

## Standard Operating Procedures to assess Physical Functioning in people with Myotonic Dystrophy type 1

Six-Minute Walk Test  
10-Meter Walk Test  
10-Meter Walk/Run Test  
30-Second Chair Stand Test  
Nine-Hole Peg Test

*Recommendations included in this document result from an international consensus obtain through the OMMYD initiative*





## Contributors

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## Table of contents

Background .....	1
Six-Minute Walk Test.....	2
Scoring sheet .....	5
10-Meter Walk Test .....	8
Scoring sheet .....	10
10-Meter Walk/Run Test.....	11
Scoring sheet .....	13
30-Second Chair Stand Test .....	14
Scoring sheet .....	16
Nine-Hole Peg Test .....	17
Scoring sheet .....	19
Appendix 1.....	20



## Background

In 2011, the international initiative *Outcome Measure for Myotonic Dystrophy type 1* (OMMYD) was created with the objective to obtain a consensus between researchers and clinicians concerning the best outcome measures to be used in the myotonic dystrophy type 1 (DM1) population. Outcome measures should have documented metrological properties (i.e. validity, reliability, and responsiveness) in the DM1 population.

The present document is the result of the work done by the Functional Capacity Special Interest Group of the OMMYD initiative. Based on available data and the experience of each expert member of the group, a consensus was achieved concerning the use of four key outcome measures to assess functional capacity in the DM1 population and one additional measure was added based on an international consultation: 1) Six-Minute Walk Test; 2) 10-Meter Walk Test; 3) 10-Meter Walk/Run Test; 4) 30-second Chair Stand Test; and 5) Nine-Hole Peg Test. All metrological properties have not yet been documented for these tests in the DM1 population, but DM1 experts presently consider them as the best outcome measures to be used.

Experts have also reached consensus about the administration protocol for each outcome measure. The objective was to ensure the standardization of the administration of the tests, and to facilitate and improve the realisation of multi-center research.

In addition to the experts taking active part in the Functional Capacity Special Interest Group, a Delphi validation of these administration protocols has been made among other DM1 experts from the OMMYD initiative and members of the Myotonic Dystrophy Foundation special meeting group on physical therapy outcome measures. A total of 22 experts were asked and answered this Delphi survey and the present document was created taking in consideration their comments and suggestions.

## Six-Minute Walk Test

**Acronym:** 6MWT

### Description

The 6MWT is a performance-based test assessing walking capacity over longer distances. The maximum distance in meters covered in six minutes is recorded.

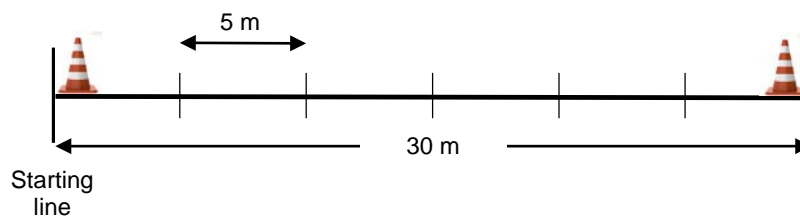
ICF Code: d4 Mobility; d450 Walking

### Equipment

Stopwatch	Beanbag
2 bright coloured cones	Stethoscope and blood pressure cuff / digital blood pressure device
Bright coloured adhesive tape	Heart rate monitor (optional)
Chair	Saturometer (optional)
Measuring tape	CR-10 Rating Scale*
Mechanical lap counter (optional)	Corridor, preferably 35-meter long

\* See Appendix

- Delineate a 30-meter walking course in a quiet corridor and put a mark at least every 5 meters using bright coloured adhesive tape. If it is not possible with a 30-meter walking course, make it as long as possible though no shorter than 20 meters. Make sure to use the same course length at subsequent visits.
- Put a cone at each end of the course. Make sure there is enough space to turn safely around it.
- Have a chair available at the end of the course (at least on one side).



### Preparation

#### Participant

- Comfortable clothing and appropriate shoes for walking should be worn. Any orthosis or walking aids used during the test should be recorded on the scoring sheet (make sure that the same are used at subsequent visits).
- The participant should not have exercised vigorously during the 2 hours preceding the beginning of the test.

Contraindications according to the American Thoracic Society (ATS) Guidelines:

- Absolute: unstable angina in the last month, myocardial infarction in the last month
- Relative: resting pulse over 120 bpm, systolic blood pressure > 180 mm Hg or diastolic blood pressure >100 mm Hg

### Tester

Make sure the corridor is free, quiet, and safe for testing so that the participant can perform the test without being disturbed.

