. NOTE: it is not necessary to administer the balance screen if it is already apparent that the participant is able to stand unaided for 30 seconds.

If the participant reports typically wearing a knee brace around the home or when they go out, note on data collection form. Demonstrate the rapid step up and maximal step length tests and ask the participant if they feel they can safely complete these tests without using the brace.

- If “yes” for both, administer the tests without the brace.
- If “no” for either test, administer both tests with the brace and record this on the form. If “no” for either test and they do not have their brace at the clinic, DO NOT administer the tests and record “Not attempted/unable.”

In addition, if a participant appears to have impairments of gait, balance or vision that may pose a risk of falling, discuss with the participant whether they can safely perform the tests. If the examiner or participant determine that the participant cannot safely perform the tests, the form should be marked “Not attempted/unable.”

If the participant is wearing high-heeled shoes or shoes that the examiner thinks are unsafe to test in, ask the participant if they brought comfortable walking shoes. If yes, test the participant in their walking shoes. If the participant did not bring comfortable shoes, test them barefoot.

7.3 RAPID STEP UP

7.3.1 Equipment and supplies

- Senior Step (Shure-Step)
- Digital stop-watch
- Count-down timer (optional, this can replace digital stop-watch **if it can be calibrated**)

7.3.2 Exam room preparation

The Shure-Step block is used for this test. The step should be placed near the corner of a wall so that the participant can use the wall for steadying in the event of loss of balance. (See photo below showing ideal placement of Shure Step.)



During the test, the examiner should stand next to and facing the same direction as the participant with one arm available for support, if needed, for the participant's safety during the rapid step up test.

7.3.3 Description

The rapid step-up test is a functional, dynamic test of standing balance in which the participant stands on one leg while stepping on and off a 15-cm step as quickly as possible for 15 seconds with the other leg. (We will test both right and left legs.) This test should be done without holding onto or touching anything for support. Walking aids such as canes, walker, or crutches may not be used.

7.4 Administration

7.4.1 Right foot

1) Describe

Script: "This is a test of balance and strength in your legs in which you rapidly step up onto a block and down again using the same foot as many times as you can for 15 seconds, keeping your other foot flat on the floor."

2) Demonstrate

Script: "When I say, 'Go,' step completely onto the block with your right foot and step down again, keeping your left foot on the floor. Be sure to put your foot down completely on the step and on the floor. Keep your arms folded across your chest. Continue stepping up and down with your right foot as rapidly as you can, until I say 'Stop.'" [Demonstrate by stepping up and down several times]. "Do you think you can do this?"

If "yes," go on to practice test; if "no" record "Not attempted, unable."

3) Practice

Have participant perform a practice test.

Script: "Let's do a quick practice first. Ready, go."

If the participant performs correctly, go on to the test. If not, repeat the instructions.

If the participant loses balance during practice, ask:

Script: "Would you like to try again?"

If "no," record "Not attempted, unable" for the right foot and attempt test of the left foot.

If "yes," ask them to try one more time. If they lose their balance again, record "Not attempted, unable." Then attempt the test with the left foot.

4) Test

Script: "Are you ready for the real thing? OK, when I say 'Go,' step completely onto the block with your right foot and step down again, keeping your left foot on the floor. Be sure to put your foot down completely on the step and on the floor. Keep your arms folded across your chest. Continue stepping up and down with your right foot as rapidly as you can, like this, until I say STOP. OK?"

"Ready, Go."

- Press the stopwatch to begin timing when participant first lifts their foot.
- Count the number of times the participant returns their foot to the floor after stepping on the step.
- When 15 seconds have elapsed push the right/hand STA/STP button and instruct the participant to stop.

Script: “Stop.”

