

OUT-OF-OFFICE BLOOD PRESSURE MONITORING CLINICAL SIGNIFICANCE AND PRACTICAL ADVANTAGES

Blood pressure (BP) measurement is an important part of physical examination. It should be done routinely and accurately. However, clinic or office BP is often not enough to provide a full clinical picture.¹

There is increasing evidence from different medical societies regarding the use of out-of-office BP monitoring, including both ambulatory BP monitoring (ABPM) and home/self-BP monitoring (HBPM).^{2,5} One advantage is that it provides a large number of BP measurements, away from the medical environment, which could allow for a more reliable assessment (Table 1).²

ABPM or HBPM is usually lower than office BP measurements (Table 2). The difference often increases with higher office BP measurements. While both out-of-office BP monitoring methods provide somewhat different information on BP status, these methods should be regarded as complementary rather than competitive.² ABPM can measure BP variability throughout the day, even nocturnal BP.^{2,3,6} HBPM provides BP measurements over longer periods of time.² Both are used to correlate with cardiovascular events.²

Practical advantages of HBPM

ABPM is considered the gold standard in out-of-office BP monitoring. However, the device is expensive. In some health care settings, cost for ABPM may not be reimbursed. HBPM is more widely available and the device is cheaper. An HBPM device that is appropriately standardized correlates well with ABPM. In addition, HBPM is more reproducible than either clinic BP or ABPM.¹

Clinical significance of HBPM

Out-of-office BP monitoring using HBPM has been recommended for the diagnosis and management of hypertension by several guidelines, particularly in the confirmation of white coat hypertension and masked hypertension (Figure 1).^{1-4,6}

Table 2. Definition of hypertension based on clinic BP, ABPM, and HBPM (Singapore Ministry of Health)^{2,7}

Setting/Method	Systolic BP (mmHg)	Diastolic BP (mmHg)
Clinic	≥140	≥90
Ambulatory daytime (or awake)	≥135	≥85
Ambulatory nighttime (or asleep)	≥120	≥70
Ambulatory, 24h	≥130	≥80
Home	≥135	≥85

WHITE COAT HYPERTENSION	MASKED HYPERTENSION
Office BP readings are elevated when measured in the clinic but otherwise normal with either ABPM or HBPM ^{2,3}	Office BP readings are normal but are found to be elevated with either ABPM or HBPM ^{2,3}
Conversion to sustained hypertension is 1% to 5%—justifies need for continuous monitoring ³	CVD risk is similar to one with sustained hypertension and almost double than their normotensive counterparts—justifies need for continuous monitoring ³

Figure 1. White coat hypertension vs masked hypertension

Singapore Ministry of Health hypertension guidelines recommend HBPM or ABPM (in that order) for younger patients, and for whom target organ damage is found without a raised clinic BP.⁷

Table 1. Comparison between ABPM and HBPM

24-hour ABPM	HBPM
Performed using a lightweight, portable BP device attached to an arm cuff that provides semi-continuous BP monitoring; the monitor is usually attached to a belt or pouch ⁵	Performed by the patient or an observer (eg, a family member) in the home and/or work environment ⁵
<ul style="list-style-type: none"> The device is programmed to inflate every 20-30 minutes during the day and 30-60 minutes during the night At the end of the monitoring, the readings are downloaded to a computer to generate a report⁵ 	<ul style="list-style-type: none"> Readings are obtained in duplicate (1 minute apart) and recorded for a period of 7 days and averaged BP is taken in the morning and evening (preferably before taking medications)⁵
<ul style="list-style-type: none"> Considered the gold standard or best out-of-office method, as it can measure BP throughout the day while the patient does his/her routine activities^{1,3} Can measure BP variability throughout the day as well as nocturnal BP^{2,3,6} 	<ul style="list-style-type: none"> A more practical alternative to ABPM³ Frequent measurements produce values that may be more reproducible and reliable than clinic BP⁴ Provides BP measurements over extended periods²
Prognostic significance: correlates with left ventricular hypertrophy, increased carotid intima media thickness, and CV morbidity and mortality better than clinic BP ²	Prognostic significance: correlates with hypertension-induced organ damage and CV morbidity and mortality better than clinic BP ^{1,2}

Table 3. Recommendations to obtain accurate HBPM^{1,3,7}

WHAT BP DEVICE TO USE	Use a validated automated machine
	Use an appropriate-sized upper arm cuff (NOT a wrist or finger cuff) Soft cuff is recommended
WHERE TO DO HBPM	Use the upper arm of the non-dominant hand
WHEN TO DO HBPM	Take BP readings at around the same time in the morning and evening <ul style="list-style-type: none"> • Morning: 1h after waking, after micturition (sitting after 1-2 minutes of rest), before drug ingestion and breakfast • Evening: just before going to bed (sitting after 1-2 minutes of rest)
	Measure BP for 7 days, or as advised by doctor
HOW TO DO HBPM	DO NOT take BP readings if patient smoked or drank caffeine within 30 minutes of BP measurement
	DO NOT measure BP if patient is uncomfortable, stressed, or in pain
	Sit still and correctly—with back straight and supported and feet flat on the floor
	Ensure ≥5 minutes of quiet rest before taking BP
	Keep arm supported on flat surface, with upper arm at the level of the heart
	Take 2 BP readings 1 minute apart
	Record all BP readings for doctor's review/evaluation

HBPM not only engages and empowers patients in their own care, but also allows them to assess their own response to treatment, which may consequently help improve their adherence to medications.^{1,4} Therefore, general practitioners and specialists should educate patients on how to perform HBPM and encourage them to do it regularly (Table 3).

[Click here](#) for specific instructions on how to tell your patients about HBPM.

[Click here](#) if you want to show your patients how to obtain accurate HBPM.



References:

¹ Sharman JE, Howes FS, Head GA, et al. *J Hypertens* 2015;33:1721-1728. ² Mancia G, Fagard R, Narkiewicz K, et al. *Eur Heart J* 2013;34:2159-2219. ³ Whelton PK, Carey RM, Aronow WS, et al. 2017. ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Available at: <http://hyper.ahajournals.org/content/early/2017/11/10/HYP.0000000000000065>. Accessed March 30, 2018. ⁴ National Institute for Health and Clinical Excellence Hypertension: Clinical Management of Primary Hypertension in Adults (Update). Clinical Guideline 127; 2011. Available at: <https://www.nice.org.uk/guidance/cg127/chapter/1-guidance>. Accessed March 30, 2018. ⁵ Peixoto AJ. *Methodist DeBakey Cardiovasc J* 2015;11:214-218. ⁶ Kantarci G. *Kidney International Supplements* 2013;3:337-339. ⁷ Ministry of Health (MOH) Singapore. Hypertension: MOH Clinical Practice Guidelines, 2017. Available at: https://www.moh.gov.sg/content/dam/moh_web/HPP/Doctors/cpg_medical/current/2017/hypertension/cpg_Hypertension%20Booklet%20-%20Nov%202017.pdf. Accessed March 30, 2018.