Tester should stand at the starting line during the test and not walk with the participant. However, you may exceptionally walk behind the participant for safety reasons and indicate it on the scoring sheet.

Do not talk during the test, except to say the standard phrases of encouragements (see Administration #5).

Use an even tone of voice when saying the phrases.

Do not use other words of encouragement to get the participant to accelerate.

Each time the participant turns around a cone (i.e. completes a 30 m lap), make a note of the time on the scoring sheet.

Reasons for immediately stopping the 6MWT according to the ATS Guidelines (keep in mind that some of these symptoms can be part of the DM1 characteristics and may not lead to discontinuing the test):

- Chest pain
- Intolerable dyspnea
- Leg cramps
- Staggering
- Diaphoresis
- Pale or ashen appearance

### Practice

None for the participant. The administrator demonstrates a 2x30m walk.

### Administration

1. The participant should sit at rest in a chair, located near the starting position, preferably for 10 minutes before the test starts. During this time, check for contraindications, measure heart rate and blood pressure, and make sure that clothing and shoes are appropriate.
2. If pulse oximetry is performed (optional), measure and record baseline oxygen saturation (SpO<sub>2</sub>). The SpO<sub>2</sub> should not be used for constant monitoring during the test.
3. Have the participant stand and rate their baseline perceived exertion, and optional their baseline dyspnea (shortness of breath) and overall fatigue using the CR-10 Rating Scale. Use the standardized instructions provided for the scale (see Appendix).
4. Instruct the participant as follows: *“The object of this test is to walk as far as possible for 6 minutes (in order to insure comprehension in DM1 population, please instruct the participant that it means as fast as possible without running). You will walk back and forth in this hallway. Six minutes is a long time to walk, so you will be exerting yourself. You will probably get out of breath or become exhausted. You are permitted to slow down, to stop and to rest as necessary. You may lean against the wall while resting, but resume walking as soon as you are able. 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. Please watch the way I turn without hesitation.”*

**Demonstrate by walking a 2 X 30m lap yourself. Walk and pivot around the cone briskly.**

*“Are you ready to do that? I am going to keep track of the number of laps you complete. (If using a lap counter) I will click this counter each time you turn around the cone. Remember that the object is to walk AS FAR AS POSSIBLE for 6 minutes, but don’t run or jog. The test will start after I say “Ready, steady, go!” Do you have any questions?”*

5. Position the participant on the starting line. When the participant is ready, give the start signal and start the stopwatch on “Go!”.

*Encouragement sentences according to the ATS Guidelines*

After the 1<sup>st</sup> minute, tell the participant: "You are doing well. You have 5 minutes to go."

After the 2<sup>nd</sup> minute, tell the participant: "Keep up the good work. You have 4 minutes to go."

After the 3<sup>rd</sup> minute, tell the participant: "You are doing well. You are halfway done."

After the 4<sup>th</sup> minute, tell the participant: "Keep up the good work. You have only 2 minutes left."

After the 5<sup>th</sup> minute, tell the participant: "You are doing well. You have only 1 minute to go."

6. If the participant needs to rest during the test, do not stop the stopwatch. If the participant stops before the 6 minutes are up and refuses to continue (or you decide that they should not continue), bring the chair over for the participant to sit on, discontinue the walk, and note the distance, the time stopped, and the reason for stopping prematurely on the scoring sheet.
7. When the timer is 15 seconds from completion, say this: "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."
8. When the time is up, say: "Stop!" Walk over to the participant. Consider bringing the chair over if they appear exhausted. Mark the spot where they stopped by placing a beanbag or a piece of tape on the floor.
9. Immediately after the stop, record the postwalk perceived exertion and optional postwalk dyspnea and overall fatigue using the CR-10 Rating Scale (see Appendix) and ask: "What, if anything, kept you from walking farther?"
10. If using a heart rate monitor and a saturometer, measure heart rate and SpO<sub>2</sub>.
11. Record the additional distance covered (the number of meters in the final partial lap) using the markers on the floor and the measuring tape. Measure the distance to the nearest meter.
12. Congratulate the participant on good effort and offer a drink of water.
13. If possible, make two trials. Prior to starting the second trial, make sure that perceived exertion has come back to baseline. If it is not possible to do two trials on the same occasion, do them on separate days but at the same time and in the same conditions.

## Scoring

The total distance walked, rounded to the nearest meter for each trial is recorded.

