

PERFORMANCE-BASED TESTS FOR LOWER LIMB MUSCULOSKELETAL PAIN

User manual for telehealth assessment



Produced by the Centre for Health, Exercise and
Sports Medicine, The University of Melbourne

TABLE OF CONTENTS

Setting up before each telehealth session	1
30 second chair stand test	3
Stair climb test	5
Timed up and go test	7
Step test	9
Timed single-leg stance test	11
Calf raise test	13

SETTING UP BEFORE EACH TELEHEALTH SESSION

Setup instructions for clinicians:



Ensure your computer is connected to Wi-Fi, with the chosen telehealth software installed and functioning correctly.



Try to make sure the room you are in is quiet so you and the participant can hear each other.



Make sure bright light sources (e.g. window, lamps) are behind your webcam, not behind you. This will mean you can be seen easily.



Setup instructions for patients:

Things you will need to have prepared before your telehealth session:



A videoconferencing device (laptop computer is preferable, or otherwise a tablet - if no laptop or tablet, a smart phone is ok) that is fully-charged, connected to Wi-Fi, and with the telehealth software installed and functioning correctly.



Comfortable footwear (e.g. tennis shoes/cross trainers).



A straight back chair with a seat height of 40-51cm, preferably with arms and **MUST HAVE NO WHEELS.**



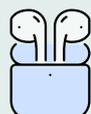
Tape measure (ideally at least 3 metres long, otherwise at least 1 meter).



One cone/marker (e.g. filled water bottle, plastic cup or bowl turned upside down).



Sticky/duct tape or pieces of rope/ribbon.



Wireless earphones if you have them (not essential).

Ideally, you will need to have identified the following spaces in your home to be used as testing areas:



4m length of clear space for walking (an indoor area (e.g. hallway) is preferable).



One step (e.g. bottom of staircase, flat sturdy wooden box, edge of deck, small portable step).

At the time of your telehealth session:



Wear comfortable clothes that you can move easily in.



Make sure testing areas are well-lit and free from clutter, and that any pets won't get in the way.



Try to make sure the testing areas are quiet so you and your clinician can hear each other.



Ensure there is space to position your laptop/tablet/phone so the clinician can see you perform the test.

30 SECOND CHAIR STAND TEST



Purpose

A test of lower body strength and dynamic balance.



Brief description

The maximum number of chair stand repetitions possible in a 30 second period.



Equipment

- Clinician has timer/stop watch.
- Participant has a straight back chair with approximately a 40-51cm seat height and no wheels. If the chair has arms, instruct patient that the chair arms cannot be used. The same chair should be used for re-testing.



Preparation

Environment

- Ensure the chair cannot slide backwards by placing the back of the chair against a wall (if possible, or ask a family member to stabilise the chair from the back).

Camera & audio

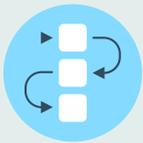
- Participant to position their device so that it faces side-on to the chair.
- Ensure the clinician can see the participant sitting in the chair, and when the participant is standing fully erect out of the chair. Ask the patient to stand up and sit down to check view.
- Check the participant can hear the clinician clearly.

Participant

- Should wear comfortable walking footwear (e.g. tennis shoes/cross trainers).
- If the participant normally uses an assistive device to stand up out of a chair, they should use the assistive device for this test.

Clinician

- If safety is of concern, the clinician should ensure someone else stands close to the side of the chair for safety.



