

Service Development and Delivery

The One-Minute Sit to Stand Test Protocol



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The one-minute sit to stand test (1-MSTST) has become the test of choice during the pandemic for measuring exercise capacity, both at in-person and virtual appointments due to the inability to conduct robust six minute or incremental / endurance shuttle walk tests (6MWT/ ISWT/ ESWT). A systematic review of 17 studies¹ concluded that it 'appears to be a practical, reliable, valid, and responsive alternative for measuring exercise capacity, particularly where space and time are limited.' It can easily be conducted in the patient's home or a small clinic room, requires little equipment, is quick to undertake and yields useful information about the patient's physiological response to exercise.

In primary care settings, often a functional walk test is undertaken to gain information indicating a patient may need referral for an ambulatory oxygen therapy assessment, however this type of test has no standardisation and is not reproducible. Crook *et al*² found that if observations in the 1-MSTST are extended to 1 minute post recovery, patients who showed desaturation on their 6MWT also showed desaturation on the 1-MSTST. Whilst larger studies are still required, and the nadir of desaturation does not seem to be as low as on the 6MWT, the 1-MSTST gives a more reliable indication of whether someone is likely to meet the criteria for AOT.

It is important to note that the 1-MSTST is not a replacement for validated field walking tests for the prescription of exercise or AOT, as it is a submaximal test.

The following pages provide information on how to prepare, undertake and record the one minute sit to stand test.

You can also view a one minute sit to stand test being carried out in this short video
<https://vimeo.com/manage/videos/662662918/33fa6b3f55>

References

1. Bohannon RW and Crouch R. 1-Minute sit-to-stand test: systematic review of procedures, performance, and clinimetric properties. *J Cardiopulm Rehabil Prev.* 2019; 39: 2-8.
2. Crook S, Schultz K, Leibert N, Büsching G, Jelusic D, Keusch S, Wittmann M, Schuler M, Radtke T, Turk A. A multicentre validation of the 1-minute sit-to-stand test in COPD patients. *Eur Respir J* 2017; 49: 1601871 [https://doi.org/10.1183/13993003.01871-2016].

One-Minute Sit to Stand Test Protocol

What is it? The one-minute sit to stand test is a validated and reliable field exercise test for quantifying exercise capacity that can be undertaken quickly and in a small space. The one minute sit to stand test is preferable to the 30 seconds test x 5 as it correlates more reliably with the 6 minute walking test and is a more accurate measure of fitness


Why is it done? This test helps with treatment planning by providing a baseline of fitness, information about the participant's response to exercise and about the participant's recovery from exertion and use of dyspnoea coping strategies.

Equipment checklist

- | | |
|---|---|
| <input type="checkbox"/> Standard height chair (45-48cm) - no wheels, straight backed with a hard flat seat and ideally no armrests | <input type="checkbox"/> Means of recording performance e.g. a pen and paper or electronic record |
| <input type="checkbox"/> 2m squared of floor space | <input type="checkbox"/> Test instructions |
| <input type="checkbox"/> Stopwatch or timer | <input type="checkbox"/> Borg dyspnoea scale |
| | <input type="checkbox"/> Pulse oximeter, if available |

Safety The test should not be completed if the participant:

- ✗ Has a health condition which contraindicates exercise of this nature
- ✗ Is feeling more unwell than usual
- ✗ Has new or unusual joint or muscle pain
- ✗ Is abnormally tired or fatigued
- ✗ Has a current or possible infection / exacerbation
- ✗ Feels dizzy, light-headed, unsteady, or nauseous
- ✗ Is under the influence of alcohol or drugs
- ✗ If the environment is too hot or too cold e.g. during a heat wave

The test should be stopped if: 

- The participant experiences any adverse effects, such as chest pain or dizziness
- There are concerns for safety, such as poor balance or poor spatial awareness when sitting
- The patient uses their hands to push up

Some degree of muscle fatigue and dyspnoea is to be expected.

Borg Dyspnoea scale

The Borg Dyspnoea Scale is a tool for measuring breathlessness on exertion. A score of 3 to 5 is considered normal on the scale during exercise.