## References

1. Butland RJ, Pang J, Gross ER, Woodcock AA, Geddes DM. Two-, six-, and 12-minute walking tests in respiratory disease. *Br Med J (Clin Res Ed)* 1982;284:1607-8.
2. American Thoracic Society. ATS statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med* 2002;166:111-7.
3. Borg GA. Psychophysical bases of perceived exertion. *Med Sci Sports Exerc* 1982;14:377-81.
4. Kierkegaard M, Tollback A. Reliability and feasibility of the six minute walk test in subjects with myotonic dystrophy. *Neuromuscul Disord* 2007;17:943-9.
5. Borg G, Borg's Perceived exertion and pain scales. Champaign, IL, US: Human Kinetics, 1998: 104 pp.



## Scoring sheet

### Six-Minute Walk Test

Patient name: _____	Examiner name: _____
Patient ID: _____	Time: _____
Birth date: _____ / _____ / _____ (dd) (mm) (yyyy)	Date: _____ / _____ / _____ (dd) (mm) (yyyy)

### Trial 1

Walked distance	Time	Walked distance	Time	Walked distance	Time
30m	<input type="text"/> min <input type="text"/> <input type="text"/> s	420m	<input type="text"/> min <input type="text"/> <input type="text"/> s	810m	<input type="text"/> min <input type="text"/> <input type="text"/> s
60m	<input type="text"/> min <input type="text"/> <input type="text"/> s	450m	<input type="text"/> min <input type="text"/> <input type="text"/> s	840m	<input type="text"/> min <input type="text"/> <input type="text"/> s
90m	<input type="text"/> min <input type="text"/> <input type="text"/> s	480m	<input type="text"/> min <input type="text"/> <input type="text"/> s	870m	<input type="text"/> min <input type="text"/> <input type="text"/> s
120m	<input type="text"/> min <input type="text"/> <input type="text"/> s	510m	<input type="text"/> min <input type="text"/> <input type="text"/> s	900m	<input type="text"/> min <input type="text"/> <input type="text"/> s
150m	<input type="text"/> min <input type="text"/> <input type="text"/> s	540m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
180m	<input type="text"/> min <input type="text"/> <input type="text"/> s	570m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
210m	<input type="text"/> min <input type="text"/> <input type="text"/> s	600m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
240m	<input type="text"/> min <input type="text"/> <input type="text"/> s	630m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
270m	<input type="text"/> min <input type="text"/> <input type="text"/> s	660m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
300m	<input type="text"/> min <input type="text"/> <input type="text"/> s	690m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
330m	<input type="text"/> min <input type="text"/> <input type="text"/> s	720m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
360m	<input type="text"/> min <input type="text"/> <input type="text"/> s	750m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
390m	<input type="text"/> min <input type="text"/> <input type="text"/> s	780m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
Partial lap = _____ m		Total distance walked = _____ m			

	Trial 1		
	Baseline	End of test	
Blood pressure	_____	_____	
Heart rate	_____	_____	
Perceived exertion (optional)	<input type="text"/> <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="text"/> . <input type="text"/>	(CR-10 Rating Scale)
Shortness of breath (optional)	<input type="text"/> <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="text"/> . <input type="text"/>	(CR-10 Rating Scale)
Fatigue	<input type="text"/> <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="text"/> . <input type="text"/>	(CR-10 Rating Scale)
SpO <sub>2</sub> (optional)	_____ %	_____ %	

Contraindications: Resting pulse > 120 bpm, systolic pressure > 180 mm Hg and diastolic pressure > 100 mm Hg





**Trial 2**

Walked distance	Time	Walked distance	Time	Walked distance	Time
30m	<input type="text"/> min <input type="text"/> <input type="text"/> s	420m	<input type="text"/> min <input type="text"/> <input type="text"/> s	810m	<input type="text"/> min <input type="text"/> <input type="text"/> s
60m	<input type="text"/> min <input type="text"/> <input type="text"/> s	450m	<input type="text"/> min <input type="text"/> <input type="text"/> s	840m	<input type="text"/> min <input type="text"/> <input type="text"/> s
90m	<input type="text"/> min <input type="text"/> <input type="text"/> s	480m	<input type="text"/> min <input type="text"/> <input type="text"/> s	870m	<input type="text"/> min <input type="text"/> <input type="text"/> s
120m	<input type="text"/> min <input type="text"/> <input type="text"/> s	510m	<input type="text"/> min <input type="text"/> <input type="text"/> s	900m	<input type="text"/> min <input type="text"/> <input type="text"/> s
150m	<input type="text"/> min <input type="text"/> <input type="text"/> s	540m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
180m	<input type="text"/> min <input type="text"/> <input type="text"/> s	570m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
210m	<input type="text"/> min <input type="text"/> <input type="text"/> s	600m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
240m	<input type="text"/> min <input type="text"/> <input type="text"/> s	630m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
270m	<input type="text"/> min <input type="text"/> <input type="text"/> s	660m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
300m	<input type="text"/> min <input type="text"/> <input type="text"/> s	690m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
330m	<input type="text"/> min <input type="text"/> <input type="text"/> s	720m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
360m	<input type="text"/> min <input type="text"/> <input type="text"/> s	750m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
390m	<input type="text"/> min <input type="text"/> <input type="text"/> s	780m	<input type="text"/> min <input type="text"/> <input type="text"/> s		
Partial lap = _____ m		Total distance walked = _____ m			