5) Score as follows:

- a) If the participant tries the practice trial and cannot remain balanced, score “Not attempted, unable.”
- b) Record the number of times the participant stepped up and returned the foot to the floor on the data collection form. If the participant’s foot has not yet reached the floor when you press the STA/STP button, do not count that step.
- c) If the participant loses balance and touches the wall for support or touches the examiner for support during the test, record the number of steps completed prior to the loss of balance, and record “Attempted, lost balance.” If the participant loses balance before completing one step, record “Attempted, lost balance” and record “00” for number of steps.
- d) If the participant cannot attempt the test for any reason, score “Not attempted, unable.”

7.4.2 Left foot

Follow instructions in 7.4.1 (4) above, but having the participant step up with the left foot rather than the right. Do not include a practice trial.

7.5 MAXIMAL STEP LENGTH

7.5.1 Equipment and supplies

- Yellow adhesive-backed ruler tape 1 inch wide, perforated every 12 inches for floor (1 inch wide by at least 50 inches long)
- Colored adhesive tape, blue (1/2 inch wide by 4 feet long)
- Colored adhesive tape, green (1/2 inch wide by 6 feet long)
- Colored adhesive tape, orange (1/2 inch wide by 8 inches long)
- Clear adhesive tape (2 inches wide by at least 15 feet long)

7.5.2 Exam room preparation

The maximal step test should be done on a low pile carpeted surface to allow for standardization between the two clinic sites. A standardized course is set up using adhesive-backed colored ruler tape affixed to the exam room floor to measure maximal step length out to the nearest inch.

7.5.3 Course set up

Figure 1 shows the Maximum Step Length (MSL) course. The black line (tape) is 40 inches in length. Use adhesive-backed ruler tape in inch increments. (Inches are indicated in red in the figure.) Since the ruler tape can stretch, detach at each 12 inch perforation out to 40 inches and check measurement of ruler tape with a conventional tape measure and adjust as necessary before permanently affixing ruler tape to floor. Affix blue adhesive backed tape with the outside edge crossing the vertical ruler tape horizontally at 40 inches. The blue tape should extend two feet on each side of the ruler tape. Use green adhesive tape to create two starting boxes, one for each foot, with the inside edge of the green tape starting at the 0 inch mark on main ruler tape. (See Figure 1) The boxes are each 6 inches wide by 12 inches long on the inside dimensions. In each starting box, affix a 2 inch long strip of tape with the leading edge one inch back from the inside of the horizontal 0 inch starting line and centered from side to side (approximately) in each starting box. Also affix a 2 inch strip of tape with the leading edge one inch vertically outside the 0 inch start line of each starting box (in the direction of the arrow in the diagram) and in line horizontally with the 2 inch strips you just affixed. (See Figure 1.) These four strips of tape will indicate whether the participant has returned their foot within 1 inch of the start line. Once the course is laid out correctly, affix clear adhesive tape over the ruler and other colored tape to protect it.

