

Cardiovascular technology and indication service

Today's topic:

Office-based 24-hour/ambulatory blood pressure monitoring (ABPM)

Series: Best practice management of hypertension



Blood pressure measurement through history

- Stone age** Cave paintings in Spain show the heart as a vulnerable organ.
- 1628** William Harvey's description of blood circulation founds the science of cardiology. Thomas Sydenham makes the visionary statement that, "A man is as old as his arteries".
- 1896** Riva-Rocci describes a technique for measuring blood pressure indirectly.
- 1940** Ayman and Goldshine¹ describe a technique for home-blood pressure measurement and demonstrate that blood pressure in the clinic and at home differ.
- 1962** Hinman et al.² describe a technique for ambulatory blood pressure measurement (ABPM).
- 1966** Sokolow et al.³ show that ABPM measurements better-correlate with cardiovascular morbidity than measurements made in the clinic.
- 2007** The ESH/ESC⁴ states that ABPM should be the preferred method of diagnosing hypertension.
- 2010** The Swiss Society of Hypertension recommends ABPM measurement be adopted as standard practice.
- 2011** NICE guidelines state that the evidence shows that ABPM has health and financial benefits compared to measurement at the clinic.
- 2013** European Society of Hypertension – Guideline for procedure and Value of ABPM⁵



Clinical background – scientifically proven.

What is the prognostic significance of ABPM?

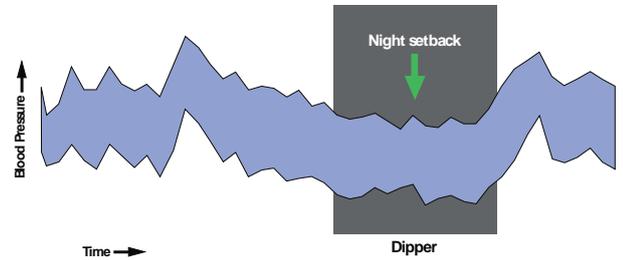
24-hour blood pressure monitoring provides important additional information for optimising anti-hypertensive therapy. In particular, it enables the identification of 'white coat' and 'masked' hypertension.

The SHEAF (self-measurement of blood pressure at home in the elderly; assessment and follow up) study⁶ compared home blood pressure measurements with clinical blood pressure measurements for 4,939 patients being treated for hypertension, followed up for 3.2 years.

Why is ABPM a more effective diagnostic instrument than office blood pressure measurement?

Identifying or excluding hypertension requires repeated measurements on different days and at different times of day. Resting blood pressure is measured after five minutes rest and requires at least 2–3 measurements.

ABPM involves measuring blood pressure over a longer period, with the patient wearing a blood pressure monitor for 24 hours. ABPM provides the best measure of actual blood pressure and is essential for treatment decision and monitoring. A diagnosis can be arrived at after just a single examination.



The 24-hour profile is used to decide whether drug regimen needs to be adjusted.

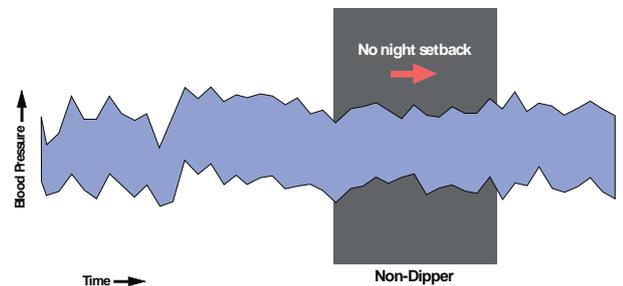
What other benefits does ABPM offer?

Frequent measurements both during the daytime and at night allow physiological blood pressure variability under day-to-day conditions to be captured and provide information on:

- 1) white coat hypertension
- 2) masked hypertension
- 3) early morning blood pressure
- 4) day-night rhythm (dipping status is prognostically significant)
- 5) indications of secondary hypertension

Over a 24-hour period, blood pressure has a characteristic day-night rhythm. The lack of a day-night rhythm may be an indicator of secondary hypertension. ABPM correlates much better with comorbidities such as LVH, IMT, retinopathies and kidney function/proteinuria.

