

# Managing blood pressure using ABPM

Ambulatory blood pressure measurement should be an integral part of good clinical practice, writes **Prof Eoin O'Brien**

**A**BPM (Ambulatory Blood Pressure Measurement) should be available in primary care to improve the diagnosis, to guide treatment, and to facilitate achievement of optimal control of blood pressure in all patients with hypertension or suspected hypertension.

One sometimes has to ponder what it takes to make a technique so indispensable to practice that it must, and indeed needs be, become the rule rather than the exception. And yet nothing is new under the sun; it seems to me that (ABPM) is in much the same historical position at the start of the twenty-first century as conventional measurement with the mercury sphygmomanometer and stethoscope was at the end of the 19th century when one sceptic, while acknowledging that "the middle-aged and successful physician may slowly and imperceptibly lose the exquisite sensitiveness of his fingertips through repeated attacks of gouty neuritis", went on to express his sincere doubts that the sphygmomanometer would ever be welcomed by "the overworked and underpaid general practitioner, already loaded with thermometer, stethoscope, etc."

ABPM is not exactly new to medicine; in fact it has been with us in one form or another for nearly half a century. In 1964, Sir George Pickering showed for the first time the profound fall in blood pressure recorded during sleep and the fluctuations in pressure during the course of 24-hours. Pickering's group went on to develop an ambulatory technique whereby pressure could be measured directly from the brachial artery with a small plastic catheter and the first intra-arterial ambulatory blood pressure measurement in unrestricted man was performed in 1966. In 1962, Hinman and his colleagues described the first truly portable ambulatory system for the non-invasive measurement of blood pressure, which was subsequently developed commercially by the Remler Company in California. So began non-invasive measurement of ambulatory blood pressure. We first used ABPM in 1979, and as an early plot from this period bearing the diagnosis "anxiety then normotension", we clearly recognised what is now known as white coat hypertension. It is interesting to contrast this plot

with a contemporary computerised presentation to appreciate how much software development can add to the diagnostic process. Writing in the *ABC of Hypertension* series in the *British Medical Journal* in the same year (1979) we advocated "development of a cheap and accurate means of ambulatory recording would have a considerable impact on the diagnosis of borderline hypertension and the assessment of the efficacy of treatment". This forecast has been slow to materialise but the evidence that ABPM is indispensable to good clinical practice has been growing steadily, and during the last decade the information that can be derived from ABPM has surprised even the most ardent supporters of the technique. It is timely, therefore, to review the evidence that justifies the title of this review.

## Diagnostic role for ABPM

In clinical practice the most common use of ABPM is to identify patients with suspected white coat hypertension, who constitute at least 20 per cent of hypertensive patients. The problem is that there are no clinical characteristics that permit the practicing physician to "suspect" the condition. Indeed one has to agree with the conclusion from the European Society of Hypertension statement on *When to Suspect White Coat Hypertension*: "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 pressure, should have ABPM to exclude white coat hypertension."

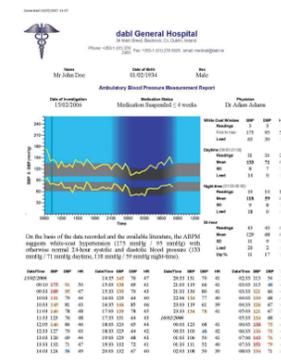
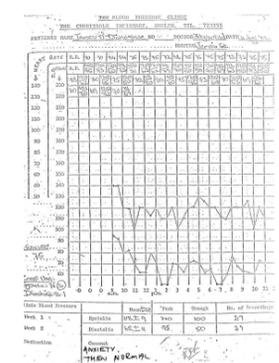
Identification of masked hypertension: ABPM can also identify patients with the recently recognised phenomenon of masked hypertension, which occurs in at least 10 per cent of the adult population (estimated to be as many as 10 million people in the US) in whom conventionally measured blood pressure in the clinic setting is normal but ABPM is increased. Clearly ABPM cannot be performed on everyone, but is there not a strong case for performing ABPM in patients who have had a cardiovascular event, simply because the consequence of not prescribing antihypertensive medication to a patient with, for example, a history of a previous stroke, is to deny that patient the most potent medication to prevent stroke recurring? It is a salu-



**'It might not be a bad idea for patients to take a look at ABPM and to ask why the investigation is being denied them so often?'**

tary thought that if white coat hypertension is present in 20 per cent of the population when blood pressure is measured conventionally in primary care and if masked hypertension is present in 10 per cent of patients whose blood pressure is measured in similar circumstances, it follows that the diagnosis of