**Trial 2**

**Baseline                      End of test**

Blood pressure

\_\_\_\_\_

Heart rate

\_\_\_\_\_

Perceived exertion

.                         .

(CR-10 Rating Scale)

Shortness of breath  
(optional)

.                         .

(CR-10 Rating Scale)

Fatigue (optional)

.                         .

(CR-10 Rating Scale)

SpO<sub>2</sub> (optional)

\_\_\_\_\_ %                      \_\_\_\_\_ %

Contraindications: Resting pulse > 120 bpm, systolic pressure > 180 mm Hg and diastolic pressure > 100 mm Hg

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**Trial 1**

---

Walking aid used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Orthosis used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Type of shoes worn	Specify: _____	
Stopped before 6 minutes?	No <input type="checkbox"/> Reason: _____	Yes <input type="checkbox"/> Time: _____
Participant paused during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Tester walked behind the participant during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Falls?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Limiting factors (e.g. pain, cold)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Did any circumstances influence the test (e.g. busy corridor)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Adverse events?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____

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**Trial 2**

---

Walking aid used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Orthosis used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Type of shoes worn	Specify: _____	
Stopped before 6 minutes?	No <input type="checkbox"/> Reason: _____	Yes <input type="checkbox"/> Time: _____
Participant paused during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Tester walked behind the participant during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Falls?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Limiting factors (e.g. pain, cold)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Did any circumstances influence the test (e.g. busy corridor)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Adverse events?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____

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## 10-Meter Walk Test

**Acronym:** 10mWT

### Description

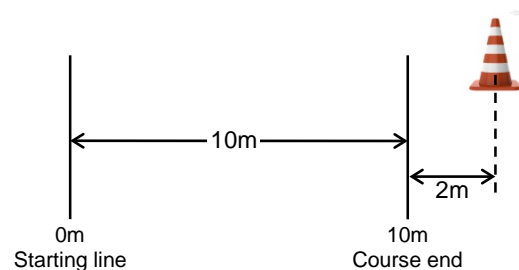
The 10mWT is a performance-based test assessing walking in two different conditions, own preferred speed and maximum speed, over a short distance. The time taken to **walk** 10 meters at usual comfortable and maximum speed is recorded.

ICF Code: d4 Mobility; d450 Walking

### Equipment

Stopwatch  
Bright coloured adhesive tape  
1 bright coloured cone  
Corridor or open space preferably 15 m long

- Delineate a 10-meter walking course with bright coloured adhesive tape.
- Use a cone or another coloured or contrasting adhesive tape to put additional mark two meters after the 10-meter course.



### Preparation

#### *Participant*

- Comfortable clothing and appropriate shoes for walking should be worn. Any orthosis or walking aids used during the test should be recorded on the scoring sheet. (make sure that the same are used at subsequent visits).

#### *Tester*

Make sure the corridor is free, quiet, and safe for testing so that the participant can perform the test without being disturbed.

A standing start and a flying stop are used.

If there is no concern of safety, the tester should stand adjacent to the finish line to ensure that the stopwatch is stopped accurately when the first foot crosses the finish line.

You may use a “target” such as the cone, which is 2 m beyond the finish line, and instruct the participant to walk towards it.

Do not refer to the bright coloured adhesive tape on the floor marking the 10m finish line.

*Practice*

None for the participant.

**Administration***Usual comfortable walking speed*

1. Provide the following instructions to the participant:  
*“This test involves walking over a 10 meter distance at your usual comfortable speed. The test will start after I tell you to go and will end when I tell you to stop. During the test, I will not provide encouragement. Do you have any questions?”*
2. Position the participant on the start line with the front of his foot not exceeding the tape mark (0 m). Before the trial, tell the participant:  
*“You will walk in a straight line at your usual comfortable speed, until I say, “Stop!” You will start walking when I say, “Go!”*
3. If there is no concern of safety, the tester positions him/herself adjacent to the finish line.
4. Give the start signal to the participant when he/she is ready: *“Are you ready? Then you can go!”*
5. Start the stopwatch on *“Go!”* and stop it when the first foot cross the finish line (10 meters). Let the participant keep walking until they reach the 12m marks and then say, *“Stop!”*
6. Note time required to cover 10 meters in seconds (to the nearest tenth of a second).
7. Perform one trial unless invalid. If a second trial is necessary, the procedure for the second trial is the same.
8. If the participant drops his/her walking aid, stop the trial and restart it. Record the reason on the scoring sheet.