0	Nothing at all
0.5	Just noticeable (v, v slight)
1	Very slight
2	Slight
3	Moderate
4	Somewhat severe
5	Severe
6	
7	Very severe
8	
9	Very, very severe
10	Maximal

Instructions (for in-person testing)

Equipment set up:

- Stabilise the chair by placing the backrest against a supportive surface (e.g. wall)
- If able, record the chair height



Notes for clinicians

- Start the stopwatch on 'Go'
- Count aloud each full stand
- The score is the number of full stands completed in 1 minute
- Continue to monitor the participant for at least 2 minutes after test completion
- ✗ Do not give encouragement
- ✗ Do not count incomplete stands
- ✓ You may give reminders to stand up fully

Participant instructions:

Starting position: seated upright but forward on the seating surface to ensure:

- Hip and knees flexed to 90 degrees where possible
- Calves well forward of the seat
- Feet placed flat on the floor, shoulder width apart

Participants hands should be on hips, or arms loose by side or crossed over chest

Encourage participant to maintain a gap between their knees during sit to stand cycle if able (note if unable to achieve this)

If the test is being performed pre- and post- treatment or intervention as an outcome measure, use the same (or an identical) chair for standardisation.

Remote testing

If remote testing via telephone or if the test is being conducted by the participant alone remember:

- This method is less accurate as you will be unable to check technique and you rely on their honesty/accuracy for the score
- Risk assess to check whether the participant is safe to undertake the test
- The participant will need to undertake monitoring of their own HR & SpO2 as equipment allows. Equipment should ideally be CE kite marked

Participant's whose resting SpO2 is below 92% should be seen in a supervised clinical setting.



Interpreting the results

Age group (years)	Number of STS repetitions										Men	Women
	p2.5	p25	p50	p75	p97.5							
20-24	27	31	41	39	50	47	57	55	72	70		
25-29	29	30	40	40	48	47	56	54	74	68	p5 2.5th percentile	
30-34	28	27	40	37	47	45	56	51	72	68	p25 25th percentile	
35-39	27	25	38	37	47	42	58	50	72	63	p50 median	
40-44	25	26	37	35	45	41	53	48	69	65	p75 75th percentile	
45-49	25	25	35	35	44	41	52	50	70	63	p95 97.5th percentile	
50-54	24	23	35	33	42	39	53	47	67	60		
55-59	22	21	33	30	41	36	48	43	63	61		
60-64	20	20	31	28	37	34	46	40	63	55		
65-69	20	19	29	27	35	33	44	40	60	53		
70-74	19	17	27	25	32	30	40	36	59	51		
75-79	16	13	25	22	30	27	37	30	56	43		

Age-related reference figures: (Based on 7000 Swiss patients – Strassman, A. et al, 2013). The Minimal Important Clinical Difference (MCID) for the STS is +3 repetitions (Crook, S et al, 2016)

Example of a One minute Sit to Stand test performance record sheet:

Date: _____		Time: _____			
Purpose of test: Practice test / Baseline or pre-intervention test / <u>Post-intervention</u> test / other:					
Location of test: _____		Face to face / Remote			
Height of chair: Low / Medium / High - ___ cm		Does the chair have arms? Yes / No			
Smoked within the last 4 hours? Yes / No		AO2: Yes / No			
AO2: _____ Litres		Continuous / Pulsed			
Delivery Device: _____		Placed on floor / Worn by patient			
Oximetry Probe used: Finger / Earlobe / Both					
Device used: Medical device / Participant's own device					
Practice cycle completed: Yes / No					
Pulse Oximeter	Finger		Ear		Borg Dyspnoea Score
	Time	SpO2	HR	SpO2	
Pre					
Post					
1 min Post					
2 mins Post					
No. of rests:		Time of final stop (if less than 1 min)	Secs	Recovery time to baseline SpO2:	
Upper Limb position used:	Arms crossed <input type="checkbox"/>	Hands on hips <input type="checkbox"/>	Hands loose at sides <input type="checkbox"/>	Total number completed:	
Limiting factor:					
SOB Low SpO2 Leg <u>fatigue</u> Joint pain					
Other:					
Reason for stopping test (if applicable):					
Coping strategies used:					
Additional Comments:					