

400 METER WALK

1.0 Overview

The 400 Meter Walk test (400 M Walk) is a measure of functional ability. Its potential as a predictor of morbidity and future disability makes it an important measure for cross-sectional, longitudinal, and intervention trials.

2.0 Required Equipment

The following equipment is required for the 400 M Walk:

- Redi-Measure distance measuring wheel or equivalent (tape measure).
(Redington Counters Inc., Windsor CT)
- Stop Watch with lap time button
- Small traffic cones
- 2 Standard chairs
- 22 meter uninterrupted distance for the course (or alternative length course as described below)
- Tape (to mark the course)

3.0. Procedures

3.1. Overview of 400 M Walk

Clinical centers where the 400 m walk course is located more than 50 meters from the assessment area should consider transporting participants to the course by wheelchair.

To ensure reproducibility, it is imperative that all participants are given the same instructions and that quantitative measurements associated with the tests are made in a uniform manner. You should not develop your own way of giving instructions. Since the instructions are fairly long, you may want to read them from the protocol (or provided script) during the test.

3.2 Course Preparation

The test will be administered on a 20 meter course, with two lines marking both ends of the course. A small traffic cone should be placed at each end of the course right within the lines marking each end. There should be enough clearance around each end of the course past the traffic cones so the participants can comfortably make the turn (approximately 1 meter). Ten laps will be performed for a total of 400 meters. The cones should be placed prior to the test and distance between them measured with the Redi-Measure (or equivalent). Two chairs should be placed, one just beyond the cone marking the start line and one just beyond the turn around. The course used for the test should be isolated and free from disruption as much as possible.

A diagram for laying out the course is provided in Appendix A.

3.2.1. Alternative 400 M Walk Course

If the clinic does not have a suitable space to set-up the 400 M course as described above, an alternative course can be laid out. Requirements for this course are:

1. For a back and forth course, cones should be at least 5 m apart, with no obstruction to walking.
2. A second option is to create a circular course. A circular course of a least 10 m can be used if the alternative layout allows it.
3. Instructions for the walk should be modified to fit the course. Verbal support should only be given at the same distance intervals as for the standard course. Questions should be asked at the same distance as for the standard course.

Please contact the Coordinating Center to discuss the specifics of your Alternative 400 M walk course before using it. The Alternate Course 400 m Walk Worksheet (Appendix B) can be used to help the assessor in tracking the number of laps completed and timing of the verbal encouragements and level of effort question.

If using an alternative 400 M walk course, indicate the length of a lap on the form.

3.3. The 400 M Walk Preparation

3.3.1 Use of assistive walking devices and orthotics

Only a single straight cane may be used to complete the test; a walker or any other assistive device (e.g. quad cane, crutch, hemiwalker etc.) may not be used at any point during the 400 M Walk test.

If the participant brings a cane (or other assistive device) to the clinic, the walk is to be attempted without the cane (or other assistive device) if the participant feels safe doing so. However, if the participant brings a single straight cane to the clinic and does not feel safe doing the walk without this cane, he may use this to complete the test. If a participant brings a walker or any walking aid other than a straight cane to the clinic and does not feel safe attempting the walk without this assistive device, the test should not be administered.

3.3.2 Participant Footwear

Shoes should be worn during the test. Use of orthotics is permitted. Use of heeled shoes is discouraged but allowed if there are no alternative shoes available.

3.3.3 Oxygen Use

The use of supplemental oxygen is permitted during the 400 m walk test, however the participant must be able to carry or push the oxygen device without assistance.

3.4. The 400 M Walk Protocol

3.4.1 Introduction

Accompany the participant to the starting line of the 400 meter walk with the form, script (if necessary) and stop watch. Describe the 400 meter walk (note if an alternative course is used, the script should be modified to match the course description). You may have the participant sit in the chair placed at the starting end of the course during the description of the test.

Script: “Now I would like to observe how you normally walk. You will be walking 10 complete laps around the course, which corresponds to about ¼ mile. **I would like you to walk at your usual pace and without overexerting yourself.**”

During this test, I will ask you to rate how hard you feel you are working. When I ask you to rate how hard you are working during the walk, I want you to think about the total feeling of exertion in your overall body, including your breathing and muscles. At the end of lap 4, while you continue walking, I will ask you how hard you are working.