The day/night button, allowing for exact identification of whether the patient is a dipper or non-dipper⁷), is important for the determination of precise averages for day and night.



A 24-hour profile reveals a suspected secondary hypertension, eg. pheochromocytoma (disorder of the adrenal medulla which produces catecholamines/adrenaline).

"The assistant prepares the ABPM device and the MD gets the tool for correct therapy decisions."

What are the key criteria for choosing a measurement system?

The product should include at least 3 cuffs, ranging from pediatric to obese patients for example. Environmentally-friendly rechargeable battery systems are useful for reducing running costs. The analysis software should meet methodological requirements for risk screening, diagnosis and monitoring of treatment. Reports for patients should facilitate patient management. On-site training and training for medical assistants should always be available.

High patient acceptance – adjusted pressure control

The most important criterion for patients is being able to sleep through the night whilst undergoing an ABPM monitoring. An important aid reflects the barely audible noise of the pump and automated pressure control using AF[®]-Logic (Auto-Feedback-Logic ensures that the pump reacts to actual systolic blood pressure).



Maximum integrity in everyday practice – accurate measurement

As well as 24-hour blood pressure monitoring for diagnostic purposes, monitoring should also be possible during hypertensive crises, for rapidly checking therapeutic measures, for example. Daily device management, from replacing the battery to rapid connection to a computer, should be simple and safe. Optimum cuff fit for young and old is as important as being able to clean the cuff easily. The device should meet ESH protocol and the BHS A/A grading accuracy requirements. For references, see: www.bhsoc.org/bp-monitors/bp-monitors and [dabl[®] www.dableducational.org](http://dabl.org).



Sophisticated software – analysis with high interoperability

Modern analysis software includes numerous options for measurement modes, ranging from clinical measurement to ABPM measurement and home blood pressure measurement. Extensive analysis as well as a "single page compact report"⁵ for a quick, brief insight should be available. An interface with the office or hospital information system should ensure the smooth and safe exchange of relevant data.



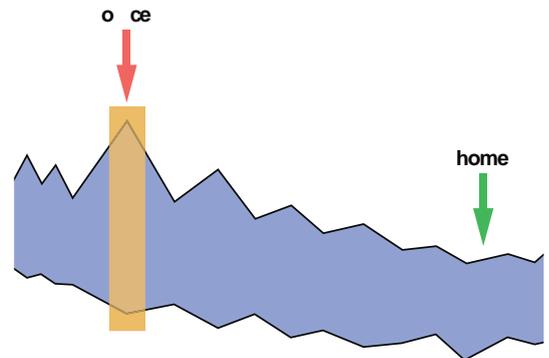
"Patient acceptance, simplicity of operation, clear, detailed analysis and high measurement accuracy are essential requirements for successful operation in day-to-day practice routine."

ABPM reveals masked hypertension. Is there a difference in morbidity?

The SHEAF-study involved patients being treated by their treating physician with no specific recommendations. It compared the frequency of incidents of mortality and morbidity (stroke, myocardial infarction, sudden cardiac death, hospitalisation for heart failure, angina pectoris).

White coat hypertension was identified in 13% of patients. The incidence of cardiovascular events within this group was 12.1 per 1,000 treatment-years.

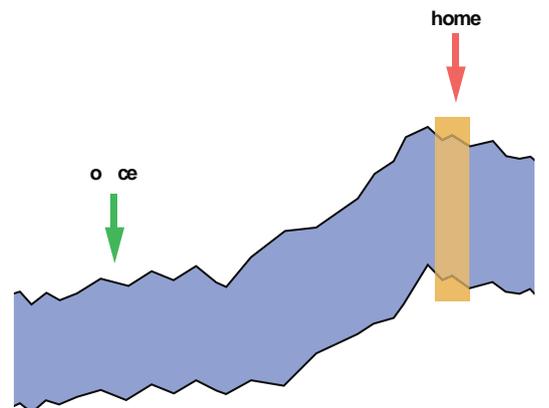
(Office blood pressure elevated, home blood pressure normal)



150/84 mmHg in office, 126/74 mmHg at home

Masked hypertension was identified in 9% of patients. This group showed the highest incidence, at 30.6 per 1,000 treatment-years.

