



**Diabetes Prevention Program
Outcomes Study Phase 3
(DPPOS-3)**

**Six Minute Walk Test Manual
Version 2.0**

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Prepared by the DPPOS Data Coordinating Center

The George Washington University Biostatistics Center
6110 Executive Boulevard, Suite 750
Rockville, MD 20852

Telephone: (301) 881-9260
Fax: (301) 881-8752

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Procedure:*6 Minute Walk Test

(Adapted from: ATS Statement: Guidelines for the Six-Minute Walk Test Am J Respir Crit Care Med, Vol 166. pp 111–117, 2002; Six Minute Walk Test, Manual of Procedures, Laboratory of Exercise Physiology and Physical Performance, Brigham and Women’s Hospital, Version 5.0 August 7,2015.)

1. Certification

1.1 Training and Certification

Prior to the first DPPOS examination, examiners will be trained to a common level of proficiency in the administration of the six-minute walk test (6-MWT). Examiners who perform the 6-MWT will undergo a certification procedure including:

- Participation in a 6-MWT Webinar.
- Lead trainers will attend a training meeting that will include instruction and practice in 6-MWT administration. New staff will be trained and certified by the lead trainer.
- Practice administering the test using the standard protocol at the home site using volunteer walkers.
- Examiners are encouraged to practice several times, self-evaluate and ask for clarification as needed.
- Examiners should be certified in BCLS.

The lead local trainer or study coordinator is responsible for the basic training of all new local center examiners. Following basic training and approval by the local trainer or study coordinator, new examiners will be permitted to perform the 6-MWT.

Maintaining proficiency in the administration of the 6-MWT measures requires regular exposure to the protocol. In order to maintain certification, examiners should administer the 6-MWT at least twice per month. This could be done with volunteer walkers in an accurate simulation of the 6-MWT if no DPPOS participants are scheduled.

1.2 General Training Guidelines

The site coordinators/lead examiners will train new examiners with strict adherence to the following guidelines:

1.2.1 Pre-certification, Training and Observation

- a. Examiner reviews updated forms & manual (check with Study Coordinator that you have the most updated manual).
- b. Coordinator/lead examiner and new examiner will review forms/manual and answer any questions.
- c. With manual in hand, the examiner will observe the study coordinator/lead examiner or a coworker administer the test on a coworker either in the field or in the office. The examiner will ask the study coordinator any questions that arise as a result.
- d. With manual in hand, the examiner will practice administering tests to two co-workers at least twice.
- e. Coordinator/lead examiner will set up mock tests where multiple scenarios are presented. Some examples of scenarios include:

- Use of walking aids
 - Unsteady gait
 - Stops to rest with restart and finish
 - Stops and does not continue
 - Stops and complains of symptoms
- f. Questions, observations will be reviewed with coordinator and feedback will be provided. This will continue until procedures are clear.

1.2.2 Certification

- g. Coordinator/lead examiner will observe examiner administering tests to a participant at least twice.
- h. If additional training or practice is needed, the certification tests should be repeated until the examiner has completed two tests correctly in a row.
- i. Once the examiner is certified, the clinic should update the staff certification tracking webpage on the DPPOS website.

1.2.3 Post-certification

Observation in field will be repeated regularly with feedback and clarification from Coordinator/lead examiner. If additional training is needed as a result of observations in the field, the examiner should repeat the certification process. Examiners at sites with only one staff member should self-evaluate. The Observational Checklist (appendix) may be used for this purpose.

2. Location

- a. The 6-MWT will be performed indoors, along a long, flat, straight, enclosed corridor with a hard surface that is seldom traveled.
- b. A corridor of at least 25-m (82 feet) in length must be available. This will allow a 20-m (65 feet, 7 inches) walking course plus about 2.5-m (8 feet) on each end for comfortable turn around zones.
- c. The turn around points should be marked with a cone (such as a small orange traffic cone).
- d. CLARIFICATION NOTE: Cones should be placed IN FRONT of the starting line and 20-meter line as shown below in the illustration.



