

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.l.durkin@soton.ac.uk).

This document has been prepared from Version 3 of the BRC Standard Operating Procedure for making circumference measurements of adults. It was last reviewed in October 2015 and the next review date is set for October 2017. The version number only changes if any amendments are made when the document is reviewed.

NIHR Southampton Biomedical Research Centre

Procedure for Measuring ADULT CIRCUMFERENCES

BACKGROUND

This procedure is to be used for making circumference measurements of adults.

PURPOSE

To ensure correct and uniform measurements of adult circumferences.

SCOPE

This procedure applies to any study that requires taking circumference measurements of adults, within the BRC.

RESPONSIBILITIES

It is the responsibility of the measurer to use this procedure when making circumference measurements of adults. It is the responsibility of the study Principal Investigator to ensure that staff members who are working on specific studies have adequate experience to do so.

PROCEDURE

Metal tapes are the best to use for making anthropometric circumference measurements.

Adult Maximal Calf Circumference

1. Where possible, make measurements on the non-dominant side.
2. Perform this measurement in the same way for both males and females.
3. Wash your hands and explain the procedure to the participant.
4. It is always preferable for circumference measurements to be made on bare skin. However, if this is not possible, it can be measured over a thin layer of

clothing such as tights, leggings or thin trousers. If trousers can be rolled up, this should be done, as long as it does not compress the area where you measure. The measurement must **not** be made over jeans.

5. Ask the volunteer to stand with his/her feet about 25cm apart in a relaxed position, with their weight evenly distributed on both feet.
6. Place the tape around the calf at the widest part and ensure that the tape is horizontal around the calf. The tape should rest on the skin but not indent it.
7. Move the tape up and down to locate the maximum circumference.
8. Make 3 measurements of calf circumference.
9. Measure to the nearest 0.1cm and beware of digit preference.
10. Record all three measurements and the mean, by adding the values together and dividing by three.

Adult Mid Thigh Circumference

1. Where possible, make measurements on the non-dominant side.
2. Perform this measurement in the same way for both males and females.
3. It is always preferable for circumference measurements to be made on bare skin. However, if this is not possible, it can be measured over a thin layer of clothing such as tights, leggings or thin trousers. The measurement must **not** be made over jeans.
4. Wash your hands and explain the procedure to the volunteer.
5. Ask the participant to stand in a relaxed position with their weight evenly distributed on both feet.
6. Begin by identifying and recording the length of the femur:
 - a. Palpate for the anterior superior iliac spine (ASIS) and mark with a pen.
 - b. Palpate for the lateral superior margin of the patella (LSMP) and mark with a pen.
7. Using a tape measure, find and record the mid-point between the ASIS and LSMP and mark with a pen.
8. Ensure the tape is horizontal around the thigh. It should rest on the skin but not indent it.
9. Make 3 measurements of thigh circumference at this mid-point mark.
10. Measure to the nearest 0.1cm and beware of digit preference.
11. Record all three measurements and the mean, by adding the values together and dividing by three.

Adult Hip Circumference

1. Perform this measurement in the same way for both males and females.
2. Wash your hands and explain the procedure to the volunteer.
3. Ask them to stand with their legs together.

4. Apply the blank tape at the widest part, usually between the greater trochanter (top of the thigh bone) and the lower buttock level, with the volunteer's legs together.
5. Ensure tape is horizontal around the hips. It should rest on the skin but not indent it.
6. Make 3 measurements of hip circumference.
7. Measure to the nearest 0.1cm and beware of digit preference.
8. Record all three measurements and the mean, by adding the values together and dividing by three.

Adult Waist Circumference

1. Perform this measurement in the same way for both males and females.
2. Wash your hands and explain the procedure to the volunteer.
3. Stand behind the patient and palpate the iliac crest (the large curving pelvic bone, just below the waist). Palpate and mark the skin on both sides with a horizontal line at its highest point.
4. Palpate the lower rib margin on and mark skin with a horizontal line at the lowest point. Palpate and mark the skin on both sides.
5. Using the tape measure, make a mark (on both left and right side) identifying the mid-point between those made at the iliac crest and the lower rib margin. Apply the tape at the mid-point marks. Ensure the tape is level with the mid-point marks around the waist. The tape should rest on the skin but not indent it.
6. Ask the volunteer to relax, i.e. not to deliberately hold him/herself in or out, and to look straight ahead with arms relaxed at his/her sides.
7. Be prepared to make the measurement and then ask the volunteer to breathe in and then out. As the waist circumference will change the tape so that it sits on the skin all the way round. Make the measurement and read the tape during the pause at the end of expiration.
8. Make 3 measurements of waist circumference
9. Measure to the nearest 0.1cm and beware of digit preference.
10. Record all three measurements and the mean, by adding the values together and dividing by three.

Adult Mid Upper Arm Circumference

1. Where possible, make measurements on the non-dominant side
2. Perform this measurement in the same way for both males and females.
3. Wash your hands and explain procedure to the volunteer.
4. Ask the volunteer to stand with his/her back to the measurer, with their arms hanging by their sides.
5. Palpate the tip of the acromion (the point of the shoulder) on the non-dominant side and mark with a cross.

6. Ask the volunteer to flex their arm to 90 degrees. Palpate the olecranon (tip of the elbow) and mark it with a cross.
7. Put the tape measure on the mark made at the shoulder and drop it down to the tip of the elbow by the side of the arm.
8. Read the exact distance as if you had drawn an imaginary horizontal line from the bottom most point of the elbow to your tape measure.
9. Mark a point on the arm halfway between the acromion and olecranon. This marks the vertical level at which the circumference will be measured. It is important that this measurement is made with the arm flexed, otherwise the tape takes an oblique course across the upper arm, and the mid-point is too high up.
10. The subject is then asked to relax, with the arm hanging by her side. This is important as a very different reading may be obtained if the arm is not fully relaxed.
11. Place the tape around the upper arm with the tape's upper border on the mark. Ensure tape is horizontal around the arm. Make sure the tape is not pulled too tight. It should rest on the skin, but not indent it.
12. Read the tape to the nearest 0.1cm and beware of digit preference.
13. Make three measurements of mid upper arm circumference.
14. Record all three measurements and the mean, by adding the values together and dividing by three.

Adult Mid Forearm Circumference

1. Where possible, make measurements on the non-dominant side
2. Perform this measurement in the same way for both males and females.
3. Wash your hands and explain procedure to the volunteer.
4. Ask the participant to stand straight facing you.
5. Palpate for the olecranon and make a mark with a pen. Palpate for the styloid process (the prominent bone of the wrist) and mark the most prominent point with a pen.
6. Using a tape measure, measure the distance between the marks at the olecranon and styloid process and mark the mid-point with a line.
7. Measure forearm circumference by placing the tape around the arm with the upper border of the tape at the mid-point line.
8. Read the tape to the nearest 0.1cm and beware of digit preference.
9. Make three measurements of mid forearm circumference.
10. Record all three measurements and the mean, by adding the values together and dividing by three.

N.B. You may make the measurements using either pre-marked anthropometric measuring tape or blank tapes. Blank tapes provide a permanent record and reduce observer bias. This way, the circumference is marked with pen on a blank tape and subsequently converted to length by measuring against a validated fixed ruler.