After you have completed all 10 laps, I will tell you to stop, and again ask you how hard you were working during the test on a scale from 6 to 20 (*Show the participant the BORG Scale in Appendix C*), where 6 represents no exertion at all and 20 represents maximal exertion. After the walk, I will also measure your heart rate.

If you develop chest pain, significant shortness of breath, or are too uncomfortable to continue, please stop walking and tell me. If you need to, you may stand in place and rest for a few moments, but you may not lean against the wall or any other surface.”

3.4.2. Safety assessments

If the participant uses a cane or other assistive device: "I would like you to attempt this test without your cane (or other assistive device)." As noted above, only a single straight cane may be used to complete the test; a walker or any other assistive device may not be used.

Script: “**Do you feel it would be safe to try and walk up and down this hallway 10 times?**”

If yes, proceed with the test.

If No, and participant brought a cane to the clinic, ask, “**Do you feel it would be safe if you could use your cane?**”

If yes, proceed with the test with the participant’s single straight cane. Mark aid use on the form.

If No or if participant brought a walking aid other than a single straight cane to the clinic, end the test.

For all participants who did not complete the 400 M walk, please indicate why the walk was not completed. Please choose the best option. Reasons include:

- Participant required the use of an aid to walk the 400 M course other than a single straight cane.
- Participant felt unsafe. Please also note why they felt unsafe.
- Examiner deems test unsafe. This option would be marked when the participant is willing to complete the test, but during the explanation and positioning of the participant for the start of the exam, the examiner deems the test unsafe for the participant to complete.
- Shortened Clinic Visit (visit was ended before participant had the opportunity to attempt the 400 m walk)
- Course was obstructed during the clinic visit or unavailable
- Refused
- Other

3.4.3 Positioning of Examiner

The position of the examiner is critical for the walk. Unless otherwise indicated, the best position to maintain during the walk is to the side and slightly behind, outside of the participant's visual field.

If the participant is hesitant to attempt the walk or is doing it without their cane, the assessor should position themselves beside the participant [to the right side] rather than behind the participant. In addition, if available, a second assessor should time the test so that the first assessor can focus solely on the safety of the participant. The assessor should try not to set the pace of the walk.

3.4.4 Demonstration of the walk

Demonstrate the walk and ask participant if he has any questions.

Script: “I will demonstrate 1 lap.” *After completing demonstration, ask:* “Do you have any questions?”

3.4.5 Starting the exam

Before starting the exam, the examiner should double check the participant's footwear to make sure their shoes are tied/secure.

After shoes are checked and when participant indicates that they feel ready to begin, the test may proceed:

Script: “I will walk behind you, when I say ‘GO’, start walking at a comfortable pace you can maintain. Ready, Go.”

Start the stop watch when the participant takes their first step. Because there is a risk that a participant may slip and fall, the evaluator should follow the participant at a reasonable distance during the test. The examiner should be close enough to the participant to be able to provide help should the participant falter during the test, but not so close as to dictate the pace of the test.

For every lap, offer standard encouragement. Call out the number of laps completed and number remaining.

Script: "You're doing a good job. You have completed __ laps and have __ to go"

Use the lap button on the stopwatch to determine lap split times based on the first footfall crossing the finish line. After the walk, record the split times for lap 1-10 on the data collection form. Also record the total cumulative time on the data collection form.

3.4.6 Resting/Stopping Rules

At any time, if the participant feels they need to stop and rest, they may stand in one place and rest. Participant should not lean on wall, table or elsewhere (desk, counter etc.) or sit down. If they do lean or sit, they should be immediately instructed not to do so and the test can continue. If participant needs to lean on wall, table or other surface or needs to sit down for a second time during the rest stop or needs to lean again on a subsequent rest stop, stop the test and record the reason on the form.

During the walking test, if the participant appears to be in obvious distress (excessive sweating, unusually pale, labored breathing, unsteady/wavering gait, appears confused, or unresponsive to questions) or pain, you may recommend that he/she stand in place and rest for a moment or discontinue the test if required.

After 30 seconds of resting in place, ask the participant if they can continue walking.

