

# Ambulatory Blood Pressure Monitoring (ABPM) For the Clinician

## What is it?

ABPM measures blood pressure at regular intervals (every 15-30 minutes is typical) throughout the day and night. It is especially useful for patients in the following groups:

- To evaluate suspected white-coat hypertension in patients with hypertension and no target organ damage.
- Apparent drug resistant hypertension
- Hypotensive symptoms with antihypertensive medications
- Episodic hypertension
- Autonomic dysfunction

Because blood pressure is monitored during sleep, ABPM is useful to determine whether the blood pressure falls at night compared to daytime values. A night time fall is normal. Absence of a night time dip is associated with increased cardiovascular disease risk and other end-organ damage.

## How does ABPM work?

Ambulatory BP monitors are fully automatic and can record BP for 24 hours or longer while patients go about their normal daily activities. Monitors measure about 4 by 3 inches and weigh about 4 lbs. They can be worn on a belt or in a pouch and are connected to a sphygmomanometer cuff on the upper arm by a plastic tube. Patients are asked to keep their arm still while the cuff is inflating and to avoid extreme physical exertion while wearing the monitor.

## What clinical information can be determined by ABPM?

- An estimate of the true or mean blood pressure
- The diurnal rhythm of blood pressure
- Blood pressure variability

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# Ambulatory Blood Pressure Monitoring (ABPM) For the Clinician *(cont)*

## Is ABPM a reimbursable procedure?

Yes. Medicare will reimburse an ABPM test for suspected white-coat hypertension, while private insurance carriers may reimburse for additional indications.

### Medicare criteria for ABPM reimbursement includes:

- Clinic blood pressure >140/90 mm Hg at 3 separate clinic visits with 2 measurements made at each visit
- At least 2 documented BP measurements taken outside the clinic <140/90 mm Hg
- No evidence of end-organ damage

### Private carriers may reimburse additional indications including:

- Evaluation of antihypertensive therapy
- Resistant hypertension
- Nocturnal angina
- Episodic hypertension
- Autonomic dysfunction
- Masked hypertension
- Failed home BP management

## What reimbursement codes do I need to know?

<b>CPT code</b>	93784 (recommended global code) – 93790 Ambulatory blood pressure monitoring utilizing a system such a magnetic tape and/or computer disk, for 24 hours or longer; including recording, scanning analysis, interpretation, and report  93786 – recording only 93788 – scanning analysis 93790 – physician review with interpretation and report
<b>ICD-9 code</b>	796.2 – Elevated blood pressure reading without diagnosis of hypertension

## How much is reimbursement?

Medicare: \$60- \$120, depending on region

Private insurance carriers: \$75 - \$225

### Adapted from:

Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003;290.

Pickering TG, Shimbo D, Haas D. Ambulatory Blood Pressure Monitoring, *NEJM*. 2006;354:2368.

# Home Blood Pressure Monitoring (HBPM) For the Clinician

<b>Classification</b>			
<b>BP Classification</b>	<b>Systolic BP, mm Hg*</b>		<b>Diastolic BP, mm Hg*</b>
Normal	<120	and	<80
Prehypertension	120-139	or	80-89
Stage 1 hypertension	140-159	or	90-99
Stage 2 hypertension	≥160	or	≥100
<b>Treatment Goals</b>		<b>Goals for different disease states</b>	
All hypertensives: <140/90 mm Hg		Patients with diabetes: <130/80 mm Hg	
		Patients with chronic kidney failure: <130/80 mm Hg	

\*Treatment determined by highest BP category.  
Adapted from Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. The JNC 7 Report. *JAMA*. 2003;289:2561.

## Benefits of Home Blood Pressure Monitoring (HBPM)

1. Rule out white-coat hypertension: elevated in office but may not be at home.
2. Confirm the diagnosis of hypertension.
3. Rule out masked hypertension; occurs when a patient's office BP is <140/90 mm Hg but ambulatory or home readings are in the hypertensive range (typically >135/85 mm Hg). It conveys the same cardiovascular risk as sustained hypertension.
4. Confirm the efficacy of pharmacotherapy.
5. Evaluate hypertension control.

