

# Ambulatory blood pressure measureme

*Prof Eoin O'Brien reviews the evidence showing that ambulatory BP measurement*

Since Riva-Rocci and Korotkoff gave us the technique of conventional blood pressure (BP) measurement over a century ago, we have landed men on the moon, encircled Mars, invented the automobile and aeroplane, and most importantly, revolutionised the technology of science with the microchip. Why, we might ask, has medicine ignored scientific evidence for so long so as to perpetuate a grossly inaccurate measurement technique in both clinical practice and hypertension research?

It is generally accepted that traditional clinic or office blood pressure measurement (OBPM) is limited in the amount of information it can provide for the adequate management of hypertension, and that contemporary practice must turn to out-of-office measurement to obtain additional information to guide the diagnosis and management of hypertension.

## Ambulatory blood pressure measurement

There can be little argument that ABPM is superior to OBPM, and the use of ABPM is recommended by several national and international guidelines for the management of hypertension in Europe and the US. The devices currently available for ABPM have been subjected to independent validation, mostly according to the European Society of Hypertension International Protocol, and are accurate. It is important for physicians and patients using ABPM to ensure that the device being used has been recom-

Study – showed that only 12 per cent of patients achieved target BP with OBPM compared to over one-third of patients with ABPM. Furthermore, 38 per cent of patients had a change in their medication as a result of ABPM; 32 per cent had a new medication started; plus 14 per cent of untreated patients with elevated OBPM, who were candidates for drug treatment, were not commenced on medication because ABPM was normal.

The largest study to date on ABPM in primary care comes from Spain, where a nationwide project to promote the use of ABPM in primary care settings is being established. In this large cohort of some 20,000 patients, clinic BPs were approximately 16/9mmHg higher than ABPM in patients categorised as being at low to moderate added risk, with a greater difference (23/23mmHg) in those categorised as being at high-risk, in spite of receiving much more anti-hypertensive treatment. Moreover, high-risk hypertensive patients showed a high prevalence of circadian rhythm abnormalities on ABPM with the prevalence of a non-dipping pattern being almost 60 per cent, and in patients with the lowest ABPM levels, high-risk patients showed a higher prevalence of non-dipping nocturnal BP than lower-risk cases. An editorial commentary on this study urges the wider use of ABPM to gain more accurate risk categorisation of patients in the community, as well as being able to

underestimated in over a third of patients, and overestimated in some five per cent by OBPM as compared to ABPM. Notably BP was uncontrolled by both methods of measurement in 43 per cent of patients. High-risk patients showed poorer ABPM control than low-to-moderate risk patients in spite of receiving much more anti-hypertensive treatment.

## Advantages of ABPM

*Identification of white coat hypertension:* ABPM is the most effective technique for identifying white coat hypertension, which may be present in as many as 20 per cent of people who appear to have hypertension with OBPM, and these patients may be spared years of unnecessary and expensive drug treatment, as well as avoiding being penalised unnecessarily for insurance or employment by having the diagnosis of 'hypertension' misapplied.

*Identification of masked hypertension:* Masked hypertension is the reverse of white coat hypertension in that patients have normal OBPM but elevated daytime ABPM. The prevalence of masked hypertension seems to vary between 10 and 20 per cent, but even if the prevalence was only five per cent, this number applies to the whole adult population, not just the proportion of the population with hypertension, which translates into about 10 million people in the US. Indeed it is a salutary thought that if white coat hypertension is present in 20 per cent and masked hypertension in 10 per cent of the population when BP is measured conventionally in primary care, it follows that the diagnosis of hypertension is being misdiagnosed in as many as a third of all patients attending for routine BP measurement.

*Identification of nocturnal hypertension:* Nighttime BP measured by ABPM is superior to OBPM in predicting cardiovascular events. In the Spanish study in primary care, the prevalence of a non-dipping BP pattern was almost 60 per cent and this was more likely in high-risk patients. Recent studies have drawn attention to the importance of controlling not only daytime, but also nighttime BP. In this regard, control of

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mended for clinical use by checking the website, [www.dableducational.org](http://www.dableducational.org), which provides the latest accuracy data on all BP measuring devices.

## Experience with ABPM in primary care

An Irish study in primary care – the RAMBLER

obtain a more accurate estimate of the community control of BP. As in the Irish study, BP control was better when assessed by ABPM than by OBPM, indicating that the “white coat effect” with OBPM is leading to an underestimation of BP control in the community. BP control was

# ment should be available in primary care

## ent (ABPM) is superior to clinic or office measurement

the early morning surge may prove to be particularly important in preventing stroke. It follows, therefore, that if nocturnal BP control, which can only be assessed with ABPM, is important in preventing cardiovascular events, ABPM should be available to ensure that 24-hour BP control is achieved in hypertensive patients.

### Conclusion

Individuals aged over 60 represent the most rapidly growing segment of the population. Projections for the European region suggest that the proportion of the population aged 65 and over will increase from 20 per cent in 2000 to 35 per cent in 2050, and the median age will rise from 37.7 years in 2000 to 47.7 years in 2050. The prevalence of hypertension increases with advancing age, to the point where more than half of people aged 60 to 69 years old and approximately three-quarters of those aged 70 years and older are hypertensive. As the predominant determinants of stroke are hypertension and age, it is hardly surprising that increased age carries an increased risk of stroke, and that with increasing longevity the incidence of stroke is rising; for example in Europe, stroke rates increased from approximately 5,000 per 100,000 in subjects aged less than 75 years to 10,000 or more per 100,000 in those aged more than 80 years.

