

Blood pressure 2: procedures for measuring blood pressure

Author Phil Jevon is academy tutor, Manor Hospital, Walsall, and honorary clinical lecturer, School of Medicine, University of Birmingham.

Abstract Blood pressure is measured for a wide range of diagnostic and monitoring purposes. Accurate results are essential to ensure patients receive the correct treatment and care in a timely manner. This article, part 2 in a two-part series, explains the different procedures for non-invasive measurement; part 1 discussed key principles and measuring equipment.

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Blood pressure (BP) measurement is a commonly performed procedure in most healthcare settings, and provides essential information to aid diagnosis and monitoring. It is vital that measurement gives accurate results to ensure patients receive the correct treatment and care in a timely manner. Part 1 of this series discussed the key principles of BP measurement and the types of equipment used; this article describes the procedures for manual and automated measurement, and for lying and standing BP measurement.

Training

All health professionals who undertake BP measurements should have adequate initial training and their competence at performing the skill should be periodically reviewed (National Institute for Health and Care Excellence, 2019). It is also important to ensure that, when new devices are introduced, staff training includes the equipment's limitations and how to recognise artefacts (Medicines and Healthcare products Regulatory Agency, 2019).

Despite the growing use of automated devices, it is recommended that health professionals continue to receive training in manual BP measurement using auscultation (MHRA, 2019). Helpful videos demonstrating the correct procedure for manual and automated BP measurements are available on the website of the British and Irish Hypertension Society (BIHS) ([Bit.ly/BIHSBPMMeasurement](https://bit.ly/BIHSBPMMeasurement)).

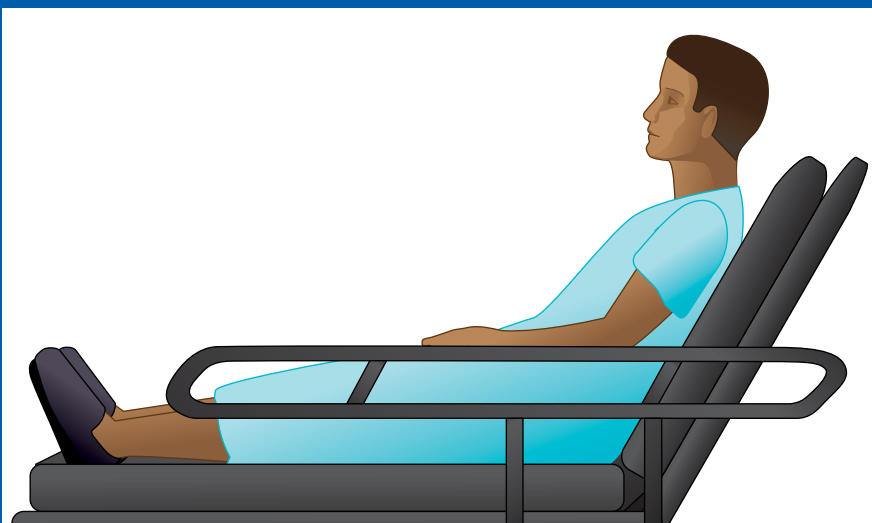
Infection prevention

The sphygmomanometer is an important tool for clinical assessment, but it can become contaminated by micro-organisms. As such, adherence to local infection prevention and control policies – including the cleaning of equipment between every patient contact – is essential.

Non-sterile gloves are not required routinely for measuring BP. However, nurses do need to:

- Assess individual patients for the risk of exposure to blood and body fluids;
- Be aware of local policies relating to glove use.

Fig 1. **Correct patient position for BP measurement**



1a. When on a bed or trolley, ensure the patient is sitting, with legs outstretched and uncrossed



1b. When seated, ensure the patient is in a chair with a backrest and positioned with feet on the floor and legs uncrossed

Clinical Practice

Practical procedures

Fig 2. Arm support



Use a pillow, armrest or table to support the patient's arm at heart level

Preparation

Before undertaking a manual or automated BP measurement, ensure the patient is either lying on a bed or trolley (Fig 1a), or sitting comfortably in a chair that has a backrest, and positioned with feet placed on the floor and legs uncrossed (Fig 1b). Ideally, the patient should not have drunk alcohol or a caffeinated drink or smoked tobacco for 15 minutes before the procedure, and should be relaxed, not talking and should have been in position for at least five minutes (British and Irish Hypertension Society, 2017a).