## Evaluating Need for Treatment of High Blood Pressure (BP)

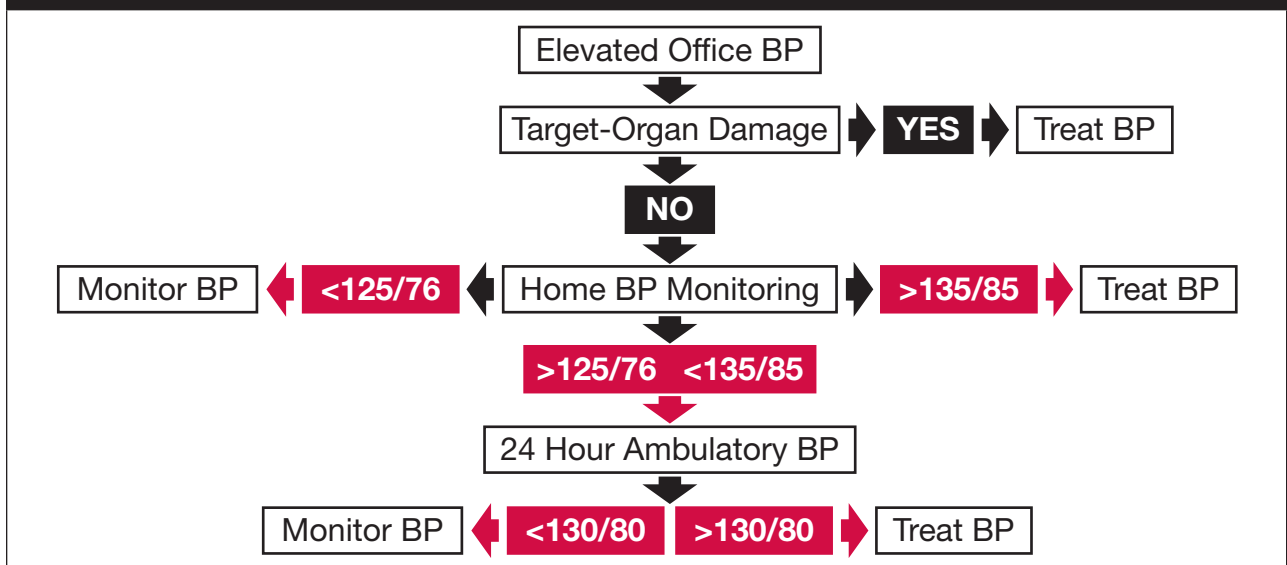


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# Home Blood Pressure Monitoring (HBPM) For the Clinician *(cont)*

## Frequency of Measurement

<b>For initial use</b>	Monitor over 7 days discarding 1st day. Measure BP 2-3 times before meds twice daily (am/pm)—average am and pm readings.
<b>To assess treatment effects</b>	Apply same technique as above and average BP readings after 2-4 weeks of monitoring.
<b>Once controlled</b>	Monitor 1 week per quarter as above. Recommend more frequent monitoring if adherence decreases or status changes.

## Monitors

<b>Arm</b>	Monitors that measure the BP in the brachial artery are the most reliable and for the majority of patients, this is the preferred type of monitor.
<b>Wrist</b>	At present these devices have failed the validation studies and therefore are not recommended.
<b>Finger</b>	At present these devices have failed the validation studies and therefore are not recommended.

## Validated Home Blood Pressure Monitors

An up-to-date list of validated monitors is available on the Dabl Educational website (<http://www.dableducational.org>) and the British Hypertension Society website (<http://www.bhsoc.org/default.stm>)

**Home measures > 135/85 mm Hg are generally considered hypertensive.**

## Number of Readings To Make a Clinical Decision

2 morning and 2 evening readings every day for 1 week but discard the readings of the first day, which gives a total of 12 readings on which to make clinical decisions. Patient education must include appropriate BP technique, checking validation of home devices including return demonstration, how to handle unusual readings, and BP reports.

## Contraindications to HBPM

1. Patients who have atrial fibrillation or other arrhythmias such as frequent ectopic beats.
2. Patients who may become very anxious with elevated readings.

### Adapted from:

Pickering T, Houston Miller N, Ogedegbe G, et al. Call to Action on Use and Reimbursement for Home Blood Pressure Monitoring. *J Clin Hypertens*. 2008;10:467-476.

Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42(6):1206-1252.

Pickering T, Houston Miller N, Ogedegbe G, et al. Call to Action on Use and Reimbursement for Home Blood Pressure Monitoring A Joint Scientific Statement From the American Heart Association, American Society of Hypertension, and Preventive Cardiovascular Nurses Association. *J Card Nursing*. 2008;23(4):299-323.

# Home Blood Pressure Monitoring For Patients

## Reasons to measure my blood pressure at home

<b>1</b>	To check if my new or current blood pressure medicine is controlling my blood pressure.
<b>2</b>	To see if I have “white-coat” high blood pressure—meaning it is high in the office but may not be high at home.
<b>3</b>	To see if my blood pressure at home is high even if my blood pressure measures in the health care provider’s office are normal.

