Blood pressure recording No: 001D

1. Introduction

Blood pressure (BP) measurement provides an assessment of the overall cardiovascular status of an individual.

2. Responsibilities

Research nurses trained in the method are responsible for recording digital blood pressures from subjects.

3. Equipment

- Digital blood pressure monitor (Omron HEM-705CP)
- Blood pressure cuffs (1 regular and 1 large)
- Rechargeable batteries (R14C)
- Printer paper
- Tape measure

4. Method

The Omron HEM-705CP digital blood pressure (BP) monitor, which is currently one of the only portable monitors which has been validated by the British Hypertension Society, will be used in this study.

The BP monitor should have the charged batteries already installed; the guidelines for this procedure can be observed in the Omron manual. Additional batteries should also be available to protect against battery failure. The monitor should also be programmed with the correct date & time and printer paper. Any alterations required with the monitor's set up can be achieved by reading the guidelines from the manufacturer.

4.1 Preparation of subject

- Ensure the subject is seated and as relaxed as possible. Instruct the subject to sit with both feet parallel and flat on the floor. Ensure that they have not been smoking or participating in any vigorous exercise prior to the measurement.
- Using a stopwatch or wristwatch, ensure that the subject has been seated for at least 5 minutes before the first measurement is taken. Subsequent measurements need to be taken with at least a 3 minute interval in-between. All 3 measurements can be taken whilst the subject is seated and answering the screening questionnaire questions.
- Instruct the subject to remove any loose clothing covering the upper arms.
- Explain the procedure to the subject, pitched at their level of understanding. Answer any questions or concerns that they may have. Ensure that the subject has been seated and settled for approximately 5 minutes prior to commencing the procedure.
- The cuffs are designed to be used on the left arm of subjects. However, the right arm can be used if the correct adjustments are made.
- Measure the subject's upper arm circumference (in the middle at the thickest part). Compare the arm circumference with figure 1 for the most appropriate cuff size.

Figure 1:- Cuff sizes

Arm Circumference	Cuff	Bladder Size
24 - 32cm	Regular	12 x 22cm
32 - 42cm	Large	15 x 29cm

Gross error in blood pressure recordings will arise as a result of poor measurement and inappropriate cuffs (bladders) being used.

Like the ambulatory blood pressure cuff, the width of the bladder should be 40% of the circumference of the midpoint of the arm and the length 80% of the arm circumference.

- Apply the correct cuff size onto the left arm by slipping the cuff cylinder over the wrist and sliding it up the arm. The cuff may encircle the arm several times (depending on subject variability). The bladder centre should sit over the brachial artery (inner elbow) use the mark to aid this process. The rubber inflation tubing should sit over the brachial artery and in line with the middle finger. The cuff should sit securely 1-2cm up from the inside of the elbow joint. A green marker tab present on the cuff aids in the alignment process. The overall position of the cuff should be secured with the velcro fasteners in order to avoid an inaccurate reading.

- Ensure to tick the appropriate box in the phenotypic questionnaire as to which arm the measurements were taken on.
- Instruct the subject to support their arm on a cushion or table top, so the cuff position is in line with the level of their heart.
- Instruct the subject to relax and take 5-6 deep breaths prior to commencing the procedure. This aids in stabilising their blood pressure.
- If the cuff cannot be applied on the left arm, the right can be used, using basically the same principles. The main difference is that the inflation tubing needs to sit beneath the elbow and the green line up tab sits on the inside of the elbow joint.

5. Preparation of the equipment

- Insert the air inflation tubing plug from the cuff into the air jack of the monitor. Press the SPHYG/CLOCK button. A "Pee-Pee" noise will sound and an initial display will appear in the viewfinder.
- Set the inflation pressure depending on the subject's last general practitioner blood pressure reading. There are 4 variables, these are:-

  Auto (Use for repeated BP measurements on the same subject)
  170
  200
  240

  Buttons 2 to 4 should be determined by the subject's usual BP. The inflation pressure should be set to a pressure 30-40mmHg higher than the expected systolic pressure.

- Press the START button and immediately release it. A "Beep" noise will sound and the monitor automatically commences. The viewfinder will flash a heart symbol during the process.
- A "Pee Pee" sound will indicate the recording has taken place. The cuff then deflates and the BP and pulse will be displayed in the viewfinder. There is a latent period of 3.5 seconds for the BP to be displayed and a further 2 seconds for the pulse.
- Results can be stored by pressing the MEMORY SET button. A maximum of 14 readings can be saved. Alternatively the results can be printed by pressing the PRINT CURRENT READING BUTTON. Stored data can be retrieved and printed out later by pressing the PRINT MEMORY/GRAPH button.
- To complete the measurement process press the SPHYG//CLOCK button to return to the digital clock display. The monitor will, however, automatically return to this display if left unattended for more than 5 minutes.
- Remove the cuff from the subject and, if the subject requests to know their BP, this information can be given.

6. Additional Information

- Cuff inflation can be terminated by pressing the SPHYG/CLOCK button.
- For insufficient inflation pressure settings, the cuff will automatically repressurise to a pressure 40mmHg higher than the previous inflation pressure.
- For repeated measurements on one subject, it will be necessary to instruct the subject to raise their arm, with the cuff still attached, above their head. Instruct them to open and close their fingers about 15 times in-between readings. This will prevent blood congestion.
- Ensure the cuff taking the reading lies at the same height as the heart.
- Do not clean the monitor with any detergents. If dirty, wipe with a damp cloth.
- If the E symbol appears in the viewfinder, return to the instruction manual. A troubleshooting section can be located at the end of the manual.

7. Reference Documents

1. O`Brien E.T et al, (1995), ABC of Hypertension, BMJ Publishing group, London, 1-34
2. Petrie J.C et al, (1987), Blood pressure measurement, BMJ Publishing group, London, 5-19