*Maximum walking speed*

1. Follow the same instructions as for the *Usual comfortable speed test*, but provide the following instructions to the participant:  
*“This test involves walking over a 10 meter distance at your maximum speed. The test will start after the count of “Ready, steady, go!” and will end when I tell you to stop. During the test, I will not provide encouragement. Do you have any questions?”*
2. Position the participant on the start line. Before the trial, tell the participant:  
*“You will walk in a straight line as fast as possible, walking not running, until I tell you “Stop!” Start walking when I say “Go!”*

**Scoring**

The time in seconds to perform each trial is recorded. The speed in meter/second is calculated thereafter.

**References**

1. Bohannon RW. Comfortable and maximum walking speed of adults aged 20-79 years: reference values and determinants. *Age Ageing* 1997;26:15-19.
2. Watson MJ. Refining the ten-metre walking test for use with neurologically impaired people. *Physiotherapy* 2002;88:386-397.
3. Hammarén E, Ohlsson JA, Lindberg C, Kjellby-Wendt G. Reliability of static and dynamic balance tests in subjects with myotonic dystrophy type 1. *Adv Physiother* 2012;14:48-54.
4. Graham JE, Ostir GV, Fisher SR, Ottenbacher KJ. Assessing walking speed in clinical research: a systematic review. *J Eval Clin Pract* 2008;14:552-62.



## Scoring sheet

### 10-Meter Walk Test

Patient name: _____	Examiner name: _____
Patient ID: _____	Time: _____
Birth date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>	Date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>

		Trial 1	Unable	Trial 2 (optional)	Unable
Usual comfortable walking speed	<b>test time</b>	□□□.□s	<input type="checkbox"/>	□□□.□s	<input type="checkbox"/>
	<b>speed</b>	□□.□m/s		□□.□m/s	
Maximum walking speed	<b>test time</b>	□□□.□s	<input type="checkbox"/>	□□□.□s	<input type="checkbox"/>
	<b>speed</b>	□□.□m/s		□□.□m/s	

Speed (m/s) = 10 / (time in second to complete the task)

Walking aid used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Orthosis used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Type of shoes worn	Specify: _____	
Stopped any trials?	No <input type="checkbox"/> Reason: _____	Yes <input type="checkbox"/> Time: _____
Participant paused during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Tester walked behind the participant during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Falls?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Limiting factors (e.g. pain, cold)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Did any circumstances influence the test (e.g. busy corridor)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Adverse events?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____

## 10-Meter Walk/Run Test

**Acronym:** 10mW/RT

### Description

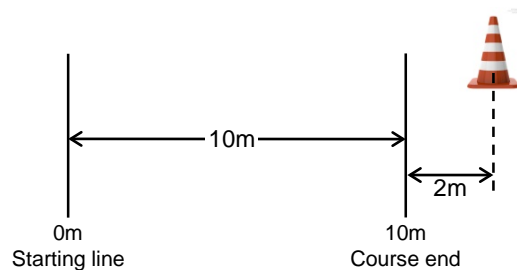
The 10mWRT is a performance-based test assessing maximum speed over a short distance. The time taken to cover 10 meters at maximum speed is recorded.

ICF Code: d4 Mobility; d450 Walking; d455 Moving around

### Equipment

Stopwatch  
Bright coloured adhesive tape  
1 bright coloured con  
Chair  
Corridor or open space preferably 15 m long

- Delineate a 10-meter course with bright coloured adhesive tape.
- Use a cone or another coloured or contrasting adhesive tape to put additional marks two meters after the 10-meter course.



### Preparation

#### *Participant*

- Comfortable clothing and appropriate shoes for walking/running should be worn. Any orthosis used during the test should be recorded on the scoring sheet (make sure that the same are used at subsequent visits).

#### *Tester*

**Have in mind that there is a risk of falls in the DM1 population if choosing to perform this test.**

Make sure the corridor is free, quiet, and safe for testing so that the participant can perform the test without being disturbed.

A standing start and a flying stop are used.

