

The NIHR Southampton Biomedical Research Centre (BRC) has a tight quality assurance system for the writing, reviewing and updating of Standard Operating Procedures. As such, version-controlled and QA authorised Standard Operating Procedures are internal to the BRC.

The Standard Operating Procedure from which information in this document has been extracted, is a version controlled document, managed within a Quality Management System. However, extracts that document the technical aspects can be made more widely available. Standard Operating Procedures are more than a set of detailed instructions; they also provide a necessary record of their origination, amendment and usage within the setting in which they are used. They are an important component of any Quality Assurance Framework, but in themselves are insufficient and need to be used and interpreted with care.

Alongside the extracts from our Standard Operating Procedures, we have also made available here an example Standard Operating Procedure and a word version of a Standard Operating Procedure template. Using the example and the Standard Operating Procedure template, institutions can generate their own Standard Operating Procedures and customise them, in line with their own institutions.

Simply offering a list of instructions to follow does not assure that the user is able to generate a value that is either accurate or precise so here in the BRC we require that Standard Operating Procedures are accompanied by face-to-face training. This is provided by someone with a qualification in the area or by someone with extensive experience in making the measurements. Training is followed by a short competency assessment and performance is monitored and maintained using annual refresher sessions. If you require any extra information, clarification or are interested in attending a training session, please contact Dr Kesta Durkin (k.i.durkin@soton.ac.uk).

This document has been prepared from Version 2 of the BRC Standard Operating Procedure for using the JAMAR hydraulic hand dynamometer to measure grip strength. It was last reviewed in May 2014 and the next review date is set for May 2016. The version number only changes if any amendments are made when the document is reviewed.

**NIHR Southampton
Biomedical Research Centre**

**Procedure for Measuring
HAND GRIP STRENGTH USING
THE JAMAR DYNAMOMETER**

BACKGROUND

This procedure is to be used for measuring handgrip strength. Grip strength has been shown in previous studies to be a predictor of current and future health.

PURPOSE

To ensure correct and uniform measurement of handgrip strength.

SCOPE

This procedure applies to any study requiring measurements of handgrip strength, within the BRC

RESPONSIBILITIES

It is the responsibility of the measurer to use this procedure when measuring handgrip strength. It is the responsibility of the principal investigator to ensure that staff members who are working on specific studies have adequate experience to do so.

PROCEDURE

Measurements are made using the Jamar Hand Dynamometer (figure 1).



Figure 1. Jamar Hand Dynamometer

The dynamometer has a dual scale readout which displays isometric grip force from 0-90 kg (0-200 lb). The outer dial registers the result in kg and the inner dial registers the result in lb. It has a peak hold needle which automatically retains the highest reading until the device is reset. The handle easily adjusts to five grip positions from 35-87 mm (1½ - 3¼") in 13 mm (½") increments. Always use the wrist strap to prevent the dynamometer from falling on the floor if accidentally dropped.

The checks below are carried out on SCBR dynamometers quarterly, to ensure that the instruments are measuring accurately. These suggestions for the Jamar dynamometer are made by the manufacturer in the owner's manual (https://www.homecraft-7rolyan.com/catalog/pdf/3_User%20Instruction.pdf):

- **To check the posts:** Remove the adjustable handle. Check that each post moves freely in its guide (the plastic section where the posts attach to the main unit). There should be a little bit of movement and the posts should wiggle slightly; they should be loose in their guides, even when you put pressure on the sides of the post.
- **To check the hydraulics:** Remove the adjustable handle. Whilst watching the top post, push the bottom post inwards. When you do this, the top post will move in the opposite direction. Then repeat on the other side, i.e., whilst watching the bottom post, push the top post inwards and the bottom post will move in the opposite direction. Normally both posts should travel approximately 1/8 inch (3mm), with top and bottom posts travelling in opposite directions. Travel less than 1/16 inch (1.5mm) means that the device requires servicing as it indicates a leak in the hydraulics system. You can measure this by holding a ruler by the guide whilst pushing on the opposite post and/or by enlisting the help of another researcher.
- **To check the handle:** Grasp the instrument normally and carefully look at the way the forks of the adjustable handle are supported on the posts. Each fork should touch the post approximately at its mid-point. If not, the instrument should be returned for adjustment.
- **To check the peak-hold (red) needle:** Turn the peak hold knob (figure 2) counter-clockwise and check the peak-hold and gauge needle move without

any excessive friction. If the peak-hold needle is not in-line with the gauge needle when it is set back to zero and/or if there feels to be excessive friction when doing so, then you should return the instrument for servicing.

- **Annual Greasing.** About once a year, place a small amount of grease on the two guides. If excessive friction exists between the post and guide, return the dynamometer for servicing.