If they can, continue the walk and record the rest on the form.

If they need to rest longer, have them continue to stand and rest in place.

After another 30 seconds (total 60 second rest), ask them if they can continue walking.

If they can, continue the walk.

If they cannot continue after a 60 second rest or if they need to sit down, stop the test.

Do not stop the stopwatch timing during any rests the participant may take.

After a 60 second rest, the test is discontinued. The time written down on the form is the time at the end of the 60 second rest. For example, if a participant stops to rest at 10 minutes, 15 seconds, and still cannot continue after resting for one minute, the time on the stopwatch would then read 11 minutes, 15 seconds. The time of 11 minutes, 15 seconds should be recorded on the form for the time at test discontinuation.

There is no limit to the number of rest stops as long as they can complete the walk without sitting. Use the space noted on the form to keep track of the number of stops a participant makes

during the 400 M walk. After the test, sum and record the total number of rests information on the form.

During the walk, if the participant requests or needs their cane to complete the test, give them their cane and allow them to continue the test. **Only a single straight cane may be used to complete the test;** a walker or any other assistive device may not be used at any point during the test. If a participant starts to use their straight cane mid-walk, indicate that a cane was used on the form. If the participant needs assistance from an aid other than a single straight cane (i.e. walker, quad cane), stop the test.

3.4.7 Stopping the Test before 400 Meters

There are several reasons the 400 M walk would be stopped before 400 M are reached.

If the participant reports chest pain, tightness or pressure in the chest, shortness of breath, feeling faint, lightheaded or dizzy, or report leg pain, stop the test. If necessary follow-up with the study physician and/or appropriate medical personnel.

Other reasons for terminating the test include:

- Participant rested for longer than 60 seconds.
- Participant requested to stop and leaned on a surface/wall for second time.
- Participant request assistive device other than a single straight cane.
- Participant requested to stop the exam.
- If the test was stopped for any other reason, please mark “Other” and specify the reason.

If the test is terminated prior to the participant completing 400 meters, the point at which they stopped should be marked by placing an object on the course. The direction in which the participant was going should also be noted. The participant should be accompanied to the nearest chair. After the participant is comfortably seated, their accomplished distance should be measured.

The number of full, complete laps should be recorded on the data collection form. The additional meters the participant walked after the last full lap should also be recorded. The number of meters completed for the incomplete lap should be measured using the 1m markings off to the side of the course. Meters should be rounded up to the next full meter. The additional meters obtained do not need to be measured with the Redi-Measure wheel (or equivalent). Also, record the time the 400 M walk was stopped (at the end of any final rest period). Record the number of rests taken during the walk (if any).

If an alternative course (not a 40 m lap) was used, please still record the number of full laps of the alternative course that were completed and the additional meters walked after the last full lap in the designated spaces on the form. As the length of the alternative walk is noted on the first page of the 400 M walk form, we can calculate the total distance walked before the test was terminated.

For all participants who stop the 400m walk early, record the reason 10 laps were not completed. Also, ask the participant why they felt they could not continue. Sites should mark all symptoms that the participant notes. You do not need to probe for specific symptoms, just record symptoms that the participant reports.

See below for obtaining a sitting pulse and obtaining the RPE on the Borg Scale at the stop of the exam.

3.4.8 Safety assessment after Lap 4

When the participant completes 4 laps (or the equivalent on an alternative course), ask the participant how hard they are working.

Script: “Please tell me how hard you feel you are working right now. Is it “light”, “somewhat hard”, “hard”, or “very hard”?”

If the participant reports “hard” or “very hard”, the participant is reminded to walk their “usual pace without overexerting yourself..”

Script: “I would like to remind you to walk at your usual pace without overexerting yourself. If you develop chest pain or significant shortness of breath, or are too uncomfortable to continue, please stop walking and tell me. If you need to, you may stand in place and rest for a few seconds.”

3.4.9 Completing the exam

When the participants completes 400 meters (first foot fall across the finish line), stop the stop watch.