139/80-89 mmHg. This condition, which carries increased risk of cardiovascular events, is estimated to be present in about 28 per cent of American adults, or 59 million people. Treatment of these patients will place an enormous financial burden on society and we must question, therefore, the accuracy of this estimate. As the

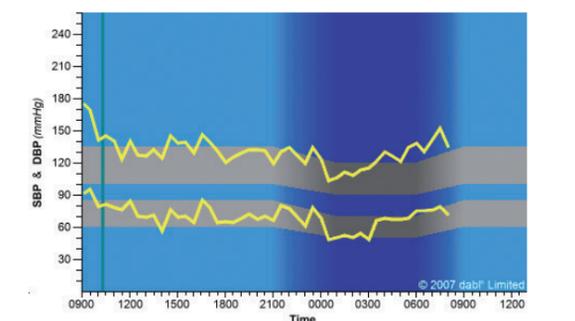


**Figure 1 (left): A sample of a graph used before the advent of ABPM in 1979. Figure 2 (right): A recent example of a modern ABPM chart**

hypertension is being misdiagnosed in as many as a third of all patients attending for routine blood pressure measurement.

Identification of prehypertension: There is growing interest in

figure is derived from conventional blood pressure measurement, we must assume that some 20 per cent of these patients will have had white coat hypertension, from which it follows that the diagnosis



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the condition known as prehypertension, which is defined as a blood pressure in the range 120-

of prehypertension will be erroneous in nearly a quarter of the patients diagnosed with this con-

dition. The financial implications for society are obvious and ABPM provides a cost-effective means of accurately determining the true prevalence of prehypertension.

## ABPM as a guide to treatment

The evidence for ABPM as a methodology to guide drug treatment in clinical practice is growing. The technique provides evidence for efficacy of blood pressure control over 24-hours, allows resistant hypertension to be differentiated from a white coat reaction that misleadingly suggests resistance to therapy, and provides evidence of overtreatment, particularly in the elderly, who are prone to hypotension.

## Nocturnal blood pressure

ABPM is the only accurate means of monitoring nocturnal blood pressure, which has been largely ignored in clinical practice despite many studies showing that nocturnal phenomena such as non-dipping, reverse dipping, extreme dipping, nocturnal hypertension, and a morning surge are associated with a poor prognosis. Pharmacotherapy for hypertension is now being directed towards ways of modifying the nocturnal patterns of blood pressure so as to improve prognosis.

## Special populations

ABPM is also valuable in special populations, such as the elderly, who may have complicated circadian patterns with, for example, daytime hypotension alternating with nocturnal hypertension due to baroreceptor dysfunction. Diabetic patients are in need of aggressive control of both day and nighttime blood pressure so as to prevent the premature onset of cardiovascular complications and ABPM must now be considered a mandatory investigation in such patients, and the same is true for patients with renal disease. In pregnancy, both mother and foetus may be spared unnecessary medication by using ABPM to diagnose white coat hypertension, which is present in as many as 30 per cent of pregnant women.

## Indices of blood pressure

Recently ABPM has been used to achieve more subtle

insights into circadian hypertension. The Ambulatory Arterial Stiffness Index (AASI), which has been shown to predict cardiovascular mortality, particularly stroke even in normotensive subjects, in a large cohort of hypertensive individuals in the Dublin Outcome Study, may prove to be a readily applicable index that can be derived from a routine ABPM to predict outcome. In this study nighttime blood pressure was the most sensitive indicator of future outcome – for each 10mmHg rise in mean nighttime systolic blood pressure, the mortality risk increased by 21 per cent. The practical importance of such an index is that it may permit early categorisation of hypertensive patients into those at risk from cardiovascular events and thus indicate those in need of aggressive blood pressure lowering.

## Conclusion

What are the messages from this review and to whom should they be addressed? First, ABPM should be an integral part of good clinical practice and it is up to healthcare providers to reimburse doctors adequately for the procedure given the assurance of considerable cost savings. Second, practicing physicians must agitate for a technique that will provide them with the means of diagnosing their hypertensive patients more accurately, of guiding drug prescribing more efficiently, and of predicting risk and outcome in individual patients. Third, manufacturers of ABPM devices must improve monitors in keeping with the innovative possibilities that contemporary technology provides and also ensure that software options allow for standardised presentation of data, statistics and plots, interpretation of recordings, and the electronic means of sharing data to further patient management and hypertension research. Finally, it might not be a bad idea for patients to take a look at ABPM and to ask why the investigation is being denied them so often?

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