Explain the procedure to the patient and obtain consent. Ensure there are no contraindications to using their arm such as lymphoedema, IV infusion, recent trauma or surgery, or an arteriovenous fistula. If there are problems, use the other arm or consider measurement on the lower limbs (Dougherty and Lister, 2015). Remove any tight clothing that is restricting the arm, and support it at the level of the heart using a pillow, table or arm rest (Fig 2). Ensure the patient is sitting comfortably

Procedures

Equipment

- Appropriate cuff;
- Sphygmomanometer;
- Stethoscope (if recording using the manual method);
- Pillow to support the arm, if required;
- Documentation.

Manual measurement

1. Decontaminate your hands and follow

local protocols on personal protective equipment (PPE).

2. Check the sphygmomanometer: make sure it is in good working order and has been serviced. The date of next annual service should be clearly marked (BIHS, 2017b).

3. Select an appropriately sized cuff: the inflatable bladder should encircle at least 80% of the arm, but no more than 100% of it.

4. Place the cuff snugly and neatly onto the patient's arm, 2cm above the brachial artery, aligning the artery index marker on the cuff with the brachial artery (Fig 3).

5. Position the sphygmomanometer close to the patient. It should be standing vertical and at your eye level.

6. Estimate the systolic pressure: palpate the brachial artery, inflate the cuff and note the reading when the brachial pulse disappears. Then deflate the cuff.

7. Inflate the cuff to 30mmHg above the estimated systolic level, sufficient to occlude the brachial pulse.

8. Place the diaphragm of the stethoscope gently over the brachial artery. Avoid applying excessive pressure on the diaphragm or tucking the diaphragm under

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the edge of the cuff, as either of these actions could partially occlude the brachial artery, delaying the occurrence of Korotkoff sounds (Fig 4).

9. Slowly deflate the cuff at a rate of 2-3mm/second, noting when the Korotkoff sounds appear (systolic) and disappear (diastolic) to the nearest 2mmHg.

10. Deflate the cuff completely.

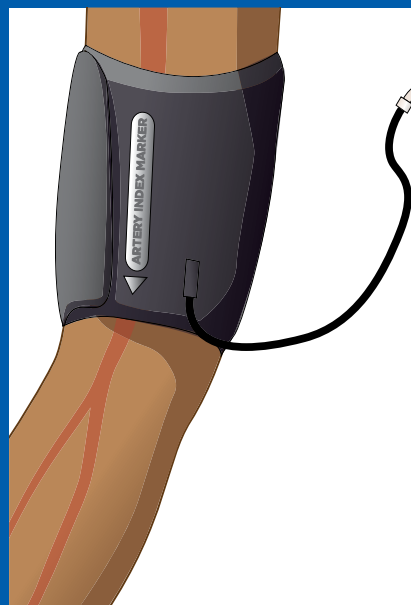
11. When you are satisfied that your reading is accurate, remove the cuff.

12. Remove your gloves and apron, if used.

13. Decontaminate your hands.

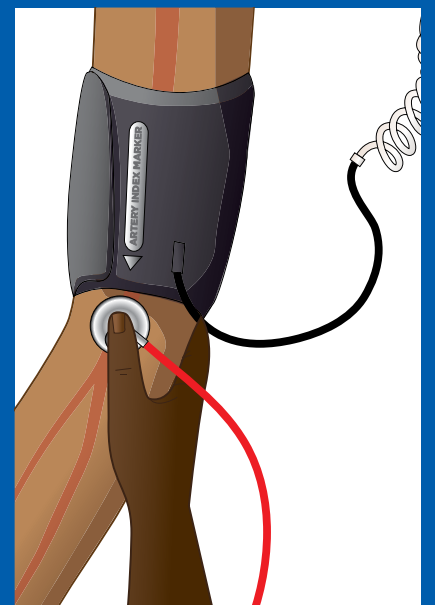
14. Document the systolic and diastolic BP readings on the patient's observation chart, following local protocols. Compare with previous readings and, if there is cause for concern, inform senior nursing or medical colleagues.

