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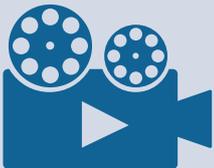
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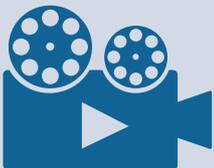
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Blood pressure assessment in general practice: focus on out-of-office measurement

Introduction

Hypertension is a common disorder that affects 35% of the adult population of South Africa. According to all guidelines it is defined as a persistent elevation of blood pressure over certain norms. In South Africa this norm is $\geq 140/90$ mmHg for office blood pressure, and assessment is traditionally based on a series of office blood pressure measurements repeated over a period of weeks or even months.¹

In 2011, the United Kingdom's National Institute of Health and Care Excellence (NICE) initiated a radical change of practice when it began advising that hypertension should rather be diagnosed based on the routine use of ambulatory blood pressure monitoring (ABPM) or, at least, home blood pressure monitoring (HBPM).²

The use of ABPM can shorten the diagnostic process to as little as a day or at most a week, and it is also a better predictor of hypertensive organ damage and cardiovascular risk.³ Based on a substantial systematic review, the NICE concluded that ABPM improves sensitivity and specificity of diagnosis and, critically, avoids the treatment of those who are not hypertensive. As many as 25% of those currently on hypertension treatment, based on traditional assessment, may not be hypertensive because of the so-called 'white-coat effect'. ABPM is cost effective, as the greatly reduced incidence of misdiagnosis more than counterbalances the additional cost thereof.⁴

This brief review encompasses a practical approach to the diagnosis and monitoring of blood pressure control using a combination of office measurement, HBPM and ABPM.

LEARNING OBJECTIVES

You will learn:

- The advantages of ABPM and HBPM over office blood pressure measurement for diagnosing hypertension and assessing blood pressure control
- That blood pressure diagnostic thresholds vary according to measurement modality
- That ABPM is a better predictor of target organ damage and cardiovascular risk
- How to investigate apparent treatment resistance.

Diagnosis of hypertension

Masked hypertension should be suspected in a patient with borderline blood pressure who nonetheless either has evidence of hypertensive organ damage or is at high risk for cardiovascular disease

All major hypertension guidelines emphasise the need for appropriate blood pressure measurement techniques and the increased use of out-of-office blood pressure measurement.^{1,5,6} Office blood pressure is not as accurate as both HBPM or 24-hour ABPM because of the white-coat effect, masking, and the inherent inaccuracies involved in performing manual blood pressure measurement. The definitions of masked and white-coat hypertension are given in Figure 1, but basically, white-coat hypertension is defined as blood pressure that is elevated in the office and normal out of office, while masked

hypertension is normal blood pressure in the office and elevated blood pressure out of office. Masked hypertension should be suspected in a patient with borderline blood pressure who nonetheless either has evidence of hypertensive organ damage or is at high risk for cardiovascular disease.

Both forms of out-of-office measurement, especially ABPM, are much better predictors of hypertensive organ damage. Furthermore, 24-hour ABPM gives information about nocturnal blood pressure and dipping status, which are the most important predictors of adverse cardiovascular outcome.

