HHS Public Access

Author manuscript

Ann Intern Med. Author manuscript; available in PMC 2016 November 03.

Published in final edited form as:

Ann Intern Med. 2015 November 3; 163(9): 691–700. doi:10.7326/M15-1270.

Role of Ambulatory and Home Blood Pressure Monitoring in Clinical Practice: A Narrative Review

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Abstract

Hypertension, a common cardiovascular disease (CVD) risk factor, is usually diagnosed and treated based on blood pressure readings obtained in the clinic setting. Blood pressure may differ considerably when measured in the clinic versus outside of the clinic setting. Over the past several decades, evidence has accumulated on two approaches for measuring out-of-clinic blood pressure: ambulatory blood pressure monitoring (ABPM) and home blood pressure monitoring (HBPM). Blood pressure measures on ABPM and HBPM each have a stronger association with CVD outcomes than clinic blood pressure. Controversy exists whether ABPM or HBPM is superior for estimating CVD risk, and under what circumstances these methods should be used in clinical practice for assessing out-of-clinic blood pressure. This review describes ABPM and HBPM procedures, the blood pressure phenotypic measures that can be ascertained, and the evidence that supports the use of each approach to measure out-of-clinic blood pressure. This review also describes barriers to the successful implementation of ABPM and HBPM in clinical practice, proposes core competencies for the conduct of these procedures, and highlights important areas for future research.

Keywords

hypertension; blood pressure; ambulatory blood pressure monitoring; home blood pressure monitoring

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Conflicts of Interest Disclosures: Dr. Paul Muntner received an institutional grant from Amgen Inc. unrelated to the topic of the current manuscript. There are no other potential conflicts of interest.

Guidelines and scientific statements recommend measuring blood pressure in the clinic setting (1, 2). Blood pressure measured in the clinic may not accurately reflect levels that a patient experiences in the out-of-clinic naturalistic setting (3). Ambulatory blood pressure monitoring (ABPM) and home blood pressure monitoring (HBPM) are two well-accepted approaches for measuring out-of-clinic blood pressure (4, 5).

The utility of ABPM and HBPM in guiding patient care has been widely debated (6, 7), and there is controversy about which method is better for determining out-of-clinic blood pressure. This review describes ABPM and HBPM procedures, the blood pressure measures that can be obtained using these methods, and the current evidence base supporting the use of ABPM and HBPM in clinical practice; barriers and clinical competencies that are required for the successful implementation of ABPM and HBPM in practice; and areas of future research.

Methods

MEDLINE was searched through July 2015 using the following key words: “ambulatory blood pressure”, “home blood pressure”, “out of office blood pressure”, “self-measured blood pressure”, and “self-measurement of blood pressure”. We focused on studies that had prospective follow-up for CVD events and/or mortality; systematic reviews, meta-analyses, narrative reviews; and hypertension guidelines, scientific statements, and position papers. A PubMed related articles search and a cited reference search through ISI Web of Science were conducted using identified articles. A manual search was also performed using the reference lists from identified reviews.

Role of the Funding Source

The funding source had no role in the study design, collection, analysis, interpretation, or drafting of the manuscript or in the decision to submit the manuscript for publication.

Fundamentals of ABPM and HBPM

Overview of ABPM Procedures

In the 1960’s, a manually inflated device was introduced that could take blood pressure readings on an ambulatory basis throughout the day (8). At present, ambulatory monitors are fully automated, utilize the oscillometric technique to estimate blood pressure, and are typically used to obtain blood pressure readings for a 24-hour period (3). Ambulatory monitors are compact, typically worn on a belt or in a pouch, and connected to a sphygmomanometer cuff on the upper arm by a tube. The monitors are usually programmed to obtain readings every 15 to 30 minutes throughout the day and night, and set without the readings being displayed to the patient. Although ABPM occurs while individuals go about their normal daily activities, they are asked to keep their arm still while the cuff is inflating, and to avoid excessive motion, which is associated with unobtainable or artifactual readings. At the end of the recording period, the readings are downloaded into a computer for processing. Individuals can fill out a diary during the monitoring period to document any symptoms, awakening and sleeping times, naps, periods of stress, timing of meals, and medication ingestion (4).

Various criteria can be used for determining whether a 24-hour ABPM session is valid including, for example, a minimum of 70% or 80% of the planned readings are obtained (4, 9); at least 14 readings are obtained during the daytime period (10); or at least 10 readings are obtained during the daytime period and at least 5 readings are obtained during the nighttime period (11). None of these criteria are considered to be a gold standard. The daytime and nighttime periods on ABPM can be determined by using the patient's self-report of awakening and sleeping (4), fixed time periods (4), and actigraphy (12). Herein, the terms "daytime" and nighttime" (or "nocturnal") are used interchangeably with "awake" and "sleep", respectively. Figure 1 (upper panel) shows blood pressure readings obtained from an individual in the clinic followed by 24-hour ABPM.

Overview of HBPM Procedures

Home blood pressure was initially measured with the auscultatory technique by an observer (13). Most currently available HPBM devices are automatic, utilize the oscillometric technique, and are initiated by the patient. Some devices are able to store readings for several weeks, which minimize the need for patients to record the measurements. HBPM devices, which measure blood pressure in the brachial artery, are more reliable than other types of devices such as wrist monitors (13). HBPM should be performed in a quiet room after 5 minutes of rest in the seated position, with the back and arm supported. A common recommendation for HBPM (2, 5, 14) is that blood pressure be measured by the patient 2 times in the morning and 2 times in the evening. A minimum of 3 consecutive days and a preferred period of 7 consecutive days of HBPM is a reasonable approach for clinical practice (2, 5, 14). For assessing mean blood pressure, readings obtained on the first day of HBPM are excluded, and all subsequent readings across days are averaged (2, 5, 14). Figure 1 (lower panel) shows blood pressure readings from HBPM for the same individual in the upper panel who underwent HBPM after ABPM.