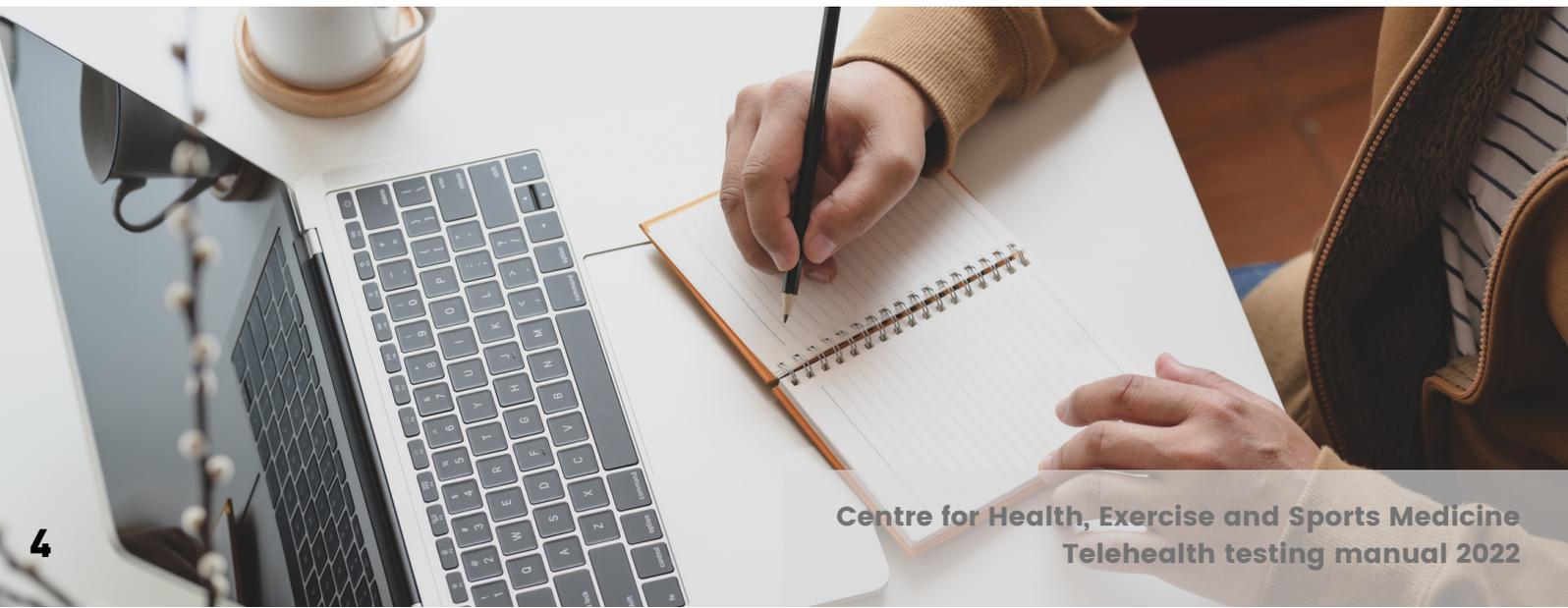
Procedure

- The participant sits in the chair in a position that allows them to place their feet flat on the floor, shoulder width apart, with knees flexed slightly more than 90 degrees so that their heels are somewhat closer to the chair than the back of their knees.
- Their arms are crossed at the wrists and held across the chest.
- From the sitting position, the participant stands up completely so hips and knees are fully extended, then completely back down, so that their bottom fully touches the seat.
- Repeat for 30 seconds, with clinician timing.
- Use of upper limbs should be recorded.



Verbal instructions

- “For this test, do the best you can by going as fast as you can but don’t push yourself to a point of overexertion or beyond what you think is safe for you.
- Place your hands on the opposite shoulder so that your arms are crossed at the wrists and held close across your chest. Keep your arms in this position for the test, do not use the armrests.
- Keep your feet flat on the floor and at shoulder width apart.
- On the signal to begin, stand up to a full stand position and then sit back down again so as your bottom fully touches the seat.
- Keep going for 30 seconds and until I say stop. I will count the total number of chair stands (up and down equals one stand). If a full stand has been completed at 30 seconds (i.e. standing fully erect or on the way down to the sitting position), then this final stand is counted in the total. You can stop and rest if you become tired – the timer keeps going.
- Practice with one or two slow paced repetitions before starting.
- -Get ready and START”.



STAIR CLIMB TEST



Purpose

A test of lower body strength and balance.



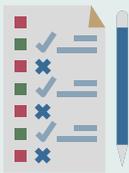
Brief description

The time it takes to ascend and descend a flight of at least 4 stairs/steps, converted to seconds/step.



