

● Ambulatory Blood Pressure Monitoring

ABPM should be available to all with hypertension



Prof Eoin O'Brien, Professor of Molecular Pharmacology, The Conway Institute, University College Dublin, says that expert international opinion has assessed ABPM and recommends that the technique, which is more cost effective than any other method of measurement, should be available to all patients with hypertension

Ambulatory blood pressure monitoring (ABPM) has become a subject of considerable scientific interest with over 10,000 papers listed on PubMed in 2012. In 2001 the Center for Medicare and Medicaid Services in the United States approved ABPM for reimbursement for the identification of subjects with white coat hypertension, and in 2011 the National Institute for Health and Clinical Excellence (NICE) in the United Kingdom recommended that ABPM should be offered as a cost-effective technique to all people suspected of having hypertension.

In recognition of the importance of ABPM in clinical practice and hypertension research the Working Group on Blood Pressure Monitoring of the European Society of Hypertension (ESH) held a consensus conference on ABPM in Milan in 2011.

Arising from this meeting, a position paper was drafted incorporating the opinions of 34 international experts in hypertension and blood pressure (BP) measurement. This paper, running to 38 pages is a comprehensive review of ABPM in 2013 and draws on the evidence from over 600 papers on the subject. The paper will serve as a reference source for ABPM and a short paper for clinical practice is now being drafted. The following are some of the main conclusions that are relevant to clinical practice.

Devices and software

Most devices available for ABPM have been validated independently according to the internationally accepted validation protocols. To-date recommendations for ABPM use have tended to concentrate on the accuracy of device hardware, with little attention being paid to the software presentation and analysis of ABPM data.

As a consequence the practising physician, who has to interpret the considerable amount of data provided by ABPM, is often faced with superfluous detail presented in plots and histograms that have little relevance for clinical practice.

The Position Paper breaks new ground, therefore, in stipulating the software requirements for ABPM, which are to provide a standardized plot format on one page, with different windows of the 24-hour period identified and normal bands clearly demarcated showing the subject's awake and asleep time intervals, summary statistics for blood pressure

and heart rate in the windows of the 24-hour period, an automated software-generated interpretative report indicating normal or abnormal BP patterns, the provision of a trend report and the system should be capable of storing data for detailed analysis for research and audit while also facilitating the establishment of national registries.

ABPM thresholds for clinical practice

The threshold values in the recent NICE guidelines, and other national guidelines influenced the definition of consensus values summarized in Box 1.

Number of measurements for a satisfactory ABPM

There are no firm data on which to base recommendations for a satisfactory ABPM recording. The Position Paper made the general recommendation that in clinical practice a satisfactory ABPM recording should have at least 70% of expected measurements. This figure will be influenced by the duration of daytime (awake) or night-time (asleep) periods, and by the frequency of measurements selected for each period (usually at 30 minute but sometimes at 15 or 20 minute intervals).

Having considered what evidence is available and the practical issues of performing repeat ABPM in practice it was recommended that there should be a minimum of 20 daytime measurements and 7 measurements at night based on measurements being performed every 30 minutes.

Diagnosis of hypertension

In reaching a consensus on the clinical indications for ABPM the recommendations of international guidelines published between 2000 and 2013 were first reviewed. Given the strong recommendations supporting the greater use of ABPM in clinical practice, it is now incumbent on each country to provide ABPM services to patients who will benefit from improved management of hypertension as listed in Box 2.

In clinical practice, the most well established indication for performing ABPM, as recommended in all international guidelines, is to identify untreated patients who have high BP readings in the office but normal readings during usual daily activities outside of this setting, i.e. white coat hypertension, and to identify varying 24-hour BP profiles.

The traditional definition of white coat hypertension is

Box 1. Thresholds for hypertension diagnosis based on ABPM

24-hour average	≥ 130/80 mmHg
Awake (Daytime) average	≥ 135/85 mmHg
Asleep (Night-time) average	≥ 120/70 mmHg

based on an elevated office BP ≥ 140 mmHg systolic and/or ≥ 90 mmHg diastolic with a normal BP during the awake period, i.e. a mean awake ambulatory systolic/diastolic BP < 135 and < 85 mmHg in untreated subjects. However, in recent years, there has been increasing interest in BP behaviour during sleep and nocturnal BP is now recognized to be superior to daytime BP in predicting cardiovascular risk.

It seems illogical, therefore, to exclude this period in definitions of white coat and masked hypertension and the Position Paper proposes including patients with office readings ≥ 140/90 mmHg and a mean 24-hour BP < 130/80 mmHg, thereby incorporating nocturnal BP in the definition.

With the prevalence of white coat hypertension in the community being as high as 20-25%, it is important to make an accurate diagnosis, which can best be achieved by performing 24-hour ABPM and/or home BP monitoring before prescribing antihypertensive drug therapy.

The Position Paper recommends that people with white coat hypertension should have the diagnosis confirmed in 3 to 6 months and be followed at yearly intervals with ABPM, or home BP monitoring, so as to detect if and when sustained hypertension occurs. It is emphasised that the term white

coat hypertension should be restricted to people who are not on antihypertensive medication.