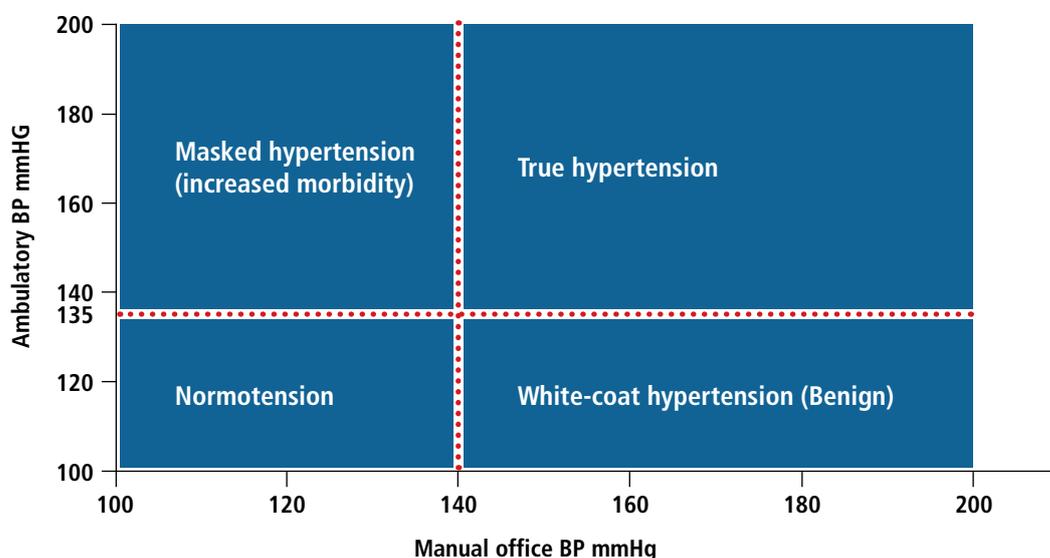


Figure 1. Definitions of normotension, white-coat, masked and true hypertension

Twenty-four-hour ABPM is usually performed every 20 minutes during the day and every 30 minutes at night; the daytime period is usually 6am to 10pm and the night period 10pm to 6am. Night time blood pressure should normally decrease by 10% but if the decrease is less than 10%, the patient is termed a 'non-dipper'. Occasionally blood pressure is higher at night and this 'reverse dipping' may be a sign of sleep apnoea. Also, blood pressure that is controlled in the daytime but elevated at night is another form of masked hypertension.

As previously mentioned, elevated nocturnal blood pressure is a very powerful predictor of cardiovascular outcome.

HBPM should be performed over seven days. Blood pressure should be measured in the morning and evening, with an average of three stable readings taken after five minutes rest in a quiet environment. The patient must be seated with back supported, legs uncrossed and the arm supported at heart level. The correct cuff size must be applied to the upper arm; wrist devices are not recommended.¹

Blood pressure diagnostic thresholds vary with method of monitoring

The diagnostic thresholds of office, HBPM and ABPM are shown in Table 1, but it is important to note that with

ABPM the optimal mean daytime blood pressure is 120/80mmHg and borderline high blood pressure 120-135/80mmHg.

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Table 1. Thresholds for the diagnosis of hypertension by different methods ⁸			
	Clinic	Home	Ambulatory
Predicts outcome	Yes	Yes	Strongly
Initial diagnosis	Yes	Yes	Yes
Cut-off levels (mmHg)	140/90	135/85	120/70 (mean night) 135/85 (mean day)
Evaluation of treatment	Yes	Yes	Limited but valuable
Assess diurnal rhythm	No	No	Yes

If masked hypertension is present, it needs to be treated, as it places a patient at increased cardiovascular risk

A simple algorithm (Figure 2) recommends incorporating both office and out-of-office blood pressure readings in the initial diagnosis.⁷ Automated office blood pressure (AOBP) measurement refers to unobserved blood pressure measurement by an automated device. This is increasingly being recognised as a better way to assess office blood pressure because it tends to mitigate the white-coat effect resulting from the presence of the health practitioner.⁸

Patients with borderline hypertension must still be assessed for other

cardiovascular risk factors and target organ damage and followed up long term, as they are likely to develop hypertension in time. Lifestyle changes need to be instituted and other cardiovascular risk factors treated, e.g. with statins for increased cholesterol. If overt target organ damage is present or the patient is assessed as being at very high cardiovascular risk, 24-hour ABPM or HBPM is recommended to exclude masked hypertension.⁶ If masked hypertension is present, it needs to be treated, as it places a patient at increased cardiovascular risk.