Equipment

- Clinician has timer/stop watch.
- Flight of stairs (minimum of 4 steps in a straight line) at participant's location. The same stairs should be used for re-testing.



Preparation

Environment

- Any available flight of stairs, with a minimum of 4 steps in the flight. Spiral stairs should not be used. If they have at least 4 steps in a straight line to another landing then that section of staircase is ok to use.
- Ensure adequate lighting and free from traffic and external distractions.

Camera & audio

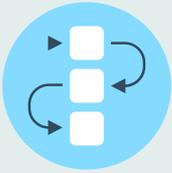
- Participant to position their device so that it faces up the flight of stairs.
- Ensure the clinician can see the participants feet at ground landing.
- Turn the volume on the laptop/tablet/smartphone to full (or use wireless earbuds) to ensure the participant can hear the clinician during the test.

Participant

- Comfortable walking footwear (e.g. tennis shoes/cross trainers) should be worn.
- If the participant normally uses an assistive device to climb stairs, they should use the assistive device for this test.

Clinician

- If safety is of concern, the clinician should ensure someone else is with the participant to guard behind/below them going up the stairs and ahead/to the side coming down the stairs. Otherwise the test should not be performed.



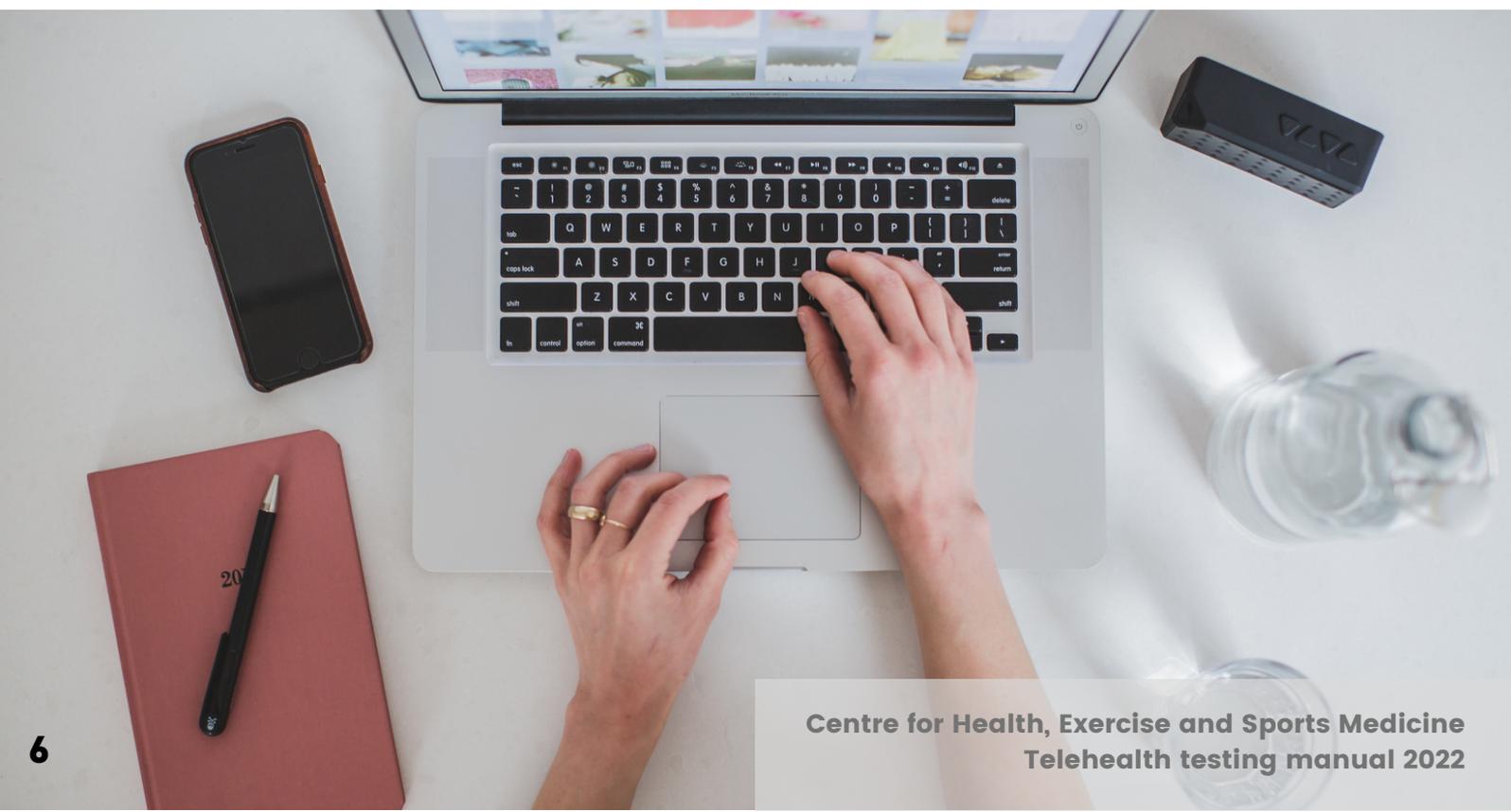
Procedure

- Ascend and descend the flight of stairs as quickly as possible but in a safe manner.
- Use of a handrail and/or walking aid is permitted if needed. Use of these should be recorded.



Verbal instructions

- “For this test, do the best you can by going as fast as you can but don’t push yourself to a point of overexertion or beyond what you think is safe for you.
- Start with both feet on the bottom landing.
- On start, go to the top of the stairs as fast but as safe as you can, turn around and return back down and stop with both feet back on the ground landing. Reciprocal stair climbing is ok (no need for both feet to touch each step).
- Use the rail only if needed.
- You can stop and rest if needed but the time keeps going.
- Timing begins on the signal to go and stops when you return with both feet to the ground level of the stairs. I will need you to say “stop” loudly when both of your feet reach the bottom of the stairs, as I have a limited view over video.
- Have a practice trial before the test.
