XPRIZE Healthspan

5 Times Sit-to-Stand (5x STS) Test — Clinical Toolkit

Executive Overview · Site Testing Protocol · Data Recording Sheet

1. Executive Overview

The 5 Times Sit-to-Stand test (5x STS) asks a participant to rise fully to standing from a seated position five times as quickly as possible, with arms folded across the chest. Time to complete five stands (rounded to the nearest 0.1 second) is the test's primary outcome and the **primary judging measure** for the XPRIZE Healthspan Competition. This toolkit follows the 5x STS specifically as it is scripted and scored within the National Institute on Aging's Short Physical Performance Battery (SPPB)- the version of the test most widely used in aging and multi-site clinical trials. The SPPB chair-stand test was formalized by Guralnik et al. (1994) and has since been validated across community-dwelling older adults and a broad range of clinical populations.

Sources: Guralnik, J. M., Simonsick, E. M., Ferrucci, L., Glynn, R. J., Berkman, L. F., Blazer, D. G., ... & Wallace, R. B. (1994). A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. J Gerontology, 49(2), M85-94.

2. Site Testing Protocol

Equipment

- Straight-backed, armless chair with a flat, firm seat and seat height of 45 cm, placed on a nonslip surface with the back of the chair against a wall for stability. Chairs that fold, are deep, have thick cushions, or are on wheels should not be used.
- Standard stopwatch (never a cell-phone timer), record time to the nearest 0.1 second.
- Clipboard with the data recording sheet (Section 3)

Use the same chair and stopwatch for every visit with a given participant. Conduct testing at approximately the same time of day, when feasible, and use the same examiner whenever possible.

Pre-test screening

Do not conduct the test if:

- The participant reports that they do not feel safe attempting the test.
- The examiner determines that attempting the test would be unsafe.

If the participant cannot perform the test according to the standardized procedure, do not modify the procedure; record the test as not completed and document the reason.

Procedure

Confirm that the 5x STS test is performed **before** other muscle power testing, if relevant. During the test, to ensure safety, stand in front of the participant and be prepared to catch them if they fall forward. However, do not stand so close that the participant feels crowded and slows their pace during the chair stand test.

Step 1- Single Chair Stand Test (safety gate). This step decides whether the timed 5-repetition trial should be attempted at all.

- Ask the participant, "*Do you think it would be safe for you to try to stand up from a chair without using your arms?*" If the participant answers "*No,*" do not attempt the Single Chair Stand test; record the reason.
- Read the standardized instructions verbatim and demonstrate the test. For efficiency, two chairs may be used so the examiner can demonstrate the test while the participant remains seated and observes.

- "*First, fold your arms across your chest and sit so that your feet are flat on the floor; then stand up keeping your arms folded across your chest. Please stand up keeping your arms folded across your chest."*

- If the participant cannot rise without using their arms, say, "*Okay, try to stand up using your arms.*" This ends the test — record whether the participant was able to stand using their arms. Do not proceed to Step 2.
- If the participant reaches full standing successfully without using their arms, proceed to Step 2. If the participant is unable to complete the chair stand correctly (e.g., is not coming to a full stand), abort the procedure, repeat the demonstration, wait 1 minute, and begin the Single Chair Stand test again. Only one restart is permitted. If the participant is still unable to complete the chair stand correctly, end the test and record the reason for stopping.

Step 2- Repeated Chair Stand Test (timed, 5 stands, repeated twice)

- Ask the participant, "*Do you think it would be safe for you to try to stand up from a chair five times without using your arms?*" If the participant says "*No,*" do not attempt the test; record the reason.
- Read the standardized instructions verbatim and demonstrate the test.
  - "*When I say, "Stand", please stand up straight as QUICKLY as you can five times without stopping in between. After standing up each time, sit all the way down and then stand up again. Keep your arms folded across your chest. On the fifth repetition, remain standing. I'll be timing you with a stopwatch.*"
- Confirm that the participant is seated upright in the middle of the chair, feet flat on the floor and roughly shoulder-width apart, arms crossed over the chest with hands on opposite shoulders. When the participant is properly seated, say, "*Ready? Stand*" and start the stopwatch.
- Count out loud as the participant completes each correct stand, up to five times. A correct stand is when the participant reaches full standing from a fully seated position.
- Do not provide physical assistance, coaching or encouragement during the test. If the participant does not stand fully upright or return to a fully seated position, provide an appropriate, standardized reminder ("*Remember to stand all the way up*" or "*Remember to sit all the way down*") and exclude that stand from the count. Do not stop the timer.
- Stop the stopwatch when the participant has straightened up completely for the fifth time. Squats and chair taps are not allowed.
- If the participant pauses and appears fatigued before completing the five stands, confirm before stopping the test by asking "*Can you continue?*" Do not stop the stopwatch. If the participant says "Yes," continue timing. If the participant says "*No,*" stop the test and record the reason.
- Record the time to complete five stands to the nearest 0.1 second. Only enter a time if all 5 stands were completed correctly without arm use, within 60 seconds.