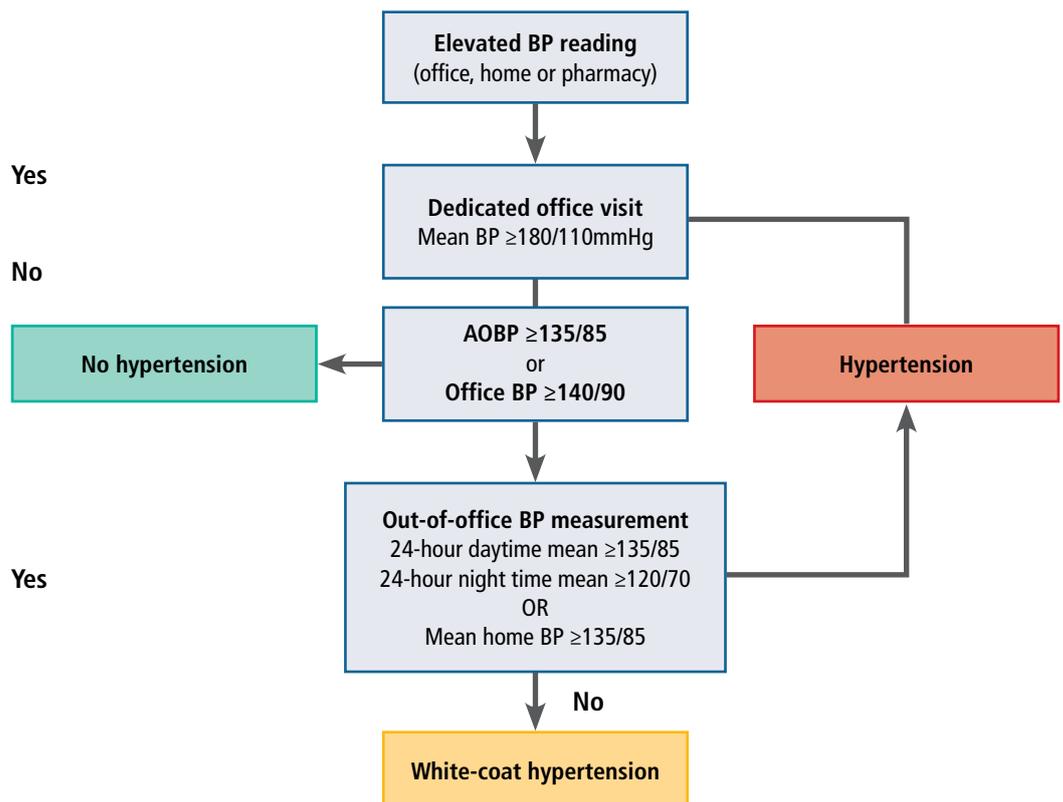


Figure 2. Hypertension diagnostic algorithm (adapted from Jones et al¹⁰)

Assessing blood pressure control

In addition to their utility in refining the diagnosis of hypertension, ABPM and HBPM should be used more routinely to assess control. Clinic monitoring is often inadequate to optimise blood pressure control, especially in high-risk patients and those with hypertensive organ damage, especially

chronic kidney disease. Identifying masked uncontrolled hypertension should drive even wider use of these modalities.

Out-of-office blood pressure measurement is also important when assessing patients with apparent treatment resistance, as these may have superadded

Clinic monitoring is often inadequate to optimise blood pressure control

Up to 40% of patients are non-adherent or suboptimally adherent to therapy

white-coating and non-adherence to antihypertensive treatment. Both can be assessed by bringing the patient to the office in the morning and instructing them not to take any antihypertensive medication beforehand. Taking of medication is then directly observed and ABPM is initiated. The patient returns the next day for the result. Up to 30% of

patients with so-called resistant hypertension actually have superadded white-coating responsible for pseudo-resistance to treatment. This is especially the case in elderly patients with isolated systolic hypertension.⁹ Furthermore, up to 40% of patients are non-adherent or suboptimally adherent to therapy.¹⁰

What are the indications for ABPM?

1. Stage 1 hypertension (140-160/90-100mmHg) where there is no target organ damage and where white-coating may explain the elevation in blood pressure
2. A hypertensive patient who remains uncontrolled despite being on optimal treatment, to assess pseudo-resistance as well as adherence to treatment by directly observing pill-taking
3. To assess out-of-office control in high-risk patients or those with hypertensive

organ damage despite optimal or borderline clinic blood pressure. ABPM may detect both masked hypertension and failure to control night time blood pressure, which may require escalation of therapy.

Words of caution

Devices should always be certified and properly calibrated. ABPM is not indicated in patients with significant arrhythmias.

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KEY LEARNINGS

- The NICE 2011 guideline's recommending the routine use of ABPM (and/or HBPM) represents the most radical change in practice in 100 years
- ABPM can accelerate the time to diagnosis and its greater sensitivity and specificity make it a better predictor of target organ damage and cardiovascular risk than office blood pressure measurement
- Other advantages of ABPM include providing objective and high-volume data while the patient is engaged in normal activity in the environment where they live, as opposed to sitting still in the artificial context of an office
- Some 25% of those currently being treated for hypertension may be white-coat hypertensives. ABPM's ability to identify those being treated unnecessarily has significant cost-saving implications
- ABPM identifies patients with masked hypertension, who are at high cardiovascular risk
- Patients with apparent treatment resistance can be assessed for non-adherence and superadded white-coating.

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