- Get ready and START”.



TIMED UP AND GO TEST



Purpose

A test incorporating multiple activity activities including sit-to-stand activity, walking short distances, and changing direction during walking.



Brief description

Time (seconds) taken to rise from a chair, walk 3m, turn, walk back to the chair, then sit down.



Equipment

- Clinician has timer/stop watch.
- Participant has standard chair with arm rests and no wheels: seat height approximately 40-51 cm. The same chair should be used for re-testing.
- Participant has tape measure.
- Participant has cone/marker (e.g. items such as filled water bottle, plastic cup or bowl turned upside down) on the floor 3m away from the chair.



Preparation

Environment

- Participant to place the chair against a wall to ensure it cannot slide backwards. If no wall available, as the assistant/helper to stand behind the chair and stabilise it.
- Participant to measure and place cone/marker on the floor 3m away from the chair so that it is easily seen and with enough room to turn safely.

Camera & audio

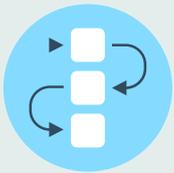
- Participant to position the device so that, ideally, the clinician can see their back leave/return to touch the back of the chair and see them walk around the cone 3m away. If this is not possible, the device should be set up to focus on the chair.
- Ensure the clinician can see the chair and walkway.

Participant

- Comfortable walking footwear (e.g. tennis shoes/cross trainers) should be worn.
- If the participant normally uses an assistive device to get up and out of a chair to walk, they should use the assistive device for this test.

Clinician

- If safety is of concern, an additional person should be asked to stand to the side of the chair, then follow the participant to guard slightly behind and to one side but not as to pace or impeded turn.



Procedure

- The participant sits in the chair with their back resting on the back of the chair and hands on armrests.
- May use usual walking aid but may not be assisted by another person.
- Participant stands up, walks to a mark 3m away, turn around and return to sit back in the chair at their regular pace.
- Timing starts on the signal to start and terminates once the participant sits back down fully with their back resting on the back of the chair.
- Regular walking aid is allowed and recorded.