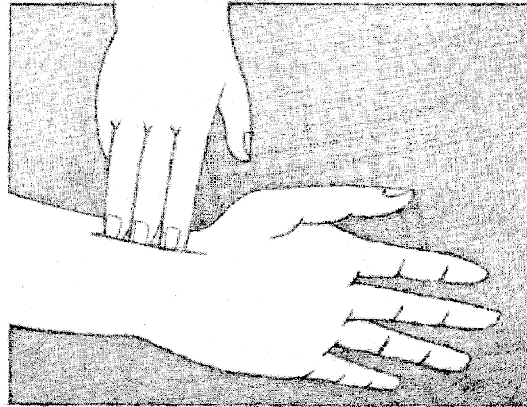
The time to complete the 10th lap will be the time it took to complete the 400 M walk. If using an alternative course (less than 20 M per lap), please also record the time at the end of the 400 M

Borg RPE Scale

At the end of the 400 meters (or at time the test was discontinued), ask the participant to rate their perceived exertion by showing them the Borg RPE scale (See Appendix C). Ask the participant to specifically choose a number between 6 and 20, rather than the verbal descriptor. If they provide a verbal descriptor, please ask them to choose a number.

Pulse

At the end of the 400 M walk or at the stop of the walk if 400 M is not reached, record sitting radial pulse.



Have the participant turn their palm upward (see figure above). Palpate the radial pulse with your index and middle fingers. Use the stopwatch to count the pulse for 30 seconds. Record the beats per 30 seconds on the form.

For all participants who complete the full 400m of the 400m walk, record the number of rest stops taken (if any).

The examiner should ask the participant “Is there anything bothering you?” Record any symptoms that the participant reports. Do not probe the participant for symptoms listed on the data collection form.

The examiner should also note if any symptoms were observed at the end of the test. These symptoms included: shortness of breath, wheezing/dyspnea, signs of discomfort, unsteadiness, sweating, other (please specify). Do not ask the participant about these symptoms. The examiner should just note if they observed any symptoms.

4.0 Quality Assurance

4.1 Training Requirements

The technician requires no special qualifications for performing this assessment. The training should include:

- Read and study manual
- Attend MrOS training session on techniques (or observe administration by experienced examiner)
- Practice on other staff or volunteers with special emphasis on terminating the walk before 400 meters is reached.
- Discuss problems and questions with local expert or QC officer

4.2 Certification Requirements

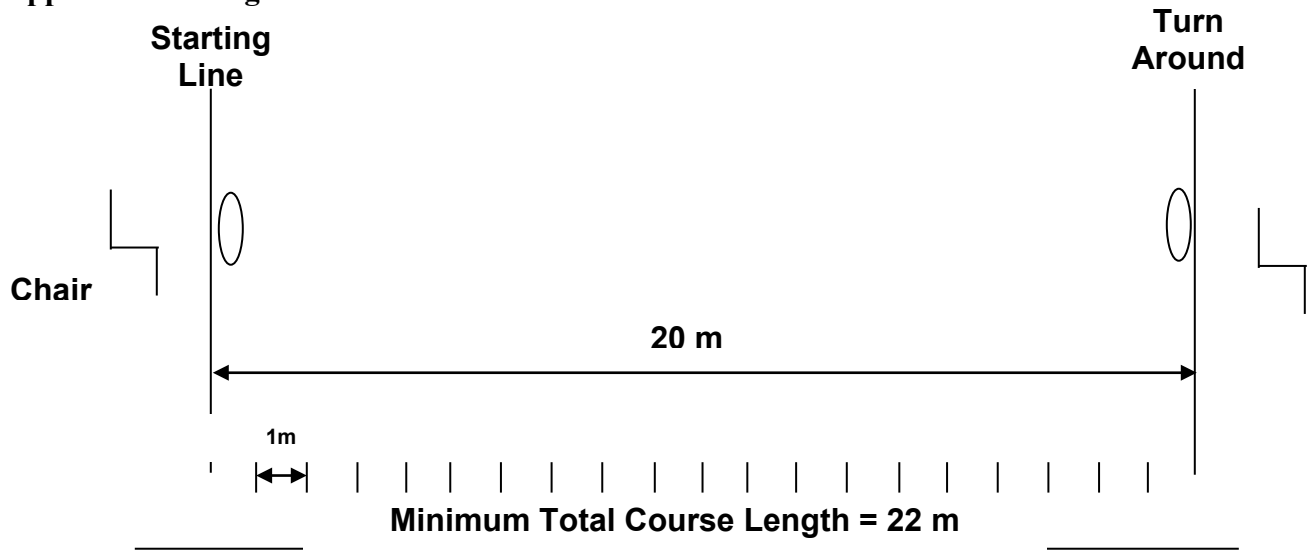
- Complete training requirements
- Conduct exam on 2 volunteers:

