

The art of detecting hidden hypertension

Eoin O'Brien outlines the importance of ABPM in identifying white coat and masked hypertension



AMBULATORY BLOOD PRESSURE MEASUREMENT (ABPM) is now accepted as being indispensable to good clinical practice.² The evidence that ABPM gives information over and above clinic blood pressure measurement (CBPM) has been growing steadily over the past 25 years.²

There are a number of obvious advantages:

- The technique gives more measurements than CBPM, and the real blood pressure is reflected more accurately by repeated measurements
- ABPM shows blood pressure behaviour over a 24-hour period during usual daily activities, rather than when sitting in the artificial circumstances of a clinic or office
- ABPM can demonstrate the efficacy of antihypertensive medication over a 24-hour period, which facilitates more rational prescribing than having to base a decision on one or a few CBPMs confined to a short period of the diurnal cycle.

However, one of the greatest advantages of ABPM is the ability of the technique to expose hidden phenomena, which simply cannot be detected by CBPM. These hidden phenomena include white coat hypertension and masked hypertension.

White coat hypertension

ABPM provides a profile of blood pressure away from the medical environment, thereby allowing identification of individuals with a white coat response. White coat hypertension (WCH) has been reviewed recently by the European Society of Hypertension Working Group on Blood Pressure Monitoring.¹ WCH is a term used to denote individuals with abnormally elevated blood pressure in the medical environment and normal blood pressure during usual daily life.^{1,2}

The most popular definition of white coat hypertension is that blood pressure measured by conventional techniques in the office, clinic or surgery exceeds 140 mmHg systolic or 90 mmHg diastolic, but when ABPM is performed, the average blood pressure is less than 135 mmHg systolic and 85 mmHg diastolic during the daytime period. Currently, an average daytime ABPM of less than 135 mmHg systolic and 85 mmHg diastolic is generally considered normal and levels less than 130/80 mmHg are considered optimal.¹

While on the issue of definition, it is important to be clear on the terms being used, and WCH should be distinguished from white coat effect, which is the difference between clinic blood pressures and ABPM regardless of the normality or otherwise of either blood pressure. In other words, white coat effect is present in virtually all hypertensive subjects, whereas WCH is considered a normal or near-normal



phenomenon.¹

The prevalence of WCH depends, of course on the definition used and other factors, such as age and gender, but data from a number of studies indicates that the prevalence of the condition is between 20% and 30%.¹

Clinical significance of white-coat hypertension

The clinical significance of WCH has become clearer from a growing mass of data, including some event-based cohort studies, which suggest that subjects with elevated office/clinic blood pressure, who have normal average daytime pressures on ABPM, have a risk of major cardiovascular events comparable to that of clinically normotensive subjects and less than that of subjects with elevated daytime pressures.³

On the other hand, some studies have suggested that patients with WCH may be at increased risk.⁴ The results of studies with large cohorts, which should include the elderly with isolated systolic hypertension, are needed to confirm these findings.

Overall, evidence to date however, does not allow us to make firm recommendations regarding drug treatment in subjects with white-coat hypertension. Antihypertensive drug treatment would seem to be unnecessary in most subjects with uncomplicated white-coat hypertension.¹

However, intervention studies are needed to determine if in subjects with white-coat hypertension might benefit from treatment to prevent the future development of organ damage and risk of cardiovascular events.

In a study by Staessen and co-workers,⁵ adjustment of antihypertensive treatment based on either ABPM or clinic blood pressure resulted in less intensive drug treatment in the ABPM group despite comparable blood pressure control in both groups, and importantly, patients in the ABPM group



who received less drug treatment were not disadvantaged as judged by left ventricular mass on echocardiography.

Identification of subjects with white-coat hypertension

Several hypertension guidelines stipulate that suspected WCH is an indication for ABPM.¹

However, the guidelines do not elaborate as to how the practising physician may 'suspect' WCH, and in fairness it has to be admitted that data allowing an estimate of the probability of WCH according to the clinical characteristics of subjects are very scarce.

Can an analysis of the available evidence give additional help to the practising physician in deciding which subject with elevated office blood pressure and suspected WCH should or should not have ABPM?

In truth, it must be admitted that it is difficult to escape the conclusion that all patients in whom a diagnosis of hypertension is being contemplated based on office/clinic blood pressures, should have ABPM to exclude WCH, but there are at least some features that may make it more likely that an elevated office blood pressure is due to WCH.

First, subjects (they are not necessarily patients) with office systolic blood pressure between 140mmHg and 159mmHg and/or diastolic blood pressure between 90mmHg and 99mmHg should have ABPM to exclude WCH because about 33% of these subjects may have the condition.

In contrast, ABPM will only identify a small number of subjects with WCH when office blood pressure is higher. Thus, if resources are limited, ABPM should not be used in these subjects solely to identify WCH.

