



CARDI•OH

Ohio Cardiovascular and Diabetes Health Collaborative



In partnership with:



Home Blood Pressure Monitoring: Supporting Evidence

Jackson T. Wright Jr., MD, PhD
Case Western Reserve University

Shari Bolen, MD, MPH
Case Western Reserve University

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Topics Covered



- Strength of evidence for recommendation and use of out-of-office and home blood pressure (BP) measurement

Implications of BP Measurement Quality



- Fewer # and increased within-patient variability in readings due to poor measurement technique results in less reliability on BP reading accuracy
- Underestimating SBP by 10 mmHg predicted to result in 10-40% increase in fatal myocardial infarctions (MIs) and strokes;^{1,2} overestimation by 5 mmHg would unnecessarily increase treatment intensity in 30 million³
- 5-10 mmHg difference in BP values approximates the difference seen in comparing BPs measured in the same patients seen in clinic and research studies
- Even when clinic-based readings are done appropriately, they are 10-40% less effective in predicting clinical events than Ambulatory Blood Pressure Monitoring (ABPM)³
- Importantly, the readings that providers are using to determine need for treatment or change in treatment intensity becomes dramatically less usable
- There is now new guidance on the measurement of BP in the clinic and the use of out of office readings⁴

¹Piper MA et al. Ann Intern Med 2015;162(3):192-204. doi:10.7326/M14-1539

²Bundy JD et al. JAMA Cardiol 2017; 2:775-81(Suppl). doi:10.1001/jamacardio.2017.1421

³Jones DW et al. JAMA 2003;289(8):1027-1030. doi:10.1001/jama.289.8.1027

⁴Muntner P et al. Hypertension. 2019 73:e35-e66. doi:10.1161/HYP.0000000000000087

Home BP Readings More Accurate Than Office BP Readings

Providers should feel comfortable making medication changes based on Home BP readings.

- Provides a better risk prediction than office-based monitoring
- Correlates better with the cardiac (Left Ventricular Hypertrophy), renal (albuminuria), and clinical outcomes than office readings

Use and Advantages:

- White Coat Hypertension (WCH)
- Multiple readings throughout the day may reveal patterns in blood pressure and periods when control is inadequate
- Improves patient adherence
- Reduces costs
- While ambulatory blood pressure monitoring (ABPM) is the gold standard, HBPM is a more practical alternative



Class of Recommendation and Level of Evidence for Out-of-Office Blood Pressure (BP) Measurement



- Most recent recommendations from the 2017 American College of Cardiology (ACC) /American Heart Association (AHA) Hypertension Guideline gives high level evidence rating for the use of out of office BP measurements
- The use of Home Blood Pressure Monitoring (HBPM) is also recommended by the US Preventive Task Force (USPSTF) to confirm the diagnosis of hypertension

COR*	LOE^	Recommendation
I†	A ^{SR} ††	Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions.

SR indicates systematic review.

2017 ACC/AHA Guideline

* Class (Strength) of recommendation

^ Level of evidence

† Strong

†† High-quality evidence

Out-of-Office Blood Pressure (BP) Measurement



■ Rationale

- Provides a better risk prediction than office-based monitoring
- Correlates better with target organ damage (e.g. Left Ventricular Hypertrophy (LVH), albuminuria, cardiovascular events)

■ Uses and Advantages

- Helps identify White Coat Hypertension (WCH) and masked hypertension
- Multiple readings throughout the day may reveal patterns in blood pressure and periods when control is inadequate
- Improves patient adherence
- Reduces costs

White Coat Hypertension and Masked Hypertension



- The prevalence of White Coat Hypertension (WCH) and Masked Hypertension (MH) is between 10-30% each depending on the study
- WCH identifies a population with ↑ office BP readings at similar CV risk to normotensives
- However, the risk of cardiovascular morbidity and mortality for MH is similar to that in adults with sustained hypertension, indicating a benefit to treatment
- While there appears to be an increased risk of cardiovascular morbidity with MH, direct evidence of benefit in treating individuals with MH is unavailable
- *In essence: Up to 30% of patients in our practices are either over or under-treated for hypertension*

Out-of-Office Blood Pressure (BP) Measurement



■ Rationale

- Provides a better risk prediction than office-based monitoring
- Correlates better with target organ damage, (e.g. Left Ventricular Hypertrophy (LVH), albuminuria, cardiovascular events)

