Measurement of blood pressure in primary care

Jonathan Mant, professor of primary care research1, Richard McManus, professor of primary care cardiovascular research2

In the linked cluster randomised controlled trial (doi:10.1136/bmj.d286), Myers and colleagues compare the quality and accuracy of blood pressure measurement of manual sphygmomanometers with automated blood pressure monitors in primary care.

The value of measuring blood pressure in the clinic is debatable, especially when it is done by doctors. Inherent variability means that true changes in blood pressure can be difficult to detect using clinic readings. Furthermore, misclassification on the basis of clinic readings can occur in people with “normal” underlying blood pressure who are labelled as hypertensive because of the pressor effects of having blood pressure measured in the clinic (white coat hypertension) and those with hypertension who are labelled as normal because clinic readings are lower than the usual blood pressure (masked hypertension). Out of clinic methods of measuring blood pressure, such as ambulatory blood pressure monitoring and home monitoring, are better predictors of cardiovascular outcome than clinic measurements. Self monitoring and self management can lead to better control of blood pressure than monitoring blood pressure in the clinic. However, the evidence base for the treatment of hypertension is based on clinic measurements, and it can be problematic to translate ambulatory and home readings to their clinic equivalent. Therefore, methods to improve the accuracy of the measurement of blood pressure in the clinic remain relevant.

An evaluation of one such method is reported in Myers and colleagues' trial, which randomised practices to continue to use manual sphygmomanometers or to use an automated blood pressure monitor (BpTRU device). This monitor takes six readings at set intervals (in this study, two minutes), and the first reading with the clinician present is ignored. Subsequent readings are performed automatically and do not require the clinician to be present: in this study, it was emphasised that the patient should be left alone. After enrolment, all participants had their blood pressure measured using ambulatory blood pressure monitoring and attended the primary care clinic where their blood pressure was measured using either the automated monitor or a manual device. Clinic systolic blood pressures were on average 5.4 mm Hg lower when measured using the automated monitor compared to manual measurement.
lower when measured using automated sphygmomanometers compared with manual ones. The readings from the BpTRU device were more similar to and correlated more closely with daytime ambulatory blood pressure monitoring than did the manual readings. This suggests that use of automated sphygmomanometers can improve the accuracy of blood pressure measurements performed in the clinic, and in particular, reduce the white coat effect.

Control practices received no training on how to measure blood pressure, so a better technique in the use of manual sphygmomanometers might have achieved similar results. Manual readings obtained by research nurses and research staff following a specific protocol correlate much better with ambulatory blood pressure monitoring than do doctors’ readings.10

The randomised controlled design is a particular strength of this study, in that it enables an unbiased assessment of the potential difference between blood pressure measurement in routine clinical practice and under controlled conditions, in this case through the use of the automated blood pressure monitors. In this study, routine clinical practice overestimated systolic blood pressure by an average 5.4 mm Hg, and this could lead to overtreatment.

What are the clinical implications of the study? Firstly, it is a reminder of the importance of measuring blood pressure properly. Secondly, it provides empirical evidence that automated sphygmomanometers can improve the accuracy of blood pressure measurement in primary care.

Blood pressure is measured for two main reasons—to diagnose hypertension and monitor blood pressure in people with a label of hypertension. Given that a diagnosis of hypertension may lead to lifelong drug treatment, blood pressure must be measured accurately when making such a diagnosis. While this study highlights improvements in monitoring that can be made through using automated sphygmomanometers, it is not yet clear what the role of such devices is compared with ambulatory blood pressure monitoring and home monitoring. The study population was restricted to people with a label of hypertension, so those with masked hypertension will have been largely excluded.

Furthermore, although automated measurements reduced the possibility of a white coat effect, they did not eliminate it—some patients had substantially higher automated office readings than daytime ambulatory readings. In terms of monitoring blood pressure, automated sphygmomanometers will reduce the “noise” associated with operator error but will not eliminate it. For example, poor arm positioning and using the wrong size of cuff may still occur and have significant effects on recorded blood pressure.11

Several questions remain. How long should the interval be between automated readings, and how many readings should be taken? The six readings taken two minutes apart as used in the study will be practically difficult to implement in many primary care settings. Are automated readings the equivalent of research measurements, or do adjustments need to be made to blood pressure target and treatment thresholds in the same way as for ambulatory measurements?10

Automated blood pressure measurement provides an alternative to manual and out of clinic monitoring. Its precise role depends on further evidence, some of which may come from the trial from which these data are drawn. In the meantime, doctors should remember that blood pressure thresholds and targets are based on measurements performed under controlled research conditions, and that poor technique can lead to substantial error.