- e. A starting line, which marks the beginning and end of each 40-m lap, should be marked on the floor using brightly colored tape. NOTE: A lap is one complete circuit of the course. One lap is 40 meters.

3. Required Equipment and Supplies

- a. A standard stopwatch should be used. Do not use the stopwatch feature from a cell phone.
- b. A tally sheet upon which tick marks can be made or length numbers can be crossed off. This is also shown on the worksheet.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42

- c. Bean bag, tape, or other marker to be used to denote participants' stopping position
- d. Two small cones to mark the turn around points: one at the start line and the other at 20-m. See illustration above for proper cone placement.
- e. Two chairs: one at the start line and one at the 20-m line. Both chairs should be just beyond the end of the turn-around zone and against the wall and/or outside the walking path. A wheel chair is optional and may be considered if appropriate.
- f. Worksheets (See Appendix 1) on a clipboard
- g. Borg CR-10 scale RPE scale (see Table 1) and Instructions to Participants (Table 2)
- h. Sphygmomanometer/stethoscope
- i. Telephone
- j. Automated electronic defibrillator (AED) that is easily available and accessible. Clinics who do not have an AED easily accessible (on the same floor), should check with their PI and determine if in the PI's clinical opinion, is it necessary to have an AED immediately available.

4. Participant Preparation

- a. Comfortable clothing should be worn.
- b. Appropriate shoes for walking should be worn; ideally, this means shoes with non-slip soles.
- c. Participants may use their usual walking aids during the test (cane, walker, etc.) if they believe it is necessary to do so for a safety. If the participant starts the test and quickly realizes that they need an aid, the participant should restart the test after a 5-minute rest. All participants should be instructed to walk as far as possible at a speed that can be maintained safely for 6- minutes without jogging or running.
- d. Participants should not have exercised vigorously within 2 hours of beginning the test.

5. Walking Aids

- e. Questions have arisen regarding a change in a participant's use of a walking aid during the course of the study. The following guidelines address such situations:

- f. If a participant used a walking aid at the baseline 6-MWT the walking aid should continue to be used during subsequent tests if the aid is still needed.
- g. In all cases, use of a walking aid and its type should be recorded.

6. Test Procedures

6.1 Prior to the Test

- a. A “warm-up” period before the test should not be performed.
- b. The participant should sit at rest in a chair, located near the starting position, for at least 5 minutes before the test starts. They should remain seated until the test starts. During this time some of the pre-test paperwork and questions for the participant can be completed.
- c. Make sure that clothing and shoes are appropriate
- d. Check for contraindications as noted on the worksheet – Do not perform the test if the participant:
 - had unstable angina during the previous month, or
 - had myocardial infarction during the previous month, or
 - complains of chest pain, pressure or tightness, or
 - does not feel it safe to attempt the 6-MWT.
- e. Measure heart rate and blood pressure
 - **Do not perform the test** if the participant's heart rate prior to the test is above 120 bpm or below 40 bpm.
 - **Do not perform the test** if the participant’s blood pressure is greater than 180 mm Hg systolic or greater than 100 mm Hg diastolic.
- f. Complete the first portion of the worksheet (Items 1-3, Appendix 1).
- g. Just before the start of the 6-minute walk test: Hand the participant a copy of the Borg CR-10 RPE scale (Table 1) and instruct the participant on its use as shown in this document, Table 3.
 - Show the participant the scale again at the end of the test and ask for his/her rating of perception of effort during the test.
- h. Clear the stopwatch. Assemble all necessary equipment stopwatch, clipboard with worksheet containing the lap tally sheet, the Borg Scale, and move to the starting point. NOTE: in some circumstances, items b-g may be completed at the starting point.
- i. Describe and demonstrate the 6-min walk test reading from the following script.

“The object of this test is to walk as far as possible at a speed that you can maintain safely for 6 minutes. You will walk back and forth in this hallway. Six minutes is a long time to walk, so you will be exerting yourself.

You are permitted to slow down, to stop, and to rest as necessary.

You may not lean against the wall while resting, but resume walking as soon as you are able.

If you develop chest pain or significant shortness of breath, or are too uncomfortable to continue, please stop walking and tell me.