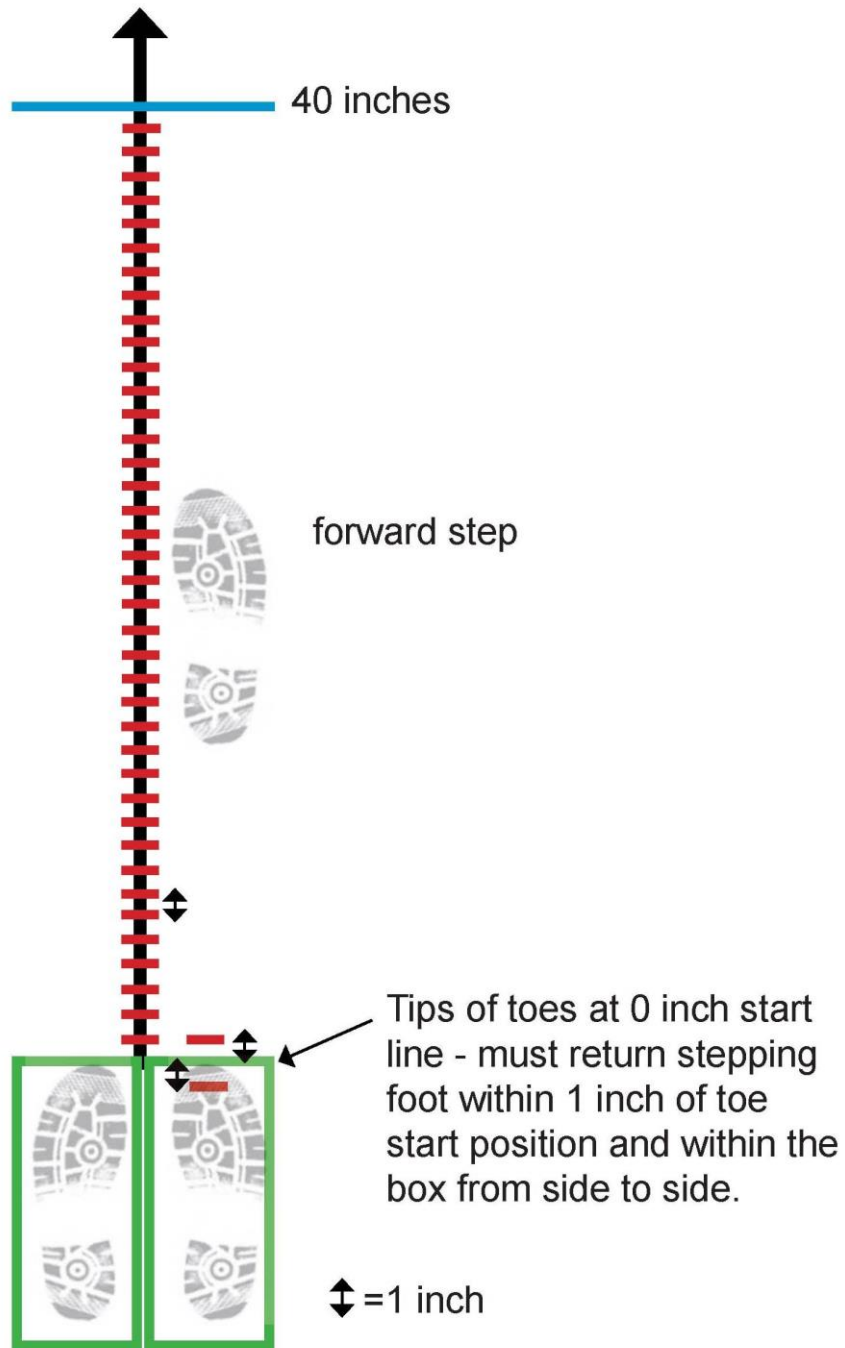


Figure 1. The course should be laid out with the right edge of the right starting box approximately 24 inches from a wall.

7.5.4 Description

This is a test of maximal step length (normalized to leg length), which is the ability to maximally step out and return to the initial position. Performance on this test reflects balance control, strength, and joint function. Participants will take the longest step out and back to their original foot position that they can while comfortably maintaining their balance. They will be told not to try to step out any further than the 40 inch blue horizontal line. They will keep their arms crossed with hands on opposite shoulders while they step out and back. The participant will also be required to maintain the stationary foot within the starting box while stepping out and back with the other foot. The return step back must fall within one inch (forward or back) of the original starting position and within the starting box from side to side for that foot.

The test will be done first with the right foot stepping out as far as safely possible and then back and then repeated with the left foot stepping out and back. Participants will complete two trials out and back with each leg.

Walking aids of any type may not be used.

7.5.5 Administration

7.5.5.1 Right foot

The participant should start with the feet in the starting boxes and the tips of the toes just touching the inside of the green horizontal line at 0 inches.

During the test, the examiner should stand next to and facing the same direction as the participant with one arm available for support, if needed, for the participant's safety during the maximal step length test.

If a participant steps out beyond 40 inches, the step will not be measured and “Greater than 40 inches” will be entered on the data collection form. When the participant steps back, they will need to return the foot within the starting box from side to side for that foot and no further back or forward than the one inch horizontal lines.

1) Describe

Script: "This is a test of balance and leg strength. With your arms folded across your chest, you will step forward as far as you safely can, without losing your balance, and then you will return with one step to the start."