(Office blood pressure normal, home blood pressure elevated)



133/78 mmHg in office, 143/82 mmHg at home

The results show a statistically significant correlation with the actual measured blood pressure under real conditions. The highest mortality identified in the study was in patients with masked hypertension. White coat hypertension and masked hypertension can be confirmed using 7-day home blood pressure measurement or better using ABPM.

24-hour ambulatory blood pressure monitoring (ABPM) is essential for managing treatment, particularly in terms of the poor prognosis for patients with masked hypertension.

"Office measurement remains the most important procedure for hypertension screening. A disadvantage is its inability to identify the presence of white coat hypertension or masked hypertension".

What health economic benefits does ABPM offer?

Analysis by British researchers at the University of Birmingham found that ABPM was the most cost-effective way of diagnosing hypertension. This has been demonstrated by the National Institute of Health and Clinical Excellence⁸ (NICE) from the UK. The process – from diagnosis, to antihypertensive therapy and management of any ensuing cardiovascular disease – was compared with other strategies. The use of ABPM led to significant savings, largely through better targeting of treatment as a result of increased diagnostic accuracy.

**23% cost reduction
per hypertensive patient**



**according to the NICE study*,
where ABPM is used**

*National Institute for Clinical Excellence – London

How can physicians reimburse 24h ABPM services?

Reimbursement is in accordance with country specific regulations. ABPM provides details on conventional blood pressure measurement and may be offered as part of a preventive program.

Even though the 24h ABPM may not be eligible for reimbursement it is yet of great importance for the patient to maintain information concerning the personal measurement of night blood pressure. This information is contained in the brochure "Do You Know Your Night Blood Pressure?" and may support the practice-to-patient marketing to increase the patient's demand. Experience shows that the patient will be encouraged to pay for the ABPM service out-of-the-pocket.



Literature and sources:

1. Blood pressure determination by patients with essential hypertension: 1: the difference between clinic and home readings before treatment; Ayman D, Goldshine; Am J Med Sci 1940; 200: 465-474
2. Portable blood pressure recorder. Accuracy and preliminary use in evaluating intradaily variations in pressure.; HINMAN AT, ENGEL BT, BICKFORD AF.; Am Heart J. 1962 May;63:663-8
3. The prognostic value of ambulatory blood pressures.; Perloff D, Sokolow M, Cowan R.; JAMA. 1983 May 27;249(20):2792-8
4. 2007 Guidelines for the management of arterial hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC).; Mancia G et al.; Eur Heart J. 2007 Jun;28(12):1462-536. Epub 2007 Jun 11
5. European Society of Hypertension position paper on ambulatory blood pressure monitoring.; O'Brien E et al.; J Hypertens. 2013 Sep;31(9):1731-68
6. Cardiovascular prognosis of „masked hypertension“ detected by blood pressure self-measurement in elderly treated hypertensive patients.; Bobrie G et al.; JAMA. 2004 Mar 17;291(11):1342-9
7. Time-weighted vs. conventional quantification of 24-h average systolic and diastolic ambulatory blood pressures.; Octavio JA et al.; J Hypertens. 2010 Mar;28(3):459-64
8. Hypertension: The Clinical Management of Primary Hypertension in Adults: Update of Clinical Guidelines 18 and 34 [Internet].; National Clinical Guideline Centre (UK).; London: Royal College of Physicians (UK); 2011 Aug. National Institute for Health and Clinical Excellence: Guidance.

Imprint:

Printing and publisher: I.E.M. GmbH, D – 52222 Stolberg, Germany

“From a health economics perspective, ABPM saves the expenditure for hypertensive patients in comparison to office BP measurement.”