

*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](mailto:k.i.durkin@soton.ac.uk)).*

*This document has been prepared from Version 4 of the BRC Standard Operating Procedure for measuring height of children over 2. It was last reviewed in June 2015 and the next review date is set for June 2017. The version number only changes if any amendments are made when the document is reviewed.*

## NIHR Southampton Biomedical Research Centre

### Procedure for Measuring HEIGHT OF CHILDREN OVER 2

#### **BACKGROUND**

Accurate length/height measurement of infants and children is essential as an indicator for physical growth. Length and height measurements can be plotted on percentile charts and compared to the general population. Height measurement can be affected by posture, footwear, feet and head positioning. It is necessary therefore to have a technique to measure height that can be replicated by other measurers; over time; and in the same subject. For the purposes of both longitudinal follow-up studies of individuals or populations, and cross-sectional group studies, accurate and reproducible measurements of height are essential.

#### **PURPOSE**

To ensure correct and uniform measurement of child height.

#### **SCOPE**

This procedure applies to all individuals measuring child height within the BRC. It is for use on children over two years of age who are able to stand stably and unaided. Any individuals over this age who are too unstable or unable to stand unaided should be length measured instead, in the supine position on a measuring board (i.e. Kiddimeter).

#### **RESPONSIBILITIES**

It is the responsibility of staff to read and use this procedure when measuring child height. It is the responsibility of the Principal Investigator to ensure that staff members who are working on specific studies have adequate experience and training to do so.

## PROCEDURE

Stadiometers: <http://www.marsden-weighing.co.uk/index.php/marsden-hm-250p.html>

Stadiometers are devices specifically designed for the accurate measurement of height and when used with care yield data of the highest quality. There are a few different stadiometer models in the BRC. The Leicester Height Measure is very “user friendly” but all the stadiometer models in the BRC can yield equally accurate and precise results if the measurer adheres strictly to the outlined procedure.

The ‘Leicester Height Measure’ is lightweight and portable and allows measurement accuracy of height to the nearest 1mm. The range is from 0 – 2.07m, in 1mm gradations. It comes in the form of a plastic measuring rod, in four sections which slot together. There are unique codes at each end of each rod (i.e. star shape, square, circle etc.) which line up with each other to ensure that sections are slotted together properly. It has a base plate for the individual to stand on, two stabilising side arms that make contact with the wall and a head plate with arrows indicating the point at which the measurement should be read. Each rod is marked in metric (centimetres and millimetres) and imperial (feet and inches) units.

You will require **two practitioners**, one holding the child’s head in the Frankfort Plane, the other maintaining the child in the correct standing position, pulling down the head plate and reading the value.

1. Ensure the stadiometer has been checked and validated using metal rods of known height.
2. Ensure that the stadiometer is wiped clean before use.
3. Wash your hands and explain the procedure to the child and/or their parent or guardian. Explain you will want them to stand as tall and straight as possible and that you will be making 3 measurements of their height.
4. Measure wearing light clothing. Ensure that heavy outer clothing and shoes are removed. Roll up trousers and jeans in order to check the position of the heels and to make sure the child is not standing on tip-toes.
5. Undo or adjust hairstyles and remove hair accessories that interfere with measurement.

If the child has a hairstyle that can not be adjusted (e.g. braids/dreadlocks), an implement of a known length (such as a short metal rod) can be placed on the crown of the head between the braids/dreadlocks when the head is in the Frankfort plane. The total height of child *plus* rod can then be measured and the length of the rod can be subtracted from the result in order to obtain a height measurement. You may ask ladies wearing headscarves if they would mind removing them. If they are unhappy to do this, you can ask to feel the top of their head/ask them how many layers of material are on top of the head and how their hair is arranged beneath the scarf. Make a note in the participant’s medical notes if you have had to do any of these.

6. Ask the child to stand on the stadiometer, facing forwards as tall and straight as possible with their arms hanging loosely at their sides.
7. Their feet should be flat on the base plate of the stadiometer and positioned slightly apart, in line with their hips, to aid balance. There is an outline of feet on the base plate but it is not necessary for the child to stand on the feet marks.
8. Their buttocks and shoulders should touch the stadiometer. The practitioner working from the side should ensure that the feet are flat and to the back of the footplate and that gentle pressure is applied to the knees to keep the legs at straight as possible.
9. Ensure the child's head is in the "Frankfort plane". This position is an imaginary line from the centre of the ear hole to the lower boarder of the eye socket. This is a midline position.
10. If will be necessary for the practitioner working from the front to manipulate the child's head in their hands by placing the heels of their palms either side of the face and the fingers of each hand on the back of the skull above the neck. Your fingers should come to rest on the mastoid process behind the ears. Firmly but gently, apply upward pressure lifting their head to the maximum height. Avoid jerky movements and perform the procedure smoothly, taking care not to tilt the head at an angle.
11. Ask the child to take a deep breath and hold.
12. The assisting measurer standing at the side should then bring the head plate down onto the head, ensuring it rests on the crown of the head, i.e. the top back half.
13. The measurer working from the side should then read the measurement.
14. The measurer's eyes should be level with counter/pointer and the measurement needs to be read to the nearest 1mm (this may require a stool/small ladder). Record the measurement.
15. The child should be able to step off the stadiometer without ducking their head.
16. Make three measurements of height, asking the child to stand off the stadiometer between each measurement.
17. The three measurements should all fall within 2mm of one another. If the first three measurements do not fall within this 2mm limit then you must perform measurements of height until the 3 **most recent** results are within 2mm of one another. Cherry-picking the best 3 results from a choice of more than 3 measurements is not permitted.
18. Record the three most recent results and calculate the mean by adding the three values together and dividing by 3.
19. Should you be making repeated measurements on the same individual on different days, it is advisable to measure at the same time of day if possible. During the day our height decreases due to compression of the spine.