If there is no concern of safety, the tester should stand adjacent to the finish line to ensure that the stopwatch is stopped accurately when the first foot crosses the finish line.

You may use a “target” such as the cone, which is 2 m beyond the finish line, and instruct the participant to walk/run towards it.

Do not refer to the bright coloured adhesive tape on the floor marking the finish line.

*Practice*

None for the participant.

**Administration**

1. Provide the following instructions to the participant:
2. *"This test involves covering a 10 meter distance as fast as you **safely** can. You may run if you want to. The test will start after the count of "Ready, steady, go!" and will end when I tell you to stop. Do you have any questions?"*
3. Position the participant on the start line with the front of his foot not exceeding the tape mark (0 m). Before the trial, tell the participant:
4. *"You will go in a straight line as fast as you safely can, until I say "Stop!". You will start when I say "Go!"*
5. If there is no concern of safety, the tester positions him/herself adjacent to the finish line.
6. Give the start signal: *"Ready, steady, go!"* to the participant when he/she is ready.
7. Start the stopwatch on *"Go!"* and stop it when the first foot cross the finish line (10 meters). Let the participant keep going until they reach the 12m mark and then say *"Stop!"*
8. Note time required to cover 10 meters in seconds (to the nearest tenth of a second).
9. Perform one trial unless invalid. If a second trial is necessary, the procedure for the second trial is the same except that the participant turns back and walks/runs the reverse course.

**Scoring**

The time in seconds is recorded. The speed in meter/second is calculated thereafter.



## Scoring sheet

### 10-Meter Walk/Run Test

Patient name: _____	Examiner name: _____
Patient ID: _____	Time: _____
Birth date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>	Date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>

	Trial 1	Unable	Trial 2 (optional)	Unable
Maximum speed	test time <input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>	<input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>
	speed <input type="text"/> <input type="text"/> . <input type="text"/> m/s		<input type="text"/> <input type="text"/> . <input type="text"/> m/s	

Speed (m/s) = 10 / (time in second to complete the task)

Walking aid used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Orthosis used?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Type of shoes worn	Specify: _____	
Stopped any trials?	No <input type="checkbox"/> Reason: _____	Yes <input type="checkbox"/> Time: _____
Participant paused during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Tester walked behind the participant during test?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Reason: _____
Falls?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Limiting factors (e.g. pain, cold)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Did any circumstances influence the test (e.g. busy corridor)?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____
Adverse events?	No <input type="checkbox"/>	Yes <input type="checkbox"/> Specify: _____



## 30-Second Chair Stand Test

**Acronym:** 30s-CST

### Description

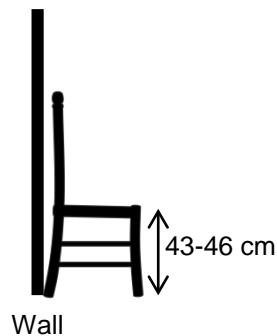
The 30s-CST is a performance-based test assessing lower limb strength and dynamic balance. The number of full sit-to-stands correctly performed in 30 seconds is recorded.

ICF Code: d4 Mobility; d410 Changing basic body position

### Equipment

Stopwatch  
Straight backchair without arm rests, seat height 43-46 cm (use same chair for re-testing)

- Ensure that the chair is placed back against a wall to prevent it from moving during the test.



### Preparation

#### *Participant*

- Comfortable clothing and appropriate shoes should be worn. Any orthosis used during the test should be recorded on the scoring sheet. If participants wear high-heeled shoes, ask them to perform the test barefooted.

#### *Tester*

Tester should stand close to the participant for safety reasons and to ensure that the movement is fully completed. Make a note on chair height on scoring sheet.

#### *Practice*

Demonstrate the task both slowly and quickly. Have the participant practice one or two repetitions of a full sit-to-stand-to-sit maneuver before starting the test to check technique and understanding.



## Administration

1. The test begins by having the participant seated in the chair (not leaning against the backrest) with back straight and arms crossed and held close to the chest. The arms should remain in this position throughout the test. Feet are approximately shoulder-width apart and placed on the floor at an angle slightly back from the knees. One foot may be slightly in front of the other to help maintain balance when standing.
2. Provide the following instructions to the participant  
*“At my signal, “Go!”, you will stand up to full standing position with your knees and hips straightened. Then you will sit down on the chair, making sure that your buttocks touch the chair at each repetition. You must repeat this motion as many times as possible, until I say “Stop!”. You cannot use your arms to help you to sit or to stand, keep them crossed and close to your chest. I will use the stopwatch to time the test. The test will last 30 seconds and we will repeat the test two times. Do you have any questions?”*
3. When the participant is ready, give the starting signal *“Ready, steady, go!”* and start the stopwatch on *“Go!”*.
4. Do not provide any encouragement and do not indicate the remaining time during the test.
5. During the test, silently count the number of times the participant performs the exercise properly. The standing position must be complete (hips and knees fully extended) for counting a repetition. If the participant has not performed a full sit-to-stand-to-sit maneuver but has risen to a full standing position at the end of the 30 seconds, count this as a repetition.
6. Do two trials; let the participant rest if needed before doing the second trial.
7. If the participant is not positioned correctly (e.g., arms are not crossed), stop the test, provide explanations on positioning again to the participant and redo the test.

