Blood pressure measurement is often inaccurate because of poor technique, inappropriate use of devices or failure to calibrate or validate monitors

Improving the accuracy of BP measurement

In this article...
- Why blood pressure needs to be measured accurately
- How poor technique can cause inaccurate measurement
- Validation, calibration and maintenance of BP monitors

Hypertension is one of the most important preventable causes of premature morbidity and mortality in the UK; it is a major risk factor for ischaemic and haemorrhagic stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death (National Institute for Health and Clinical Excellence, 2011).

If hypertension is to be diagnosed accurately and treated, it is essential that blood pressure (BP) measurements are accurate. Unfortunately, this is often not the case, and poor technique when measuring BP is a recognised problem (O’Brien, 2003).

Training needs
Inadequate initial and ongoing training is provided for nurses, doctors and healthcare assistants, although the NICE (2011) guideline advises that “healthcare professionals taking blood pressure measurements need adequate initial training and periodic review of their performance”.

In practice, BP measurement is often seen as a menial task delegated to the most junior member of the team. With the advent of digital/semi-automated devices, staff rarely measure BPs manually.

Reasons for poor technique
- Incorrect cuff size used: if a cuff is too small, the BP will be over-read; conversely, too large a cuff can lead to an incorrect low reading (Medicines and Healthcare products Regulatory Agency, 2012). The rubber bladder inside the cuff should encircle at least three-quarters of the arm circumference. If in doubt, measure the mid upper arm circumference and refer to the individual cuff arm circumference ranges from the manufacturers.
- Failure to remove tight clothing: the cuff is put on over the patient’s clothing, leading to inaccurate measurement. The patient should be asked to remove clothing if necessary.
- Incorrect positioning of the arm: the patient should be quiet and seated with the arm outstretched and supported (NICE, 2011).
- Talking to patients during the procedure: health professionals and patients should avoid talking during the measurement as it increases BP.

Blood pressure monitors
Invalidated and poorly maintained BP monitors
BP monitors require recalibrating (O’Brien, 2003) as per their manufacturers’ instructions and should undergo independent validation to ensure accuracy. Information on which BP monitors are tested and validated, as well as how often a machine needs to be calibrated and checked, is available from the British Hypertension Society website.

The MHRA recommends that all BP measuring devices should meet the performance criteria that it, in collaboration with the Committee on Blood Pressure Monitoring in Clinical Practice, defines as acceptable (MHRA, 2012).

Inappropriate use of devices
Most automated BP monitors use the oscillometric technique. This relies on the detection of variations in pressure oscillations due to arterial wall movement beneath an occluding cuff.

Manual machines for measuring BP use an auscultatory method. This relies on inflating an upper arm cuff to occlude the brachial artery and then listening to the Korotkoff sounds through a stethoscope while the cuff is slowly deflated.

In patients with clinical conditions such as cardiac arrhythmias or vascular disease, the manual method should be used, as automatic machines will not give accurate results (MHRA, 2012; NICE, 2011).

Conclusion
Given the significant health risk of hypertension, it is the responsibility of all health professionals to ensure not only that they learn how to take blood pressure correctly but also that their teams receive the information, training and ongoing support to ensure that every BP reading taken in their practice is accurate.

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References

BOX 1. RESOURCES
- The British Hypertension Society website has a section “How to measure blood pressure”. It runs study days for nurses on how to measure BP accurately: www.bhsoc.org
- Blood Pressure UK provides support and information on hypertension for patients and professionals: www.bloodpressureuk.org