

Automated blood pressure measurement for diagnosing hypertension

Martin G. Myers^{a,b}

Guidelines for the management of hypertension have started to include home blood pressure (BP) and 24-h ambulatory BP monitoring as preferred methods for diagnosing hypertension. The next step will be to incorporate automated office BP measurement into the algorithm for diagnosing hypertension. Recent studies support this approach with automated office BP readings being closely correlated with the ambulatory BP. *Blood Press Monit* 12:405–406 © 2007 Wolters Kluwer Health | Lippincott Williams & Wilkins.

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Practice guidelines for diagnosing and treating hypertension have primarily been concerned with definitions of hypertension, cardiovascular risk, lifestyle modification, selection of drug therapy and the achievement of target blood pressure (BP). An underlying assumption in all guidelines is the accurate measurement of BP. However, there is general agreement that various sources of measurement error can occur on the part of the observer (e.g. digit preference), the patient (e.g. anxiety) and observer–patient interaction (e.g. conversation), all or which tend to increase BP or result in inaccurate readings.

Guidelines for improving the quality of BP measurement have been included in most national and international monographs on the management of hypertension often supplemented by pamphlets, videos and other educational materials describing the correct technique for routine measurement of BP in the office. However, there is little evidence that any of these measures significantly improves the quality of BP readings taken in routine clinical practice.

At this point, there would appear to be two choices: (a) continue to ‘educate’ health professionals on the proper measurement of BP using manual devices or (b) utilize new technology and adopt automated BP recording devices, which have been validated for accuracy and reliability. Most hypertension specialists already recognize the limitations of conventional manual office BP recordings. Even if one wanted to continue with this approach, the rapid disappearance of mercury from the workplace, including healthcare settings, will soon require a new alternative to conventional BP measurement. Thus, there is both an opportunity and a need to shift the paradigm and switch over to automated BP measurement for routine clinical practice.

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^aSchulich Heart Centre, Sunnybrook Health Sciences Centre ^bDepartment of Medicine, University of Toronto, Toronto, Ontario, Canada

Correspondence to Dr Martin G. Myers, MD, FRCPC, Sunnybrook Health Sciences Centre, A-202, 2075 Bayview Avenue, Toronto, Ontario M4N 3M5, Canada
Tel: +1 416 480 4749; fax: +1 416 480 5404;
e-mail: martin.myers@sunnybrook.ca

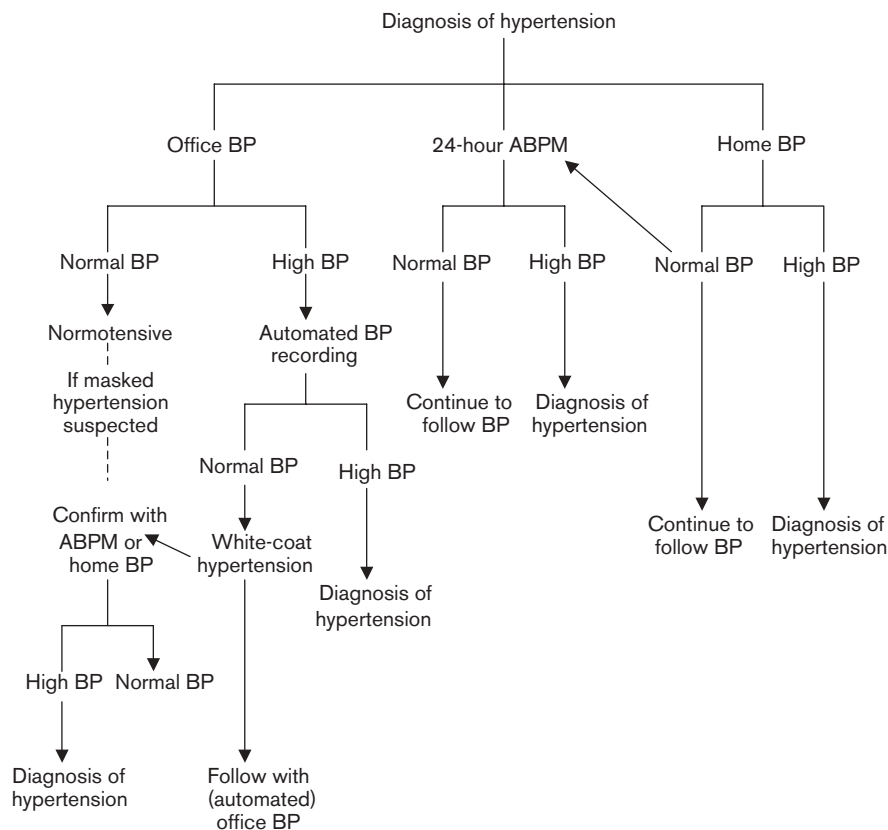
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Until recently, most national and international guidelines for managing hypertension included sections on 24-h ambulatory BP monitoring (ABPM) and home BP recordings as alternatives to routine office BP. Algorithms for diagnosing hypertension, however, have generally relied on the office BP. In 2005, the Canadian Hypertension Society adopted technological advances in BP measurement [1] by encouraging physicians to obtain out-of-office BP readings using either home BP or, preferably, 24-h ABPM. This change in approach was supported by more than a dozen clinical outcome studies showing ABPM to be superior to the office BP and two studies showing the same for home BP [1]. Readings taken outside of the office also identify patients with white-coat hypertension and those with masked hypertension. Automated BP recordings are also more reproducible than office BP with normal values for both ABPM and home BP being derived from clinical outcome data.

One final chapter remains in the BP measurement story – ‘automated recording of BP in the office’. It is now possible to obtain BP readings in the examining room with the patient resting quietly and alone, thus minimizing observer error and eliminating observer–patient interaction. The BpTRU has been specifically designed for this purpose [2]. This device takes an initial reading with the observer present to verify that the cuff is properly positioned and that a satisfactory reading is possible. If not, readings will be displayed as ‘error’ such as in patients with atrial fibrillation or frequent ectopic complexes, instances in which accurate manual measurement of BP is equally difficult to obtain. The patient is then left alone in the examining room and an additional five readings are taken with the mean value displayed on the monitor (excluding the initial reading).

The BpTRU has been validated for accuracy [3] and compares favorably with the manual BP taken with a

Fig. 1



A proposed algorithm for the diagnosis of hypertension using automated BP recording devices in the office, at home and with 24-h ambulatory BP monitoring (ABPM). BP, blood pressure. Reproduced with permission.

mercury sphygmomanometer in routine clinical practice [2]. Decreases in systolic BP of 10–20 mmHg have been reported for automated compared with conventional office BP [2,4]. In a sample of 481 patients, the automated office BP has also correlated significantly better ($r = 0.571$) with the mean awake ambulatory BP than the routine office BP taken by the patient's family physician ($r = 0.145$) [4]. Thus, automated office BP provides yet another method for minimizing observer error and the white-coat response even in the office setting. On the basis of these studies, it would appear that the target BP using an automated device in the office is about 135/85 which is similar to the target awake ambulatory BP and home BP.

The recently developed algorithm for diagnosing hypertension using ABPM and home BP [1] could now be completed by adding automated office BP (Fig. 1). This change in the guidelines for diagnosing hypertension is being proposed for future consideration on the basis of the automated BP exhibiting a markedly higher correlation with ABPM than does the routine office BP, taking into account the overwhelming evidence supporting ABPM as the gold

standard for the assessment of cardiovascular risk. Ongoing studies in routine clinical practice are expected to confirm these initial findings and should support the inclusion of automated office BP measurement in the standard algorithm for diagnosing hypertension.

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