Second, many patients may already be aware that their blood pressure is higher in the physician's office than outside it, and the likelihood of WCH makes them candidates for ABPM for suspected WCH.¹

Masked hypertension

Much less is known about the newly-described condition of masked hypertension, (sometimes called isolated ambulatory hypertension), which denotes patients whose CBPM pressure is low but whose ABPM is elevated, a condition which can be revealed only by ABPM assessment.⁶⁻¹⁰

Recent evidence demonstrates that masked hypertension is a significant predictor of cardiovascular disease, but the problem for clinical practice is how to identify these patients.⁶

Subjects with masked hypertension are those individuals who have clinic blood pressure <140/90 mmHg but elevated ambulatory blood pressure (daytime systolic blood pressure 135 mmHg or daytime diastolic blood pressure 85 mmHg).

Unfortunately, this definition is not always adhered to, which makes it difficult to compare the results from different studies. Sometimes mean 24-hour blood pressure is used instead of daytime blood pressure for identifying the subjects with this clinical condition.

Inevitably, the use of different definitions will result in varying prevalence estimates for masked hypertension.⁶

Prevalence of masked hypertension

Data from several cross-sectional studies have demonstrated prevalence rates varying from a low of 8% to a high of 49%. However, using reasonably comparable definitions, it would seem that the prevalence of masked hypertension

is between 10% and 20%.⁶

In which patients should masked hypertension be suspected? The available evidence suggests that masked hypertension results in increased cardiovascular risk, but clearly ABPM cannot be performed in everyone with normal CBPM!


On the other hand, failure to identify the condition in patients with cardiovascular disease must lead to failure to treat hypertension – the most serious risk for stroke and heart attack.

We could begin, therefore by exercising a high degree of suspicion for masked hypertension in all patients who have had a cardiovascular event, especially if there is a family history of hypertension, previously recorded high CBPM, diabetes, renal disease and proteinuria, or if the risk factor profile places the individual in a high-risk category, and also in those subjects with kidney disease and proteinuria.

Gold standard

There is now incontrovertible evidence that ABPM provides information on blood pressure behaviour that cannot be obtained from other techniques of measurement, and it must be regarded, therefore, as the gold standard of blood pressure measurement.

Moreover, it is the most sensitive measurement predictor of cardiovascular outcome. It follows that if ABPM is superior to CBPM pressure in so many respects, hypertension will be misdiagnosed in many subjects who are only offered CBPM to assess their blood pressure. White coat and masked hypertension are two examples of the benefit of ABPM in managing hypertension.

If we accept that white coat hypertension occurs in 20%-30% of subjects with elevated CBPM, and that masked hypertension is present in 10%-20% of subjects with normal CBPM, it follows that if we continue to rely on CBPM as the sole method of BP measurement, we will misdiagnose 30%-50% of our patients! 

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References

1. Verdecchia P et al on behalf of the European Society of Hypertension Working Group on Blood Pressure Monitoring. When to suspect white coat hypertension? Statement from the Working Group on Blood Pressure Monitoring of the European Society of Hypertension. *Am J Hypertens* 2003;16:87-91
2. Pickering TG et al. How common is white-coat hypertension? *JAMA* 1988; 259: 225-228.
3. Verdecchia P. Prognostic value of ambulatory blood pressure. Current evidence and clinical implications. *Hypertension* 2000; 35: 844-851.
4. Owens PE et al. Is elevation of clinic BP in patients with white coat hypertension who have normal ambulatory blood pressure associated with target organ changes? *J Human Hypertens* 1998; 12: 743-748
5. Staessen JA et al. Antihypertensive treatment based on conventional or ambulatory blood pressure measurement. A randomized controlled trial. *Ambulatory Blood Pressure Monitoring and Treatment of Hypertension Investigators. JAMA* 1997 Oct 1; 278(13): 1065-72
6. Palatini P. Masked hypertension: How can the condition be detected? *Blood Press Monit.* 2004. In press
7. Wing LMH et al on behalf of the ANBP2 Management Committee and Investigators. 'Reverse white coat hypertension' in older hypertensives. *J Hypertens* 2002; 20: 639-644.
8. Pickering T, Davidson K, Gerin W, Schwartz GE. Masked hypertension. *Hypertension* 2002; 40: 795-796.
9. Björklund K et al. Isolated ambulatory hypertension predicts cardiovascular morbidity in elderly men. *Circulation* 2003; 107: 1297-1302.
10. O'Brien E et al; European Society of Hypertension Working Group on Blood Pressure Monitoring. European Society of Hypertension recommendations for conventional, ambulatory and home blood pressure measurement. *J Hypertens* 2003; 21: 821-848.