## Type of blood pressure cuff to buy

<b>1</b>	Buy a Blood Pressure Monitor that has been tested to be accurate. An up-to-date list of validated monitors is available on the Dabl Educational Web site ( <a href="http://www.dableducational.org">http://www.dableducational.org</a> ) and the British Hypertension Society Web site ( <a href="http://www.bhsoc.org/default.stm">http://www.bhsoc.org/default.stm</a> )
<b>2</b>	Some brand names that make accurate monitors are: A&D, Artsana, Health & Life, Microlife, Omron
<b>3</b>	Make sure the cuff size is the right one for your arm size. You may need a large- or regular- size cuff.

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# Home Blood Pressure Monitoring For Patients *(cont)*

## How and When to Measure Blood Pressure at Home

<b>1</b>	Do not smoke, have caffeine (coffee or tea) or exercise 30 minutes before measuring your blood pressure.
<b>2</b>	It is important that you have the correct size blood pressure cuff or your blood pressure readings will not be correct. Make sure the bladder (the part that inflates) covers 2/3 of the distance around your arm but does not overlap. Have your health care provider show you in the office which size cuff fits you best before you buy a home blood pressure monitor.
<b>3</b>	Measure your blood pressure at the same time: In the morning before taking your blood pressure medicines and at dinner time.
<b>4</b>	Sit in a chair with your back straight and supported with your feet flat on the floor; don't cross your legs. Your arm should be supported on a flat surface (such as a table) with the upper arm at heart level. The blood pressure monitor should be placed on the table.  As you begin to use your monitor, first measure your blood pressure in each arm using the instructions listed above.  Then when you begin to measure your blood pressure on a regular basis, use the arm with the highest blood pressure numbers.
<b>5</b>	Now you are ready to begin to measure your blood pressure. <ul style="list-style-type: none"> <li>• Rest for 5 minutes (do not talk or move).</li> <li>• Measure your blood pressure and write down the blood pressure numbers with the date and time in your record log.</li> <li>• Wait one minute and take a second measurement and write it down.</li> <li>• Also make a note in your log about any unusual situations, (eg, you forgot your medications, you were ill or you had increased stress).</li> </ul>
<b>6</b>	Keep the record (log) for 1 week or as told by your health care provider.
<b>7</b>	The goal for most people with high blood pressure at home is less than 135/85 or less than 130/80 if you have heart or kidney disease, diabetes or what your health care provider and you agree upon.

*table continues* ➡



# Home Blood Pressure Monitoring For Patients

## Sphygmomanometers for Self-measurement of Blood Pressure (SBPM)

This is a partial list of available and recommended sphygmomanometers. There are many models equivalent to the devices listed below. Please ask the store owner or pharmacist for assistance on the appropriate model for the patient. For a more complete list see <http://www.dableducational.org>

### Upper Arm Devices for Self-measurement of Blood Pressure

Device	Circumstance
A&D UA-705	At rest
A&D UA-787	
A&D UA-853	
Artsana CS 410	At rest
Artsana CSI 610	At rest
Citizen CH-432B	At rest
Colson MAM BP3AA1-2	At rest
Hartmann Tensoval duo control	Auscultatory validation only
Health & Life HL-868BA	At rest
Honsun LD-578	At rest
Microlife BP 3AC1-1 PC	ESRD population
Microlife BP 3BTO-1	
Microlife BP 3BTO-A(2)	
Microlife BP 3BTO-AP	
Microlife BP A100 Plus	At rest
Microlife Exact BP (BP3MD1-3)	
Microlife RM 100	
Microlife WatchBP O3 3MZ0	At rest
Nissei DS-400	At rest
Omron HEM-705CP-II (HEM-759-E2)	
Omron HEM-7080IC	
Omron HEM-Solar (HEM-4500-SOLE)	
Omron IA2 (HEM-7011-C1)	
Omron i-C10	
Omron M1 Classic (HEM-442-E)	

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# Home Blood Pressure Monitoring For Patients *(cont)*

Device	Circumstance
Omron M1 Compact (HEM-4022-E)	
Omron M4-I	
Omron M5-I	Elderly Population
Omron M6	At rest
	General Population
	Obese Population
	Elderly Population
Omron M6 Comfort (HEM-7000-E)	At rest
Omron M7 (HEM-780E)	General population
Omron M10-IT	
Panasonic EW3106	At rest
Panasonic EW3109	At rest
Pic Indolor Comfort Check	At rest
Pic Indolor My Check	At rest
Pic Indolor Personal Check	At rest
Rossmax ME 701 series	At rest
Seinex SE-9400	At rest
Sensacare SAA-102 (Standard)	Three studies. BHS under reported.
Spengler KP7500D	At rest
Spengler Pro M	At rest
Visomat Comfort 20/40	At rest
Visomat Comfort Eco	At rest

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