2) Demonstrate

Demonstrate by taking a moderate step out and back (e.g., about 30 inches).

Script: “Start with your feet in the boxes, toes on the start line and arms across your chest. Step out as far as you safely can and then, with one step, return your toes to the start line

without losing your balance. Please do not try to step any further than the blue line. Do you think you can do this?"

If participant says, "yes," go on to practice test.

If "no" record "Not attempted, unable."

3) Practice

Have participant perform three practice tests.

Script: "OK let's do a few practice steps. Start with your feet in the boxes, toes on the start line, and arms across your chest. Take a small step forward and back."

If the participant successfully completes practice test, have them try again with a slightly longer step and then again with a long step.

If the participant loses balance in first practice test ask:

Script: "Would you like to try again, with a shorter step?"

If participant says "no," record "Not attempted, unable."

If participant says "yes," ask them to try again. Say,

Script: "This time try stepping out not quite as far."

If participant loses balance again ask if they would like to try one more time with a small step. If participant says "no" or loses balance a third time record "Not attempted, unable." If participant succeeds in practice test, proceed to test.

4) Test

Script: "Very good, now we will do the real test. You will be doing this two times with each leg. Once again, stand in the box with your toes against the starting line and your arms across your chest. When you do the test, take a step forward with your right foot as far as you can safely go and return with a single step to the starting line. Please do not try to step any further than the blue line. OK?"

- Record the measurement of the step out to the tip of the foot. Round up to the nearest inch.
- If step out is beyond the 40 inch line, record "Greater than 40 inches."
- Complete two trials stepping out and back

Repeat a trial if one of the following errors occurs:

- Loss of balance (e.g., touches wall or examiner, takes extra steps)
- Failure to return to within 1 inch of start position from front to back (determined by the tip of the toe falling within outside of one inch tape marks)
- Failure to return within start box from side to side (side of foot must be within outside of green start box tape)
- Multiple steps either to step out or step back
- Failure to keep arms crossed
- Movement of the stance foot out of the starting box

If the participant loses balance and is willing to repeat trial say again, “Would you like to try again with a shorter step?” The trial can be repeated, with the participant encouraged to take a smaller step, as many times as the participant is willing until the participant is either able to complete two trials with none of the errors above or does not want to continue. The examiner can also stop the test if they believe it is not safe for the participant to continue.

5) Score as follows:

- a) If the participant tries the practice trials and cannot attain the position, score “Not attempted, unable.”
- b) If the participant tries numerous times but cannot complete a trial without errors and does not want to continue trying, score “Attempted, unable to complete any trials.”
- c) If participant is able to complete only one maximal step, including stepping back to their original position, record the step length measurement for Trial 1 only and mark “Not done” for Trial 2.

7.5.5.2 Left foot

Follow instructions in **7.5.5.1** above but having the participant step out and back with the left foot rather than the right. Start by having the participant practice taking three steps with the left foot. Once the participant is ready, administer the actual test as in **7.5.5.1** above.

8. Alert values/follow-up/reporting to participants

All of the test results in this chapter have no alert values and are not reported to the participant or physician.

9. Quality assurance

9.1 Training and certification

The examiner requires no special qualifications or experience to perform this assessment. Training should include:

- Read and study manual
- Attend MOST training session on techniques (or observe administration by experienced examiner)
- Practice on other staff or volunteers
- Discuss problems and questions with local expert or QC officer

9.2 Certification requirements

- Complete training requirements
- Conduct exam on two volunteers while being observed by QC officer:
 - According to protocol, as demonstrated by completed QC checklist

9.3 Quality assurance checklist

Single chair stand

- Script correctly and clearly delivered
- Correctly demonstrates single stand, emphasizing
 - keeping arms tight across chest
- If task was not performed, codes and explains reasons
- Correctly completes form
- Reviews form for completeness