Verbal instructions

- “For this test, do the best you can and walk at your regular pace.
- Start by sitting in the chair with your back resting on the back rest and your hands on the arm rest.
- On start, stand up, walk to the mark, turn around, return and sit back into the chair with your back resting on the back of the chair.
- Walk at your regular pace.
- I will start the timer on the signal and stop it once you’ve sat back down fully with your back resting on the back of the chair. When you have sat back down and your back is against the back of the chair, shout out STOP loudly in case I don’t have a good view.
- Practice with one or two slow paced repetitions.
- Get ready and START”.
- Perform 2 trials (allowing for rest in between). The faster of the two is used for analysis.



STEP TEST



Purpose

A test of dynamic balance and movement while in single-leg stance.



Brief description

The maximum number of times each foot can be stepped up onto a step and back down in a 15 second period.



Equipment

- Clinician has timer/stop watch.
- Participant has step (e.g. bottom of stair, wooden box, small portable step) with a height of approximately 12-23cm. The same step should be used for re-testing.



Preparation

Environment

- Ensure the step is located near a support for balance if needed (e.g. stair rail or back of chair or wall).
- 5cm wide cardboard/paper placed at bottom of step to mark position of toe.
- If the participant is using an outdoor area, the test should not be completed in wet weather.

Camera & audio

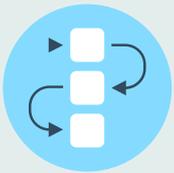
- Participant to position their device side-on to the step.
- Ensure the clinician can see the step and the ground where the stance leg is positioned.

Participant

- Should be barefoot.

Clinician

- If safety is of concern, an additional person should be asked to stand to the side of the step or the test should not be performed.



Procedure

- The participant stands at the bottom of the step with both feet on the ground. The toes should be 5cm from the base of the step (marked using the piece of paper/cardboard).
- The arms are relaxed unsupported next to the body.
- The affected/test leg grounded remains grounded while the opposite leg is stepped up onto the step and back down as fast as possible. The whole foot must touch the step, and back down on the ground flat.
- This is repeated for 15 seconds.
- The test should be performed twice- once whilst standing on the left leg, and stepping with the right, and once whilst standing on the right leg and stepping with the left.
- The same step should be used for all re-testing within site.
- If the participant cannot stand unsupported they are given a score of 0.



Verbal instructions

- “For this test, do the best you can by going as fast as you can but don’t push yourself to a point of overexertion or beyond what you think is safe for you.
- Stand with both feet on the ground, approx. 5cm away from the bottom of the step. Do not hold onto the stair rail.
- Keep your [left/right] leg on the ground, and step/lift the other leg up onto the step so that your foot is flat on the step, whilst remaining standing on the other leg, then lift your foot off the step and place it back flat on the ground. That is one repetition.
- Complete as many repetitions as possible in 15 seconds. I will time you and count the number of repetitions.
- Make sure your entire foot touches the top of the step, your heel shouldn’t be hanging over the back edge of the step. The same back down on the ground – make sure your entire foot is flat on the ground.
- You can stop and rest if you become tired, but the timer keeps going.
- Practice with one or two slow paced repetitions before starting.
- Get ready and START”.
- Allow for at least 1-minute rest, then switch legs and REPEAT the test.



TIMED SINGLE-LEG STANCE TEST



Purpose

A test of dynamic single-leg balance.



Brief description

Time standing on each leg for as long as possible. *NOTE: data suggests that test performance on the left limb is less reliable than the right*



Equipment

- Clinician has timer/stop watch.
- Participant has flat area of floor. The same floor space should be used for re-testing.



Preparation

Environment

- Ensure the flat area of floor is located near a support for balance if needed (e.g. stair rail or back of chair or wall).

Camera & audio

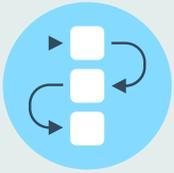
- Participant to position their device front-on to where they will be standing.
- Ensure the clinician can see the floor and the participant's hands on their hips, so they know when to stop the test.