■ Methodology

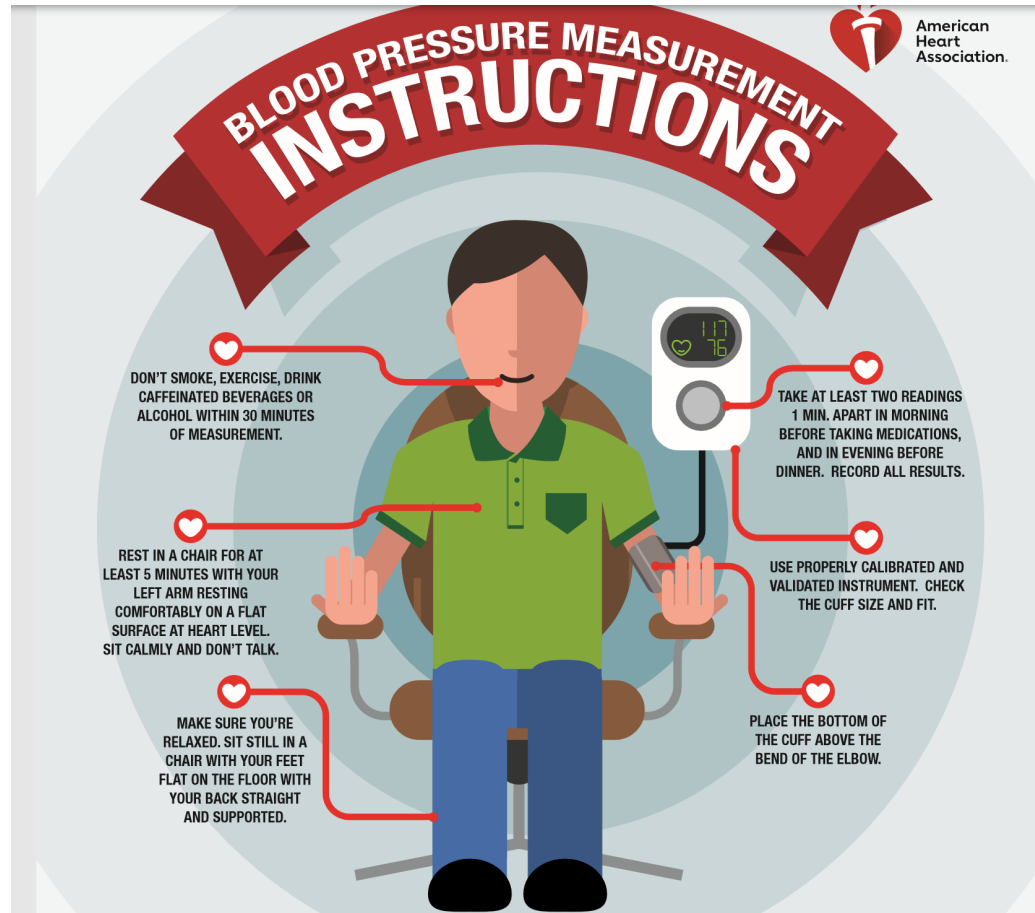
- Take at least 2 readings 1 minute apart in the morning before taking medications and again in the evening
- All monitors should be brought to all clinic appointments so staff can verify monitor accuracy and review built-in memory when available
- For clinical decision making based on HBPM readings, blood pressure should be based on an average of 3-5 days of BID (2 times a day) readings before a clinic visit^{1,2}

Note: consider requesting HBPM readings 1 week after any medication change to estimate response to change in challenging patients

¹Bello N et al. J Am Heart Assoc 2018; 7:1-6. doi:10.1161/JAHA.118.008658

²Muntner P et al. Hypertension 2019; 73:e35-e66. doi:10.1161/HYP.0000000000000087

Practical Steps for Implementing Home Blood Pressure Monitoring (Change Package Resource VI, p. 20)



Patient education should include:

- Ensure at least ≥ 5 minutes of quiet rest before measuring BP
- Avoid smoking, caffeinated beverages, or exercise for 30 minutes before measuring BP
- Sit with back straight and supported (e.g. a straight-backed dining chair)
- Keep feet flat on the floor with legs uncrossed
- Support arm on a flat surface (e.g. a table) with the upper arm at heart level
- Place midpoint of the bottom of the cuff directly above the bend of the elbow

Corresponding Values of Systolic Blood Pressure (SBP)/ Diastolic Blood Pressure (DBP) for Clinic, Home Blood Pressure Monitoring (HBPM), Daytime, Nighttime and 24-Hour Ambulatory Blood Pressure Monitoring (ABPM) Measurements

Clinic	HBPM	Daytime ABPM	Nighttime ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/80	120/70	130/80
160/100	145/90	145/90	140/85	145/90

ABPM = ambulatory blood pressure monitoring; BP = blood pressure; DBP = diastolic blood pressure; SBP = systolic blood pressure; HBPM = home blood pressure monitoring

Advantages of HBPM



- Out-of-office blood pressure readings are now recommended both to confirm the diagnosis of hypertension **and for titration of blood pressure medications** (in conjunction with telehealth counseling or other clinical monitoring or intervention)
- Offers clear potential to engage patients in their care
- Recommended by most guidelines to confirm office readings
 - Useful in identifying WCH
 - Can detect MH (**though less sensitive than ABPM in detecting MH**)¹
 - Most national and international guidelines recommend for HTN dx
 - 2017 ACC/AHA HTN Guideline recommends preference of HBPM readings over office readings for clinical decision making
- Became an essential measurement parameter during pandemic period
- Evidence available shows that HBPM is associated with increased BP control when accompanied by patient education, support by CHWs, nurse case management, or pharmacy support
- Clinical outcome data available using HBPM showing it to be a better predictor of clinical outcomes than research and routine office BPs

¹Anstey DE et al. Hypertension 2018; 72:1200-1207. doi:10.1161/HYPERTENSIONAHA.118.11319.