You will be walking back and forth around the cones

You should pivot briskly around the cones and continue back the other way without hesitation.

Now I'm going to show you how to perform the walk. Please watch the way I turn without hesitation."

NOTE: Examiners demonstrate by walking one lap from the starting line, around the cone at 20-m and again at the start cone. Examiners should walk briskly, but at a pace they expect the participant can do. They should walk and pivot around the cones briskly without hesitation. As the examiner walks briskly around the cone back at the starting line and in front of the participant, say again, "Please watch the way I turn around the cone without hesitation."

"Are you ready to do that? I am going to mark off your completed lengths on this tally sheet by crossing out the length number every time you turn around the starting line.

"Remember that the object is to walk AS FAR AS POSSIBLE at a speed you can maintain safely for 6 minutes, but don't run or jog. Do you understand these instructions?"

After positioning the participant at the start line say "Start now or whenever you are ready."

Start the stopwatch on the participant's first move.

- j. For safety purposes, examiner should follow the participant at a reasonable distance during 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. The examiner should be behind and to the side of the participant, just outside their peripheral vision. Some participants might exhibit a completely normal gait pattern with good pacing. In these cases, the examiner could use good clinical judgment as to how close to follow or whether actual following is necessary. For example, the examiner might move along the course periphery and be available for assistance especially at the turn points.

6.2 During the Test

6.2.1 General guidelines for examiners:

- a. Examiners should not talk to anyone during the walk including the participant except for the scripted phrases of encouragement.
- b. Examiners should use an even tone of voice when using the standard phrases of encouragement (see 5.B., below) neither implying encouragement or discouragement.
- c. Watch the participant carefully.
- d. Do not get distracted and lose count of the length/laps.
- e. Each time the participant returns to the starting line, mark the lap on the worksheet. Let the participant see you do it.

6.2.2 Standard phrases of encouragement.

Only these standardized phrases for encouragement should be used during the test.

- a. After the first minute, tell the participant the following (in even tones):
- b. "You are doing well. You have 5 minutes to go."
- c. When the stopwatch shows 4 minutes remaining, tell the participant the following:
- d. "Keep up the good work. You have 4 minutes to go."
- e. When the stopwatch shows 3 minutes remaining, tell the participant the following:
- f. "You are doing well. You are halfway done."
- g. When the stopwatch shows 2 minutes remaining, tell the participant the following:
- h. "Keep up the good work. You have only 2 minutes left."
- i. When the stopwatch shows only 1 minute remaining, tell the participant:
- j. "You are doing well. You have only 1 minute to go."
- k. When the stopwatch is 15 seconds from completion of the 6 minutes, say this:
- l. "In a moment I'm going to tell you to stop. When I do, just stop right where you are and I will come to you."
- m. At precisely six minutes say this:
 - "Stop"
 - Do not use other words of encouragement (or body language) to get the participant to speed up.

6.2.3 When the participant stops walking

- a. Stop the stopwatch when the participant completes the 6 minutes of walking. This may or may not be at exactly 6 minutes. Regardless, record the actual time when the participant stopped.
- b. Examiners walk over to the participant.
- c. Consider taking a chair if the participant looks exhausted.
- d. Mark the spot where they stopped by placing a bean bag or a piece of tape on the floor. The mark should be at the tip of the toes where the participant stopped.

6.2.3.1 If the participant stops during the test

- a. If the participant stops during the test and needs a rest ***Do not stop the stopwatch*** but say this:

"You may rest as long as you feel you need to then continue walking"

whenever you feel able.”

- b. Record reason for pausing on the worksheet (item 6).
- c. If the participant stops before the 6 minutes are up and refuses to continue (or you decide that they should not continue because the participant reports chest pain, tightness, or pressure, significant shortness of breath or difficulty breathing, or feeling faint, lightheaded or dizzy, or if in the clinical judgement of the examiner it is not safe for the participant to continue, stop the test. Record the reason for stopping (item 6 on worksheet).
- d. Mark the stopping spot with the bean bag or piece of tape
- e. Take a chair (a wheelchair might be most appropriate in these cases) over for the participant to sit on and discontinue the walk,
- f. Attend to the participant as needed asking about symptoms, assessing heart rate, blood pressure, and RPE. Ensure that the participant is stable.
- g. When the participant is stable, note on the worksheet the distance, the time stopped, and the reason for stopping prematurely.