Stop Rules

Stop the test immediately, regardless of elapsed time, if the participant declines to continue, uses their arms to stand up, if 1-minute elapses without the participant completing all 5 stands, or if the examiner judges it unsafe to continue. Attend to the participant until stable, and record the time stopped and reasons for early termination.

Re-test Schedule

The Repeated Chair Stand Test should be administered twice for each participant at each visit, approximately 30 minutes apart.

After the Test

- Move the participant to a chair and offer water.
- Record any symptoms experienced during or after the test
- Complete the source document fully and accurately.

What to record

For each timed test: time to complete 5 stands, recorded to the nearest 0.1 seconds (only if completed without arms within 60 seconds).

3. Data Recording Sheet (Paper Source Document)

Complete in ink at the time of testing. Transcribe into the XPRIZE Healthspan Database according to the site SOP. Complete one form per visit.

Participant ID #1 (Subject ID)		**Participant ID #2**	
Site / Clinic ID		**Visit / Timepoint**	
Date of Test (DD-MMM-YYYY)		**Examiner Initials**	

Pre-test screening

Item	Response
Any reason the test should not be attempted?	☐ Yes — DO NOT TEST ☐ No — Proceed to Single-Chair-Stand Test → If yes, reason(s) test was not conducted (Select all that apply). ☐ The participant reported that they did not feel safe attempting the test ☐ The examiner determined that attempting the test would be unsafe ☐ Other
Single-chair-stand safety test: Participant stood without using arms?	☐ Yes — Proceed to Repeated-Chair-Stand Test ☐ No → END TEST → If no, reason(s) for stopping the test (Select all that apply) ☐ Participant could not stand up unassisted (e.g., unable to stand even with using arms) ☐ Participant unable to understand instructions ☐ Other (specify) _____

Minimal inputs required to score the test

Field	Value Test 1	Value Test 2 (~30 minutes after Test 1)
Chair seat height	____ cm	____ cm *(Record only if different from test 1)*
Did the participant complete all 5 correct stands without using arms within 60 seconds?	☐ No ☐ Yes → If yes: Completion time (to the nearest 0.1 second): ___. ___s Number of incorrect stands: ____	☐ No ☐ Yes → If yes: Completion time (to the nearest 0.1 second): ___. ___s Number of incorrect stands: ____

If not completed: reason(s) for stopping (select all that apply)	☐ Not attempted, examiner felt unsafe ☐ Not attempted, participant felt unsafe ☐ Participant tried, but unable (e.g., unable to complete 5 correct stands within 1 minute) ☐ Participant could not stand up unassisted (e.g., unable to stand without using arms) ☐ Participant unable to understand instructions ☐ Participant refused ☐ Other (specify) _____	☐ Not attempted, examiner felt unsafe ☐ Not attempted, participant felt unsafe ☐ Participant tried, but unable (e.g., unable to complete 5 correct stands within 1 minute) ☐ Participant could not stand up unassisted (e.g., unable to stand without using arms) ☐ Participant unable to understand instructions ☐ Participant refused ☐ Other (specify) _____

Adverse Events during or after the test

Symptom	Y / N	Symptom	Y / N
Chest pain	☐ Y ☐ N	Shortness of breath	☐ Y ☐ N
Feeling faint or dizzy	☐ Y ☐ N	Loss of balance	☐ Y ☐ N

Notes:

Clinical Protocol Acceptance Page

XPRIZE Healthspan

Clinical Protocol Title: 5 Times Sit-to-Stand (5x STS)

Version Number and Date: v1 13Oct2026

This document will be available on a publicly accessible website. SAB members, finalist teams, and their participating sites will be provided with the URL to access the document during the XPRIZE Healthspan competition. No account or login will be required.

*By signing below, I confirm that I have reviewed and **approved** this protocol from a scientific perspective for use by the finalist teams to collect participant data for XPRIZE Healthspan competition judging.*

XPRIZE Healthspan Leadership Approval

Jamie Justice, PhD. Executive VP of XPRIZE Health Domain

_____

Name, Credentials, Role ***eSignature & Date***

*By signing below, I confirm that I have reviewed and **endorsed** this protocol from a scientific perspective for use by the finalist teams to collect participant data for XPRIZE Healthspan competition judging.*

Utah Data Coordinating Center Endorsement

Alayne Markland, DO, MSc, Executive Director, Center of Aging

_____

Name, Credentials, Role ***eSignature & Date***

Huong Meeks, PhD, MStat, MPH, Assistant Professor

_____

Name, Credentials, Role ***eSignature & Date***