Repeated chair stands

- Script correctly and clearly delivered
- Correctly demonstrates two stands, emphasizing
 - full stand and return to complete sit
- Says “Ready, Go” for each test
- Counts each chair stand, and stops timing after participant stands up on fifth stand

Performance-Based Measurements
Chair Stands, 20-Meter Walk, Rapid Step-Ups and Maximal Step Length

MOST

Operations Manual

Chapter 3L, page 24

- If task was not performed, codes and explains reasons
- Correctly completes form
- Reviews form for completeness

20-meter walk

- Main points of script correctly and clearly delivered
- Correctly demonstrates
- Toes touching start line
- Timing started coincident with participant's first footfall
- Instructs participant to walk at their usual pace
- Records number of steps for first 20 meters
- UAB: Correct number of steps counted, and time stopped with first footfall on or over the finish line
- U of I: Correct number of steps counted, and time stopped with first footfall over the finish line
- Resets stopwatch for second 20-meter walk
- Again, instructs participant to walk at their usual pace
- Records number of steps for second 20 meters
- UAB: Correct number of steps counted, and time stopped with first footfall on or over the original starting line
- U of I: Correct number of steps counted, and time stopped with first footfall over the original starting line
- Reviews form for completeness


Rapid step-ups

- Exclusion questions asked from data collection form
- Correctly determines if participant eligible for tests
- Main points of script correctly and clearly delivered
- Correctly demonstrates
- Examiner standing next to participant with arm available for participant balance
- Timing started coincident when participant first lifts foot
- Timing stopped at 15 seconds
- Correct number of steps counted
- Reviews form for completeness
- Correctly completes form


Maximal Step Length

- Exclusion questions asked from data collection form
- Correctly determines if participant eligible for tests
- Main points of script correctly and clearly delivered
- Correctly demonstrates
- Feet in start boxes and toes touching start line
- Examiner standing next to participant with arm available for participant balance
- Practice trials completed with each foot
- Two maximal step length trials performed, if possible
- Each trial measurement recorded correctly
- Correctly completes form
- Reviews form for completeness

10. Data collection forms



Visit	MOST ID #	Acrostic	Staff ID#
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



20-Meter Walk

Directions:

1. "Now we want to measure your usual walking speed over this 20-meter course. You will start behind this line. When you have walked a few steps past the orange cone, I want you to stop. Do not slow down until you have passed the cone."
(Examiner Note: Demonstrate how to walk past cone and stop.)
 "Now when I say 'Go,' I want you to walk at your usual walking pace. Any questions?"

"Ready, Go."

Begin timing and counting steps with the first footfall over the starting line and stop with the first footfall over the finish line.)

Trial 1

Done Steps Second Hundredths/Sec
 Participant refused → Stop test.
Go to next exam.
 Not attempted, unable → Stop test.
Go to next exam.
 Attempted, unable to complete → Stop test.
Go to next exam.


2. Directions:
 Reset the stopwatch and have the participant repeat the 20-meter walk by walking back in the other direction.

"OK, fine. Now turn around and when I say 'Go,' walk back the other way at your usual walking pace. Be sure to walk a few steps past the cone before slowing down. Ready, Go."

Trial 2

Done Steps Second Hundredths/Sec
 Participant refused → Stop test.
Go to next exam.
 Not attempted, unable → Stop test.
Go to next exam.
 Attempted, unable to complete → Stop test.
Go to next exam.

♦Page 34♦



MOST Follow-up
Clinic Visit Workbook
EX



Visit	MOST ID #	Acrostic
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



20-Meter Walk

3. During this test, did you experience any pain in your joints or muscles?

Yes No Refused or unable to answer

a. Where was the pain located?
(Examiner Note: Mark all that apply.)

Back

Left side	Right side
<input type="radio"/> Buttock <input type="radio"/> Hip <input type="radio"/> Thigh <input type="radio"/> Knee <input type="radio"/> Leg <input type="radio"/> Ankle <input type="radio"/> Foot <input type="radio"/> Other <i>(Please specify: _____)</i>	<input type="radio"/> Buttock <input type="radio"/> Hip <input type="radio"/> Thigh <input type="radio"/> Knee <input type="radio"/> Leg <input type="radio"/> Ankle <input type="radio"/> Foot <input type="radio"/> Other <i>(Please specify: _____)</i>

b. Did the participant report pain in either knee?