Improved BP control could have a major impact on these daunting statistics. For example, a meta-analysis of eight placebo-controlled trials in 15,693 elderly patients followed for four years showed that active antihypertensive treatment reduced coronary events (23 per cent), strokes (30 per cent), cardiovascular deaths (18 per cent), and total deaths (13 per cent), with the benefit being greatest in patients older than 70 years. Hypertensive patients in whom BP is uncontrolled by treatment have a cardiovascular risk only modestly less than that of untreated individuals, which leads to the conclusion that in practice BP lowering drugs are prescribed inappropriately without achieving optimal control, or, put another way, “patients are frequently not barely but badly controlled”. This therapeutic inertia

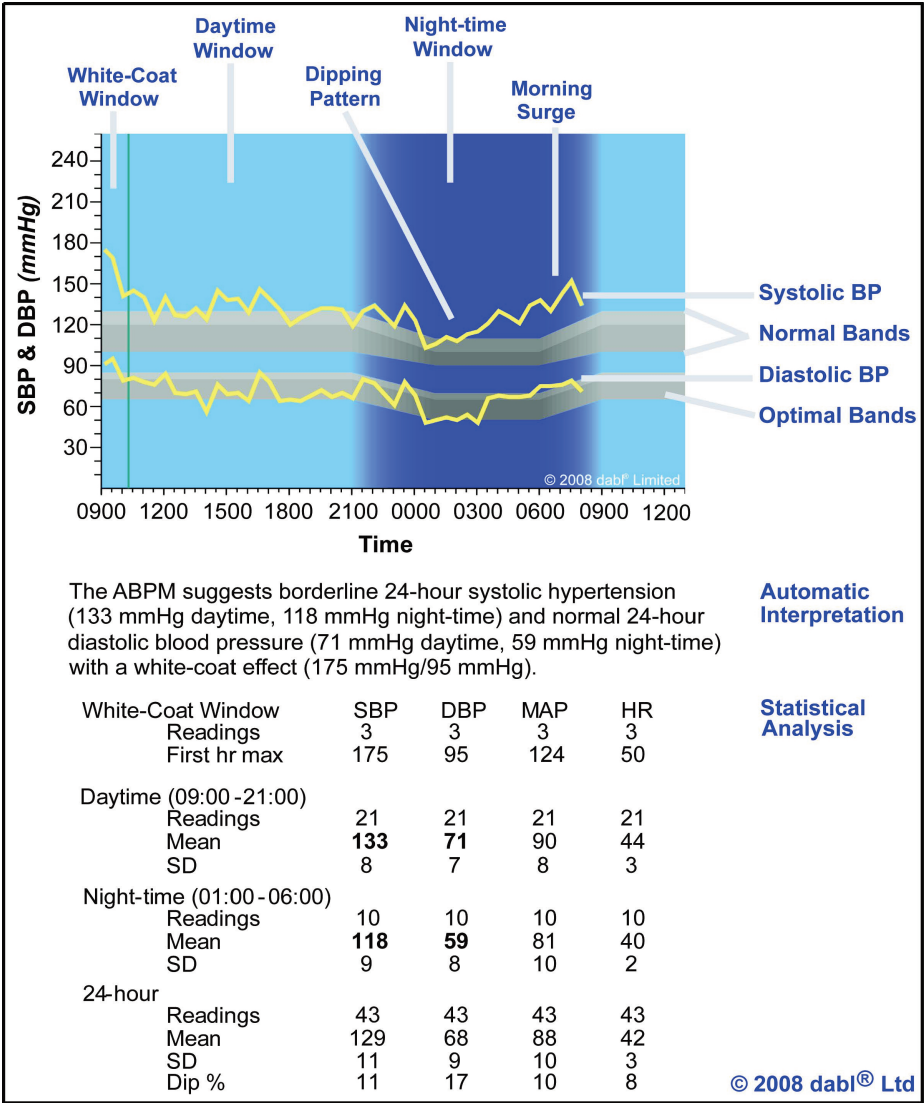


Figure: Example of a standardised interpretative ABPM report

whereby the prescribing of medication is seen as constituting an end in itself, in that some good will be achieved, must now be replaced by a clinical modus operandi recognising that the efficacy of medication will ultimately determine the fate of the patient with hypertension. Efficacy, however, can only be gauged by the achievement of evidence-based target levels of BP, which in turn demands accurate BP measurement that should also be capable of indicating BP control over the 24-hour period.

Given these facts it seems that there should be an imperative to change contemporary clinical practice if we are to avert the burden of stroke and heart failure in an aged population. We have adequate drugs to achieve effective BP lowering in the vast majority of patients; what we lack is the determination to achieve effective BP control as early as possible. In the light of the evidence available on these societal and financial

consequences of uncontrolled hypertension we must no longer quibble over the cost of technology to measure BP. Every patient suspected of having hypertension should have ABPM to confirm or refute the diagnosis, and every patient with uncontrolled hypertension should have ABPM repeated as necessary until 24-hour control of BP is achieved.

References: This essay is based on: O'Brien E. Ambulatory Blood Pressure Measurement: The Case for Implementation in Primary Care. *Hypertension* 2008;51:1435-1441 (in which a full list of references may be obtained)

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