## Scoring

The total number of correctly performed sit-to-stand repetitions is recorded. If the participant is unable to perform the test correctly, put zero repetitions in the scoring sheet.

## References

1. Jones CJ, Rikli RE, Beam WC. A 30-s chair-stand test as a measure of lower body strength in community-residing older adults. *Res Q Exerc Sport* 1999;70:113-9.
2. Gill S, McBurney H. Reliability of performance-based measures in people awaiting joint replacement surgery of the hip or knee. *Physiotherapy research international : the journal for researchers and clinicians in physical therapy* 2008;13:141-52.
3. McCarthy EK, Horvat MA, Holtsberg PA, Wisenbaker JM. Repeated chair stands as a measure of lower limb strength in sexagenarian women. *J Gerontol A Biol Sci Med Sci* 2004;59:1207-12.
4. Dobson F, Hinman RS, Roos EM, et al. OARSI recommended performance-based tests to assess physical function in people diagnosed with hip or knee osteoarthritis. *Osteoarthritis and cartilage / OARS, Osteoarthritis Research Society* 2013;21:1042-52.



## Scoring sheet

### 30-Second Chair Stand Test

Patient name: _____	Examiner name: _____
Patient ID: _____	Time: _____
Birth date: _____ / _____ / _____ (dd) (mm) (yyyy)	Date: _____ / _____ / _____ (dd) (mm) (yyyy)

<b>Trial 1</b>	<b>Unable</b>	<b>Trial 2</b>	<b>Unable</b>
□ □ rep	□	□ □ rep	□
Chair height: _____ cm			

Orthosis used?	No <input type="checkbox"/>
	Yes <input type="checkbox"/> Specify: _____
Type of shoes worn	Specify: _____
Stopped any trials?	No <input type="checkbox"/>
	Yes <input type="checkbox"/> Specify: _____
Limiting factors?	No <input type="checkbox"/>
	Yes <input type="checkbox"/> Specify: _____
Did any circumstances influence the test?	No <input type="checkbox"/>
	Yes <input type="checkbox"/> Specify: _____
Adverse events?	No <input type="checkbox"/>
	Yes <input type="checkbox"/> Specify: _____

## Nine-Hole Peg Test

**Acronym:** 9HPT

### Description

The 9HPT is a performance-based test assessing upper extremity function, specifically fine dexterity and coordination. The time taken to put in and remove nine pegs in nine holes is recorded.

ICF Code: d4 Mobility; d440 Fine hand use; d445 Hand and arm use

### Equipment

Use commercially available equipment  
(e.g., Rolyan<sup>®</sup> or Jamar<sup>®</sup> 9-Hole Peg Test Kit)  
Stopwatch  
Anti-skid surface (e.g. Dycem<sup>®</sup>)  
Chair/wheelchair  
Table



Make sure to use the same 9HPT equipment at subsequent visits.

### Preparation

#### Participant

- The participant sits on a chair or a wheelchair, feet resting on the ground or footrest, at a table. Height of table and/or chair should be adjusted so that participant's elbow is flexed approximately 90-110 degrees.
- The pegboard is placed in front of the participant approximately 8 cm (3 inches) from the border of the table.
- The participant should wear their usual eyeglasses if necessary.

#### Tester

If a peg falls on the floor or on the table, tell the participant to keep working on the task and retrieve the peg for him/her and put it back in the container. (Or if you have supplementary pegs, take one of those pegs and put in the container). The tester is allowed to stabilize the pegboard if the participant is unable to do so him/herself.

#### Practice

Demonstrate the task and then allow the participant to try to place and remove a few pegs to make sure he/she understands the task (see Administration #2).

### Administration

The administration instructions have been adapted from the NIH Toolbox and the Multiple Sclerosis Functional Composite manual.