Yes No

Examiner Note: REQUIRED: Show Card #27 and ask participant to . . .

i. Please rate the knee pain that you had by pointing to the number on this card.

0 1 2 3 4 5 6 7 8 9 10

4. Was the participant using a walking aid, such as a cane?

Yes No



Visit	MOST ID #	Acrostic
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



Repeated Chair Stands

Repeated Chair Stands

Directions: *(Examiner Note: Demonstrate and say:)*

"This time, I want you to stand up five times as quickly as you can keeping your arms folded across your chest. When you stand up, come to a full standing position each time, and when you sit down, sit all the way down each time.

I will demonstrate two chair stands to show you how it is done."

(Examiner Note: Rise two times as quickly as you can, counting as you stand up each time.)

"When I say 'Go' stand five times in a row, as quickly as you can, without stopping. Stand up all the way, and sit all the way down each time."

"Ready, Go!"

(Examiner Note: Start timing as soon as participant begins to stand. Count aloud: "1, 2, 3, 4, 5" as the participant stands up each time.)

2.

<input type="radio"/> Completes 5 stands without using arms	→	<input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/>	Seconds (Time on stopwatch)
<input type="radio"/> Rises using arms	→	Stop test. Go to next exam.	
<input type="radio"/> Participant refused	→		
<input type="radio"/> Not attempted, unable	→		
<input type="radio"/> Attempted, unable to complete	→		



Visit	MOST ID #	Acrostic
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



Chair Stands - Pain

3. During this test, did you experience any pain in your joints or muscles?
 Yes No Refused or unable to answer

a. Where was the pain located?
 (Examiner Note: Mark all that apply.)

Back

Left side

- Buttock
- Hip
- Thigh
- Knee
- Leg
- Ankle
- Foot
- Other (Please specify: _____)

Right side

- Buttock
- Hip
- Thigh
- Knee
- Leg
- Ankle
- Foot
- Other (Please specify: _____)

b. Did the participant report pain in either knee?
 Yes No

Examiner Note: **REQUIRED: Show Card #27 and ask participant to . . .**

i. Please rate the knee pain that you had by pointing to the number on this card.

- 0 1 2 3 4 5 6 7 8 9 10



Visit	MOST ID #	Acrostic	Staff ID#
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



Balance

EXCLUSIONS

1. Do you typically use a cane either around the home or when you go out?
- Yes No Don't know Refused
- Yes → Go to Question #3.
 No → Go to Question #3.
 Don't know → Go to Question #3.
 Refused → Go to Question #3.

Examiner Note: Demonstrate rapid step up and maximal step length tests. Ask participant if they can safely do these tests without their cane.

Rapid Step-up Yes No → Do NOT administer Rapid Step-up Test.

Maximal Step Length Yes No → Do NOT administer Maximal Step Length Test.

Examiner Note: If participant can safely do either test without their cane, go to Question #2.

Examiner Note: Ask participant to stand, feet together, with eyes open, for 30 seconds:

2. Was participant able to stand for 30 seconds?
- Yes No
- Yes → Go to Question #3.
 No → Do NOT administer balance tests.

3. Do you typically wear a knee brace either around the home or when you go out?
- Yes No Don't know Refused
- Yes → Go to Page 46, Question #4.
 No → Go to Page 46, Question #4.
 Don't know → Go to Page 46, Question #4.
 Refused → Go to Page 46, Question #4.

Examiner Note: Demonstrate rapid step up and maximal step length tests. Ask participant if they can safely do both tests without their knee brace.

Yes No Don't know

Yes → Test without knee brace. Go to Page 46, Question #4.

(Examiner Note: ask participant to put on their knee brace if they have it with them.)

b. Is participant wearing their knee brace for testing?