Participant

- Should wear comfortable walking footwear (e.g. tennis shoes/cross trainers).

Clinician

- If safety is of concern, an additional person should be asked to stand to the side of the participant or the test should not be performed.



Procedure

- The participant stands with both feet on the floor near a support.
- Hands should be placed on the hips.
- From a standing position, the participant lifts one leg off the ground and balances for as long as they can or for a maximum of 30 seconds.
- The timer is started when the foot leaves the ground and stopped when the foot touches the ground again or when the hands leave the hips.
- The test should be performed twice- once whilst standing on each leg.



Verbal instructions

- “For this test, do the best you can by balancing for as long as you can but don’t push yourself beyond what you think is safe for you.
- On the signal to begin, lift one foot off the ground and balance on the other leg. Place your hands on your hips.
- Keep balancing for as long as you can, or for a maximum of 30 seconds when I will say stop.
- Practice with one or two slow paced repetitions to start.
- Get ready and START”.
- Allow for at least 1-minute rest, then switch legs and REPEAT the test.



CALF RAISE TEST



Purpose

A test of lower leg strength.



Brief description

Maximum number of heel to toe raises from the floor on i) both feet and on ii) each single leg, over 30 seconds.



Equipment

- Clinician has timer/stop watch.
- Participant has flat area of floor next to a wall for finger-tip balance support. The same floor space should be used for re-testing.



Preparation

Environment

- Flat area of floor beside a wall (to be used for balance support).

Camera & audio

- Participant to position their device side-on to where they will be standing.
- Ensure the clinician can see both feet on the floor.
- Ask participant to raise up onto the toes and back down to floor to ensure clinician has full view of a complete heel to toe raise before commencing.
- Ensure participant can hear the clinician clearly.

Participant

- Should be barefoot.

Clinician

- If safety is of concern, an additional person should be asked to stand to the side of the participant to guard, but not to impede performance.



Procedure

- Participant stands on floor facing the wall with feet spaced comfortably apart. For balance support, participants should place their fingers on the wall at shoulder height, with elbows slightly flexed, but should not pull themselves up or lean their body weight onto the wall.
- Participant is asked to raise heel(s) up on to toes from the floor on both/one feet/foot. Ensure that the participant reaches full extension with each rep.
- Participants should avoid bending/straightening their knees to help them.
- The participant completes as many raises as possible in 30 seconds.
- The test should then be repeated while standing on one leg (both sides).



Verbal instructions

- “For this test, do the best you can to complete as many calf raises as possible in 30 seconds or until you are unable to do anymore, but don’t push yourself beyond what you think is safe for you.
- Start standing facing the wall with both feet flat on the floor comfortably spaced apart.
- Place your fingers on the wall at shoulder height, with your elbows slightly bent, but don’t use the wall to help push yourself up or lean your weight on.
- On start, lift your heels off the ground as high as you can. Keep your knees and hips straight.
- Lower yourself back down onto your heels so both feet are back on the ground again. This is one rep. Do as many as you can in 30 seconds, as quickly as possible.
- Practice with one or two slow paced repetitions to start.
- Get ready and **START**”.
- Then switch to single leg raise and **REPEAT** the test on the left and right sides. Allow for at least 1-minute rest between tests.



ACKNOWLEDGEMENTS

This manual was produced by researchers from the Centre for Health, Exercise and Sports Medicine at The University of Melbourne, including:

- Dr Belinda Lawford
- Professor Rana Hinman
- Associate Professor Fiona Dobson
- Professor Kim Bennell
- Dr Mark Merolli
- Ms Bridget Graham
- Mr Travis Haber
- Dr Samantha Teo
- Mr Dave Mackenzie

Contact

Dr Belinda Lawford

Level 7 Alan Gilbert Building

161 Barry Street

The University of Melbourne, VIC 3010, Australia

<https://healthsciences.unimelb.edu.au/departments/physiotherapy/chesm>

belinda.lawford@unimelb.edu.au

@CHESM_unimelb