1. The pegboard is put on the anti-skid and centered in front of the participant, the container with the pegs on the same side as the hand being tested. The participant's dominant hand is tested first.
2. Give the following instructions:  
*"Pick up the pegs one at a time, using your right (or left) hand only and put them into the holes as quickly as you can in any order until the holes are all filled. Then, without pausing, remove the pegs one at a time and return them to the container as quickly as you can. We will do this test two times*

*with each hand. You can hold the pegboard steady with your other hand. If a peg falls on the floor or the table, keep working on the task and I will retrieve it for you."*

Demonstrate the task and allow the participant to place and remove a few pegs to ensure that they understand the test.

3. Instruct the patient: *"This will be the actual test. The instructions are the same. Work as quickly as you can. Are you ready? Ready, steady, go!"*
4. Start the stopwatch as soon as the participant touches the first peg and stop it when the last peg hits the container. Note time required to complete the trial in seconds (to the nearest tenth of a second).
5. When the participant places the last peg on the board, instruct the participant *"And now remove them all"*. If the participant begins to remove more than one peg at a time, correct him/her by saying *"Pick up one peg at a time"*.
6. Do a second trial with the dominant hand.
7. Place the container on the opposite side of the pegboard and repeat the instructions with the non-dominant hand.
8. Stop the test if the participant cannot complete a trial of the 9HPT within 5 minutes.

### Scoring

The time taken to perform the test is recorded.

### References

1. Mathiowetz V, Weber K, Kashman N, Volland G. Adult norms for the Nine Hole Peg Test of finger dexterity. Occupational Therapy Journal of Research 1985;5:24-38.
2. NIH Toolbox: Administration Instructions.  
<http://www.nihtoolbox.org/HowDoI/HowToAdministerTheToolbox/Administration%20Manualsections/Nine%20Hole%20English%20All%20Ages.pdf>
3. Wang YC, Bohannon RW, Kapellusch J, Garg A, Gershon RC. Dexterity as measured with the 9-Hole Peg Test (9-HPT) across the age span. J Hand Ther 2015;28:53-9; quiz 60.
4. Fischer JS, Jak AJ, Kniker JE, Rudick RA, Cutter G, Multiple Sclerosis Functional Composite: Administration and scoring manual: National Multiple Sclerosis Society, 2001: 44 pp.



## Scoring sheet

### Nine-Hole Peg Test

Patient name: _____	Examiner name: _____
Patient ID: _____	Time: _____
Birth date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>	Date: _____ / _____ / _____ <small>(dd) (mm) (yyyy)</small>

	Trial 1	Unable	Trial 2	Unable
<b>Right hand</b>	<input type="text"/> min <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>	<input type="text"/> min <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>
<b>Left hand</b>	<input type="text"/> min <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>	<input type="text"/> min <input type="text"/> <input type="text"/> . <input type="text"/> s	<input type="checkbox"/>

---

Dominant hand	R	<input type="checkbox"/>
	L	<input type="checkbox"/>
<hr/>		
Stopped any trials?	No	<input type="checkbox"/>
	Yes	<input type="checkbox"/> Specify: _____
<hr/>		
Limiting factors?	No	<input type="checkbox"/>
	Yes	<input type="checkbox"/> Specify: _____
<hr/>		
Did any circumstances influence the test?	No	<input type="checkbox"/>
	Yes	<input type="checkbox"/> Specify: _____

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## Appendix 1

I want you to use this scale when telling me to how strongly you feel your overall perceived exertion (shortness of breath, overall fatigue) is.

The scale goes from “nothing at all” to “extremely strong” (maximal).

First look at the verbal expressions and then choose a number. “Nothing at all” corresponds to 0 and means that you do not feel any exertion (shortness of breath, fatigue) at all. “Extremely strong” (maximal) corresponds to a 10 and indicates the strongest perception of exertion (shortness of breath, overall fatigue) that you have ever experienced. If you feel that your perceived exertion (shortness of breath, overall fatigue) is “very weak”, you chose a 1, if it is moderate you give it a 3, and so on. You can choose any number on the scale, even half values or decimals such as 1.5 and 4.3 etc.

It is very important that you say what you feel, and not what you think you ought to say. Be as frank and honest as possible when you rate and try not to over- or underestimate the intensity of your feeling. Remember to first look at the verbal expressions, base your ratings on these, and then say a number.

### CR-10 Rating Scale

0	<b>Nothing at all</b>
0,5	<b>Extremely weak (just noticeable)</b>
1	<b>Very weak</b>
2	<b>Weak (light)</b>
3	<b>Moderate</b>
4	
5	<b>Strong (heavy)</b>
6	
7	<b>Very strong</b>
8	
9	
10	<b>Extremely strong (“maximal”)</b>