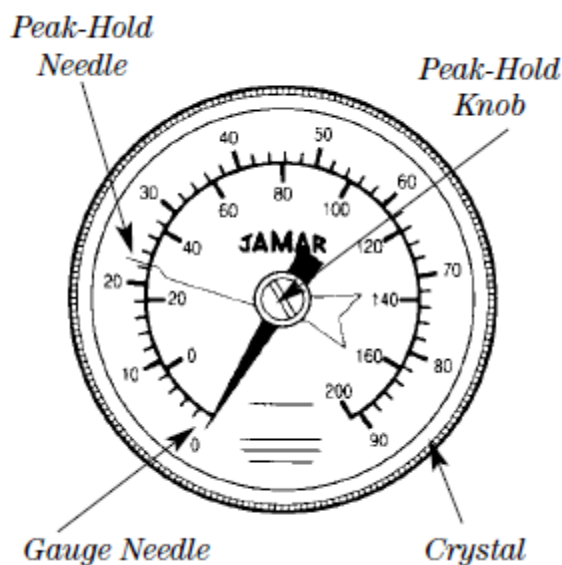


Figure 2. The dynamometer dial.

If the peak-hold needle is knocked off its support pin it can readily be repositioned. Unscrew the see-through crystal cover (figure 2) and turn it upside down. Locate the brass pin in the centre of the crystal (part of the chrome knob on the outside of the crystal). Locate the slot on the brass pin and place the peak-hold needle into this slot.

Calibration

The Jamar Hand Dynamometer calibration procedure is carried out off-site. The frequency of external calibrations will be specific to each study so make sure you are aware of when the external calibrations are due and ensure that, if required, there is another device available for use during the period of time when yours is off-site.

If well cared for, the device should only need to be calibrated annually. A six monthly calibration is recommended by the manufacturers if the device is subjected to vibrations on a frequent basis, e.g. carried around in a car. If the instrument has been dropped or there is any reason to suspect that the calibration is erroneous, the instrument should be sent for servicing.

To arrange for the device to be calibrated contact:

Certain Indexes Limited
4 Park Road, Sileby,
Loughborough,
Leics. LE12 7TJ, UK

Tel. (44) 01509 814790
Fax. (44) 01509 817701

Document the serial number of the dynamometer you are using.

1. Wash your hands and explain the procedure to the participant.
2. Ensure that the dynamometer is cleaned before use.
3. Ask the participant to remove their shoes and also any watches and/or bracelets.
4. Record the participant's hand dominance.
5. Demonstrate how to hold the dynamometer to the participant by testing it on yourself and explain how the dial registers the best result by squeezing as tightly as possible.
6. Sit them comfortably in a chair with a back support and fixed arm rests.
7. Use the same style of chair (low backed, with fixed arm rests) for every measurement.
8. Ask the participant to rest their forearms on the arms of the chair and keep their feet flat on the floor. You should ask the participant to roll their trousers/jeans up in order to ensure their feet are flat on the floor and do not rise from the floor when squeezing the dynamometer.
9. Their wrists should be just over the end of the chair's arm, thumb facing upwards.
10. Ask them to position their thumb round one side and their fingers around the other side of the handle. When they are holding the dynamometer in the correct position their fingers and thumb should be visible on the same side of the apparatus (figure 1).
11. Check with them that the instrument feels comfortable in their hand. The position of the handle can be adjusted if necessary for different sized hands. You will notice whether the handle needs altering based on the distance of the four fingers from the palm of the hand. If the finger nails are digging in to the palm, it will be uncomfortable for the participant and means that the handle needs moving further away from the mechanism. If it looks as though the fingers are not close enough to the palm and it feels to the participant as though their hand may slip off the handle when squeezing, it suggests that the handle needs to be adjusted to bring it closer to the mechanism.
12. Inform them that it will feel as if there was no resistance.
13. Ensure the red needle is in the "0" position by turning the dial.

14. Start with the right hand and then repeat the measurement with the left hand.
15. The measurer should support the weight of the dynamometer by resting it on their palm while the subject holds the dynamometer but they should not be restricting the movement of the device.
16. Encourage squeezing as long and as tightly as possible for the best result until the needle stops rising. Use a standard squeezing phrase "Squeeze.....harder, harder...and stop squeezing"
17. When the needle stops rising read the measurement (in kg) from the dial and record the result to the nearest 1kg. The outside dial registers the result in kg and the inner dial in lb.
18. Disregard and repeat the test if the participant's arm rises above the arm of the chair, or if their feet lift off the floor during the measurement.
19. Record three measurements for each hand, alternating sides.
20. Thank the participant.