Fig 3. Cuff placement



Align the artery index marker with the brachial artery

Fig 4. Stethoscope placement



Place the stethoscope diaphragm over the brachial artery

15. Ensure the cuff and device are cleaned and stored according to local policy.

If the BP needs to be repeated, wait for at least one minute before each reading. Record each measurement immediately and avoid relying on memory (Beevers et al, 2015).

Automated measurement

1. Decontaminate your hands and follow local protocols on PPE.

2. Check the equipment, ensuring it is in good working order and that it has been serviced and calibrated (BIHS, 2017a). The date of next annual servicing should be clearly marked on the sphygmomanometer. Ensure the manufacturer's operating instructions are followed.

3. Check the pulse: if it is irregular, it may be necessary to use a manual BP measurement device.

4. Select an appropriately sized cuff, as recommended by the manufacturer: the inflatable bladder cuff should encircle at least 80% of the arm but not more than 100% of it.

5. Place the cuff snugly and neatly onto the patient's arm, 2cm above the brachial artery and aligning the brachial artery indicator on the cuff with the brachial artery (Fig 3).

6. Switch on the automated BP device and press start to record the BP, following the manufacturer's recommendations.

7. When the reading has registered, document the systolic and diastolic BP measurements on the patient's observation chart, following local protocols.

8. Switch off the automated device and remove the cuff.

9. Remove your gloves and apron, if used, and decontaminate your hands.

10. Compare readings with those taken previously – if there is cause for concern,

Fig 5. Standing BP: arm support



inform senior nursing or medical colleagues.

11. Ensure the device is cleaned correctly and safely stored. If necessary, recharge the battery following the manufacturer's recommendations and local policy (Beevers et al, 2015).

Lying and standing BP

The routine measurement of both lying and standing BP is recommended in patients aged ≥ 65 years and those with diabetes or symptoms that suggest they may have postural hypotension; this is because these individuals can experience a significant fall in BP when standing up (NICE, 2019; NICE, 2013).

Before starting, ascertain whether you will need assistance from a colleague to help the patient to stand. Explain the procedure to the patient and obtain consent. Ideally, a manual BP measurement device should be used.

1. Perform the first measurement with the patient lying down, following the procedure described above.

2. Leaving the cuff in place, ask the patient to stand up. Patients with postural hypotension may feel dizzy and lightheaded so it is important to be alert to this possibility and to ensure that the patient's safety is maintained.

3. Allow the patient to stand for one minute.

4. Ensure the patient's arm is supported at the level of the heart (Fig 5).

5. Repeat the BP measurement, taking particular care to make sure the arm continues to be well supported (Beevers et al, 2015).

6. After the patient has been standing for three minutes, repeat the BP measurement.

7. Throughout the procedure, observe and document any signs or symptoms of postural hypotension, including dizziness, lightheadedness, vagueness, pallor, visual disturbance, feelings of weakness and palpitations.

8. Assist the patient to either sit or lie down, as appropriate. If necessary, take appropriate action to prevent falls, and provide advice and guidance to the patient.

9. Remove and dispose of gloves and aprons if used. Decontaminate your hands.

10. Document the systolic and diastolic BP on the patient's observation chart, in accordance with local protocols.

11. Compare BP with previous readings and, if there is cause for concern, inform senior nursing or medical colleagues (Royal College of Physicians, 2017; Beevers et al, 2015). **NT**

References

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Professional responsibilities

This procedure should be undertaken only after approved training, supervised practice and competency assessment, and carried out in accordance with local policies and protocols.

CLINICAL SERIES

Blood pressure

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| Part 1: Key principles and equipment | Jul |
| Part 2: Procedures for measuring blood pressure | Aug |