

Monitoring Home BP Readings Just Got Easier

This novel method of identifying patients with uncontrolled hypertension correlates well with ambulatory BP monitoring.

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PRACTICE CHANGER

Use this easy “3 out of 10 rule” to quickly sift through home blood pressure readings and identify patients with uncontrolled hypertension who require pharmacologic management.¹

STRENGTH OF RECOMMENDATION

B: Based on a single, good-quality, multicenter trial.¹

A 64-year-old woman presents to your office for a follow-up visit for her hypertension. She is currently managed on lisinopril 20 mg/d and hydrochlorothiazide 25 mg/d without any problems. The patient’s blood pressure (BP) in the office today is 148/84 mm Hg, but her home blood pressure (HBP) readings are much lower (see Table). Should you increase her lisinopril dose today?

Hypertension has been diagnosed on the basis of office readings of BP for almost a century, but the readings can be so inaccurate that they are

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not useful.² The US Preventive Services Task Force recommends the use of ambulatory BP monitoring (ABPM) to accurately diagnose hypertension in all patients, while The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends ABPM for patients suspected of having white-coat hypertension and any patient with resistant hypertension, but ABPM is not always acceptable to patients.³⁻⁵

HBP readings, on the other hand, correlate well with ABPM measurements and may be more accurate and more predictive of adverse outcomes than office measurements. Furthermore, the process is often more tolerable to patients than ABPM.⁶⁻⁸ If the average home BP reading is > 135/85 mm Hg, there is an 85% probability that ambulatory BP will also be high.⁸

HBP monitoring for long-term follow-up

The European Society of Hypertension practice guideline on HBP monitoring suggests that HBP values < 130/80 mm Hg may be considered normal, while a mean HBP ≥ 135/85 mm Hg is considered elevated.⁹ The guideline recommends HBP monitoring for three to seven days prior to a patient’s follow-up appointment,

TABLE

Should You Change This Patient’s Lisinopril Dose?

A 64-year-old woman is currently managed on lisinopril 20 mg/d and hydrochlorothiazide 25 mg/d. Her blood pressure (BP) in the office today is 148/84 mm Hg, but her home blood pressure (HBP) readings (shown below) are much lower. However, the patient’s HBP log notes three systolic readings ≥ 135 mm Hg (bold below), indicating uncontrolled hypertension. In light of Sharman et al’s findings, the dose of lisinopril should be increased to further control this patient’s BP.

Date	Time	2nd BP reading (mm Hg)
9/1/16	7:30 AM	124/86
	7:35 PM	135/88
9/2/16	6:30 AM	145/96
	6:35 PM	122/82
9/3/16	7:45 AM	128/78
	7:50 PM	116/74
9/4/16	6:15 AM	130/78
	6:30 PM	126/78
9/5/16	7:15 AM	140/88
	7:00 PM	120/84
9/6/16	6:45 AM	133/86
	6:30 PM	125/85
9/7/16	7:40 AM	123/83
	7:00 PM	124/82

with two readings taken one to two minutes apart in the morning and evening.⁹ In a busy clinic, averaging all of these home values can be time-consuming.

So how can primary care providers accurately and efficiently streamline the process? This study sought to answer that question.

STUDY SUMMARY

3 of 10 readings = predictive

This multicenter trial compared HBP monitoring to 24-hour ABPM in 286 patients with uncomplicated essential hypertension to determine the optimal percentage of HBP readings needed to diagnose uncontrolled BP (HBP \geq 135/85 mm Hg). Patients were included if they were diagnosed with uncomplicated hypertension, not pregnant, age 18 or older, and taking three or fewer antihypertensive medications. Patients were excluded if they had a significant abnormal left ventricular mass index (women $>$ 59 g/m²; men $>$ 64 g/m²), coronary artery or renal disease, secondary hypertension, serum creatinine exceeding 1.6 mg/dL, aortic valve stenosis, upper limb obstructive atherosclerosis, or BP $>$ 180/100 mm Hg.

Approximately half of the participants were women (53%). Average BMI was 29.4 kg/m², and the average number of hypertension medications being taken was 2.4. Medication compliance was verified by a study nurse at a clinic visit.

The patients were instructed to take two BP readings (one minute apart) at home three times daily, in the morning (between 6 AM and 10 AM), at noon, and in the evening (between 6 PM and 10 PM), and to record only the second reading for seven days. Only the morning and evening readings were used for

analysis in the study. The 24-hour ABP was measured every 30 minutes during the daytime hours and every 60 minutes overnight.

The primary outcome was to determine the optimal number of systolic HBP readings above goal (135 mm Hg), from the last 10 recordings, that would best predict elevated 24-hour ABP. Secondary outcomes were various cardiovascular markers of target end-organ damage.

The researchers found that if at least three of the last 10 HBP readings were elevated (\geq 135 mm Hg systolic), the patient was likely to have hypertension on 24-hour ABPM (\geq 130 mm Hg). When patients had less than three HBP elevations out of 10 readings, their mean (\pm standard deviation [SD]) 24-hour ambulatory daytime systolic BP was 132.7 (\pm 11.1) mm Hg and their mean systolic HBP value was 120.4 (\pm 9.8) mm Hg. When patients had three or more HBP elevations, their mean 24-hour ambulatory daytime systolic BP was 143.4 (\pm 11.2) mm Hg and their mean systolic HBP value was 147.4 (\pm 10.5) mm Hg.

The positive and negative predictive values of three or more HBP elevations were 0.85 and 0.56, respectively, for a 24-hour systolic ABP of \geq 130 mm Hg. Three elevations or more in HBP, out of the last 10 readings, was also an indicator for target organ disease assessed by aortic stiffness and increased left ventricular mass and decreased function.

The sensitivity and specificity of three or more elevations for mean 24-hour ABP systolic readings \geq 130 mm Hg were 62% and 80%, respectively, and for 24-hour ABP daytime systolic readings \geq 135 mm Hg were 65% and 77%, respectively.

WHAT'S NEW

Monitoring home BP can be simplified

The researchers found that HBP monitoring correlates well with ABPM and that their method provides clinicians with a simple way (three of the past 10 measurements \geq 135 mm Hg systolic) to use HBP readings to make clinical decisions regarding BP management.

CAVEATS

BP goals are hazy, patient education is required

Conflicting information and opinions remain regarding the ideal intensive and standard BP goals in different populations.^{10,11} Systolic BP goals in this study (\geq 130 mm Hg for *overall* 24-hour ABP and \geq 135 mm Hg for 24-hour ABP *daytime* readings) are recommended by some experts but are not commonly recognized goals in the United States. This study found good correlation between HBP and ABPM at these goals, and it seems likely that this correlation could be extrapolated for similar BP goals.

Other limitations are that (1) The study focused only on systolic BP goals; (2) patients in the study adhered to precise instructions on BP monitoring; HBP monitoring requires significant patient education on the proper use of the equipment and the monitoring schedule; and (3) while end-organ complication outcomes showed numerical decreases in function, the clinical significance of these reductions for patients is unclear.

CHALLENGES TO IMPLEMENTATION

Cost, sizing of cuffs

The cost of HBP monitors (\$40-\$60) has decreased significantly

over time, but the devices are not always covered by insurance and may be unobtainable for some people.

Additionally, patients should be counseled on how to determine the appropriate cuff size to ensure the accuracy of the measurements. The British Hypertension Society maintains a list of validated BP devices on its website: <http://bhsoc.org/bp-monitors/bp-monitors>.¹² **CR**

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