6.3 After the Test

Ask the participant to rate his/her perception of effort during the test and record on the on the P12 worksheet and P12 Six Minute Walk Test Procedure Log.

- a. If the participant gives a level of zero, the examiner should give the following prompt:

“Would you like to think more about your effort during the test? “ Remember that a rating of zero is equivalent to just sitting at rest.

Then ask this:

“How do you feel? Is there anything that is bothering you now?”

- b. Record this answer on the worksheet and P12 Six Minute Walk Test Procedure Log.
- c. Check the post-test heart rate and record the value on the worksheet and P12 Six Minute Walk Test Procedure Log.
- d. Assess any symptoms observed or experienced by the participant during or after the test by asking the participant to respond yes or no the list of symptoms on the worksheet. If yes to any symptom, ask for and record clarification. Record these on the on the worksheet and P12 Six Minute Walk Test Procedure Log. Record the examiners observation of symptoms as well.
- e. If the participant denies any symptoms, the examiner should probe for symptoms that might have affected the test such as muscle cramping, joint pain, unusual feelings of fatigue, foot soreness due to shoes or existing foot problem, etc. If the examiner detects something that might be classified as a symptom, that issue recorded.
- f. Record the number of complete length using the tick marks on the worksheet. Record the number of complete length on the P12 Six Minute Walk Test Procedure Log.

- g. Calculate the additional meters walked, rounding to the nearest meter, and record it on the P12 Six Minute Walk Test Procedure Log.
- h. Congratulate the participant on good effort and offer a drink of water.
- i. Complete the P12 Six Minute Walk Test Procedure Log.

7. Table 1. The Borg CR-10 RPE Scale

Number	Level of exertion	Expression of Intensity
0	Nothing at all	"No intensity"
0.5	Extremely easy	Just noticeable
1	Very easy	Very light activity
2	Easy	
3	Moderate	Somewhat, but not especially hard.
4		
5	Hard	The work is hard and tiring
6		
7	Very hard	Very strenuous
8		
9		
10	Extremely hard - Maximal	"Strongest intensity"

8. Table 2. The Borg CR-10 RPE Scale: Instructions to participant

To the participant:

“We want you to rate your feelings of effort at the end of 6 minutes of walking. Your feelings should reflect how heavy and strenuous the exercise feels to you, combining all sensations and feelings of physical stress, effort, and fatigue. Do not concern yourself with any one factor such as leg pain or shortness of breath, but try to focus on your total feeling of exertion.

“Look at the rating scale and see that it ranges from 0 to 10 where 0 means “no intensity” or no feelings of exertion at all. A rating of 10 means an extremely hard effort or the “hardest intensity” you could feel.

“Try to rate your feeling of exertion as honestly as possible. Your own feeling of effort and exertion is important, not how it compares to other people. When I show you the chart, look at the scales and the expressions and then tell me a number that best describes how you feel.”

I am now going to tell you what the numbers on the scale refer to.

0, *“Nothing at all”, means that you don’t feel any exertion whatsoever.*

1, *“Very easy” means very light activity such as taking a shorter walk at your own pace.*

3, *“Moderate” is somewhat but not especially hard. It feels good and not difficult to go on.*

5, *“Hard”. The work is hard and tiring, but continuing isn’t terribly difficult.*

7, *“Very hard” is quite strenuous. You can go on, but you really have to push yourself and you are very tired.*

10 *“Extremely hard – Maximal” is an extremely strenuous level. For most people this is the most strenuous exertion they have ever experienced.*

I will ask you to rate your level of exertion now and again as soon as you stop walking. Do you understand these instructions?

Appendix 1: Six Minute Walk Test Worksheet

Appendix 2: P12 Six Minute Walk Test Procedure Log

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