Yes No


i. On which side is their knee brace?

Right Left Both

→ Go to Page 46, Question #4.

No → Do NOT administer balance tests.



29591	Rapid Step Up			
<input checked="" type="radio"/> 60-month <input type="radio"/> 84-month	MOST ID # M <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Acrostic <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Staff ID# <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	

Examiner Note: Describe and demonstrate rapid step up test:

RIGHT

4. Directions:
 "When I say 'Go' step completely onto the block with your right foot and step down again keeping your left foot on the floor. Be sure to put your foot down completely on the step and on the floor. Keep your arms folded across your chest. Continue stepping up and down with your right foot as rapidly as you can until I say STOP. OK?"

"Ready, Go!"

<input type="radio"/> Done	→	<div style="display: flex; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <p>Steps</p>
<input type="radio"/> Attempted, lost balance	→	<p>Go to Step Test Left.</p>
<input type="radio"/> Participant refused	→	<p>Go to Step Test Left.</p>
<input type="radio"/> Not attempted, unable	→	<p>Go to Step Test Left.</p>

LEFT

5. Directions:
 "When I say 'Go' step completely onto the block with your left foot and step down again keeping your right foot on the floor. Be sure to put your foot down completely on the step and on the floor. Keep your arms folded across your chest. Continue stepping up and down with your left foot as rapidly as you can until I say STOP. OK?"


"Ready, Go!"

<input type="radio"/> Done	→	<div style="display: flex; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <p>Steps</p>
<input type="radio"/> Attempted, lost balance	→	<p>Go to Maximal Step Length.</p>
<input type="radio"/> Participant refused	→	<p>Go to Maximal Step Length.</p>
<input type="radio"/> Not attempted, unable	→	<p>Go to Maximal Step Length.</p>

♦ Page 46 ♦

MOST Follow-up
Clinic Visit Workbook
HY

29591



Maximal Step Length

Visit	MOST ID #	Acrostic	Staff ID#
<input type="radio"/> 60-month <input type="radio"/> 84-month	M		

Examiner Note: Describe and demonstrate maximal step length test:

RIGHT

6. Directions:
 "Very good, now we will do the real test. You will be doing this two times with each leg. Once again, stand in the box with your toes against the starting line and your arms across your chest. When you do the test, take a step forward with your right foot as far as you can safely go and return in a single step to the starting line. Please do not try to step any further than the blue line. OK?"

Done

Trial 1

in

 Greater than 40 in.

Trial 2

in

 Greater than 40 in.
 Not done

Attempted, unable to complete any trials
 Participant refused
 Not attempted, unable

Go to Maximal Step Length Left.

LEFT

7. Directions:
 "Now we are going to do exactly the same thing with the left leg: Toes on the start line, arms folded, one step as far as you can safely go and return in a single step. Do not try to step any further than the blue line."

Done

Trial 1

in

 Greater than 40 in.

Trial 2

in

 Greater than 40 in.
 Not done

Attempted, unable to complete any trials
 Participant refused
 Not attempted, unable

◆ Page 47 ◆

MOST Follow-up
 Clinic Visit Workbook
 HZ



Visit	MOST ID #	Acrostic
<input type="radio"/> 60-month <input type="radio"/> 84-month	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>



Maximal Step Length - Pain

8. During this test, did you experience any pain in your joints or muscles?
 Yes No Refused or unable to answer

a. Where was the pain located?
 (Examiner Note: Mark all that apply.)

Back

Left side

- Buttock
- Hip
- Thigh
- Knee
- Leg
- Ankle
- Foot
- Other (Please specify: _____)

Right side

- Buttock
- Hip
- Thigh
- Knee
- Leg
- Ankle
- Foot
- Other (Please specify: _____)

b. Did participant report pain in either knee?
 Yes No

Examiner Note: **REQUIRED: Show Card #27 and ask participant to . . .**

i. Please rate the knee pain that you had by pointing to the number on this card.
 0 1 2 3 4 5 6 7 8 9 10