- According to protocol, as demonstrated by completed QC checklist
- At least 1 practice exam should include scenarios where the participant must stop to rest and/or does not complete the 400 meters.

4.3 Quality Assurance Checklist

- Walking aid use is assessed correctly. Participants can only use a single, straight cane.
- Walk is described properly.
- Asks the participant if they will feel safe completing the walk.
- Accurate demonstration is given.
- Starts timing the walk when participant takes first step.
- Offers standard encouragement and calls out the number of laps completed and number remaining
- Examiner stays in proper position during walk.
- Lap times are recorded accurately.
- Number of rests are properly recorded.
- Assessment of how hard working is obtained after 4th lap.
- Time at end of the 400 M walk (10th lap) or stop time is properly recorded.
- RPE on Borg scale is obtained at the end of the walk (either at termination or 400 M).
- Pulse (beats per 30 second) is obtained after 400 M walk or at stop.
- Symptoms experienced during walk is properly assessed.

Appendix A. Diagram for 400 m Walk



Course set-up: The walking course length will be 20 meters and should be laid out in an unobstructed, dedicated corridor. Two pieces white cloth tape (1/2 meter length) should be placed on the floor 20 meters apart to mark both ends of the course. A fluorescent orange traffic cone should be placed right within the line at both ends of the course. Participants are to walk in the clockwise direction. Place a numbered 10 cm length of tape marking every meter off to the side, flush against the wall. There should also be a chair available at the end of each turnaround.

Appendix B. Alternate Course 400 m Walk Course Worksheet

Please discuss your alternative course set-up with the Coordinating Center.

1 Lap = Distance (in meters) from cone to cone and back again (2 X distance between cones) or distance of the full circle if doing a round course in the home.

- 1) Distance for 1 lap = L; L = ___ meters (minimum of 10 meters required)
- 2) Total laps to walk 400 meters = $400/L$; Total laps to walk 400 meters = ___
- 3) N = # of laps to reach 40 M (1 lap in standard 400 M walk), N = ___
- 4) Give count of laps and encouragement according to standard protocol at every ___ laps
- 5) $N \times 4$ = lap at which to ask about level of effort as per standard protocol; $N \times 4$ = ___

Instructions for grid below:

First, cross off the laps that you will not need in this alternate test. Cross off all numbers higher than the total laps you will use.

Second, circle the following laps: ___, ___, ___, ___, ___, ___, ___, ___, ___, ___ to remind you to give lap count and encouragement at that lap.

Third, put an X in the box for lap ___ ($N \times 4$ laps), when you will ask about level of effort.

As test is done, put a check mark as each lap is completed

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8
<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input type="checkbox"/> 11	<input type="checkbox"/> 12	<input type="checkbox"/> 13	<input type="checkbox"/> 14	<input type="checkbox"/> 15	<input type="checkbox"/> 16
<input type="checkbox"/> 17	<input type="checkbox"/> 18	<input type="checkbox"/> 19	<input type="checkbox"/> 20	<input type="checkbox"/> 21	<input type="checkbox"/> 22	<input type="checkbox"/> 23	<input type="checkbox"/> 24
<input type="checkbox"/> 25	<input type="checkbox"/> 26	<input type="checkbox"/> 27	<input type="checkbox"/> 28	<input type="checkbox"/> 29	<input type="checkbox"/> 30	<input type="checkbox"/> 31	<input type="checkbox"/> 32
<input type="checkbox"/> 33	<input type="checkbox"/> 34	<input type="checkbox"/> 35	<input type="checkbox"/> 36	<input type="checkbox"/> 37	<input type="checkbox"/> 38	<input type="checkbox"/> 39	<input type="checkbox"/> 40