As with the definition of white coat hypertension it is inappropriate to exclude nocturnal BP when defining masked hypertension and the definition should be extended to include also 24-hour BP values > 130/80 mmHg. Concerning the question as to whether or not the definition of masked hypertension should be applied also to subjects on BP lowering medication and not only to untreated subjects, it is inappropriate to apply the term to subjects on treatment because by definition hypertension has been diagnosed and cannot be "masked".

Patients with this condition should be offered effective therapeutic BP control throughout the 24-h period to prevent the cardiovascular consequences of uncontrolled hypertension.

There is compelling evidence that nocturnal BP is superior to casual pressure in predicting outcome. This has led investigators to suggest that the most important parameter for predicting outcome is the level of night-time BP, rather than any measure of day-night BP difference. Isolated nocturnal hypertension, which may be present in 7% of hypertensive subjects, can only be diagnosed with ABPM.

Box 2. Clinical indications for ABPM

Identifying white coat hypertension phenomena

- White coat hypertension in untreated subjects
- White coat effect in treated or untreated subjects
- False resistant hypertension in treated subjects

Identifying masked hypertension phenomena

- Masked hypertension in untreated subjects
- Masked uncontrolled hypertension in treated subjects

Identifying abnormal 24-hour blood pressure patterns

- Daytime hypertension
 - Siesta dipping/post-prandial hypotension
- Nocturnal hypertension
 - Dipping status
 - Morning hypertension and morning blood pressure surge
 - Obstructive sleep apnoea

Assessment of treatment

- Increased blood pressure variability
- Assessing 24 hour blood pressure control
- Identifying true resistant hypertension

Assessing hypertension in the elderly

Assessing hypertension in children and adolescents

Assessing hypertension in pregnancy

Assessing hypertension in high-risk patients

Identifying ambulatory hypotension

Identifying blood pressure patterns in Parkinson's disease

Endocrine hypertension

When to repeat ABPM in clinical practice

The recommendation as to when ABPM should be repeated was debated at length. However, so many factors influence any recommendation that the question largely becomes one of clinical judgement and the availability of ABPM. For example, severe or apparently resistant hypertension, the presence of target organ damage, the existence of comorbidities, such as diabetes, and a bad family history should prompt frequent ABPM in the quest for BP control, whereas, mild hypertension and the absence of target organ involvement and other features of cardiovascular disease, might call for less frequent ABPM and the use of self-BP measurement at home.

Role of Home BP

The Position Paper recommends that ABPM should be performed whenever possible in subjects with suspected hypertension in whom it is necessary to confirm the diagnosis of sustained hypertension, (i.e. to exclude white coat hypertension), to assess the severity of hypertension throughout the 24-hour period, to detect nocturnal hypertension, to detect patterns of BP behaviour such as non-dipping and alterations in BP variability due to autonomic failure, and to be able to analyse the 24-hour data for indices of BP fluctuations, such as the ambulatory arterial stiffness index (AASI), and measures of BP variability.

ABPM is particularly appropriate for the initial evaluation, because it provides standardised and unbiased information within 24 hours and without need of training, skills and commitment from the patient, as required for home BP.

However, when ABPM is not readily available, out-of-office assessment of BP with self-home monitoring is recommended according to the procedure recommended the ESH guideline by having duplicate morning and evening self-measurements for 7 days and calculating the average after discarding measurements on the first day.

Who should perform ABPM?

Despite the large diversity in the structure of healthcare systems across different countries, the vast majority of hypertensive patients are being man-

aged in primary care. Thus, in practice, primary care doctors may establish their own ABPM service, or alternatively they may refer their patients to an external ABPM service, as they routinely do for multiple other medical tests.

Models to develop such services are being currently tested in several countries and might include specialist clinics, healthcare providers in the private sector, pharmacy based services, and other solutions.

Whereas primary care practices and hypertension centres will be the main providers of ABPM, the valuable role of pharmacies in achieving improved control of hypertension has been recognised for many years.

Indeed it has been shown that when pharmacists become engaged in the management of hypertension, BP control improves, and therefore the pharmacy might be a very appropriate setting in which to initiate the wide referral of patients for ABPM in collaboration with primary care physicians and/or specialists.

Recently ABPM has been introduced to pharmacists in Ireland, and the pharmacy-based service is proving popular with patients and is being increasingly adopted.

Conclusion

Expert international opinion has assessed ABPM and recommends that the technique, which is more cost effective than any other method of measurement, should be available to all patients with hypertension. The recommendations of the Position Paper from the European Society of Hypertension should be acknowledged by the HSE and the Department of Health and Children, and immediate measures should be put in place to ensure that patients with hypertension have ready access to ABPM. This will only be achieved by reimbursing general practitioners to provide the technique and using innovative ways of making the technique available to the public, for example, through pharmacies.

In addition the opportunity to establish a blood pressure registry by centrally hosting data from ABPM should be realised so as to allow the accurate apportionment of resources to prevent the increasing cardiovascular consequences of hypertension, most especially stroke, cognitive impairment and heart failure.

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