Validated Devices

Only validated devices are recommended for conducting ABPM and HBPM. Three validation protocols are widely accepted: the Association for the Advancement of Medical Instrumentation (AAMI) (15), the British Hypertension Society (BHS) (16), and the ESH International Protocol (ESH-IP) (17). The 2010 ESH-IP (17) is currently the most commonly used. An up-to-date list of validated ambulatory and home blood pressure monitors is available on the dabl Educational Trust website (www.dableducational.org) (18), and also the British Hypertension Society website (http://www.bhsoc.org/bp-monitors/bp-monitors) (19).

Similarities and Differences in Performing ABPM and HBPM

More measurements are typically obtained with ABPM and HBPM than in the clinic setting. ABPM and HBPM can assess average blood pressure outside of the clinic setting, which allows for the identification of white coat hypertension (20, 21) and masked hypertension (22-24); blood pressure variability on ABPM (25) and HBPM (26); and hypotension (2, 4). As ABPM and HBPM devices use the oscillometric technique, which assesses the amplitude of pressure oscillations during cuff deflation to estimate blood pressure, accurate

measurements can be affected by movement (27). The ability to obtain accurate readings is also limited by larger upper arm circumference, arterial stiffness, and variability in heart rate (e.g. atrial fibrillation) (27). As ABPM and HBPM devices inflate the blood pressure cuff above systolic blood pressure, individuals particularly with severe hypertension may experience discomfort or pain with repeated measurements. The main difference between ABPM and HBPM is that ABPM assesses daytime and nighttime blood pressure during routine daily activities typically during one 24-hour period, whereas HBPM assesses blood pressure at specific times during the day and night over a longer period of time while the patient is seated and resting. For almost all HBPM devices, blood pressure readings cannot be obtained during sleep.

Clinical Significance

Elevated blood pressure on ABPM and HBPM

Numerous studies have reported associations of average out-of-clinic blood pressure measured by ABPM including average 24-hour, daytime and nighttime blood pressure, and, separately, average blood pressure on HBPM with CVD and mortality outcomes, independent of mean clinic blood pressure (28-32). Few studies with CVD events or mortality as outcomes have conducted both ABPM and HBPM in the same sample (33-36), and it remains unclear which method is superior for predicting outcomes. Levels that constitute normality and elevated blood pressure status for ABPM and HBPM have been published (1, 2, 4, 5, 37-39) **(**Table 1**).** Most of the normality data for ABPM and HBPM have been derived from studies conducted in Europe and Japan.

Phenotypes defined by clinic and out-of-clinic hypertension status

Four phenotypes can be defined by cross-classifying clinic and out-of-clinic hypertension status using ABPM or HBPM **(**Table 2**).** Two phenotypes represent agreement; sustained normotension (non-elevated clinic and non-elevated out-of-clinic blood pressure) and sustained hypertension (elevated clinic and elevated out-of-clinic blood pressure), which are phenotypes associated with the lowest and highest CVD risk, respectively (40). As originally described by Pickering (20), the term “white coat hypertension” refers to untreated individuals with elevated clinic blood pressure without elevated daytime blood pressure on ABPM. The term “masked hypertension” refers to untreated individuals who do not have elevated clinic blood pressure but have elevated daytime blood pressure on ABPM (22). In addition to those with daytime hypertension, individuals without elevated clinic blood pressure but with 24-hour hypertension and/or nighttime hypertension are also considered to have masked hypertension (4). HBPM can also be used to define white coat hypertension and masked hypertension (5).

The terms white coat hypertension and masked hypertension can be applied to individuals taking antihypertensive medication (23, 41). Treated individuals with elevated clinic blood pressure without elevated out-of-clinic blood pressure have “treated white coat hypertension” or “white coat uncontrolled hypertension”, and treated individuals with non-elevated clinic blood pressure with elevated out-of-clinic blood pressure have “treated masked hypertension” or “masked uncontrolled hypertension”. ABPM and HBPM can

identify white coat resistant hypertension (42, 43), which is defined as treatment resistant hypertension based on clinic blood pressure but controlled out-of-clinic blood pressure. In untreated and treated individuals, ABPM and HBPM can assess the white coat effect, defined as having a clinic blood pressure that is greater than average out-of-clinic blood pressure, and the masked hypertensive effect, defined as having an average out-of-clinic blood pressure that is greater than clinic blood pressure.

White coat hypertension—A systematic review performed for the United States Preventive Services Task Force (USPSTF) evaluated the prevalence of white coat hypertension using ABPM and HBPM in untreated populations (28). Across 22 studies of ABPM, the prevalence of white coat hypertension ranged from 5% to 65%. The prevalence of white coat hypertension ranged from 16% to 55% across six studies using HBPM. Several (21, 28, 41, 44, 45), but not all (46, 47) studies have reported white coat hypertension to not be associated with an increased risk for CVD outcomes, compared to sustained normotension. Treated white coat hypertension has not been associated with an increased risk of CVD events or mortality, compared with treated sustained normotension (21, 41, 47).

Masked hypertension—In a systematic review which identified 5 population-based studies (four conducted in Europe and one in Japan), the prevalence of masked hypertension ranged from 14% to 30% among participants without elevated clinic blood pressure (23). Three of the studies used ABPM only (48-50), one used HBPM only (51), and one used both ABPM and HBPM (46). Four studies included participants on antihypertensive medication (46, 49-51). In addition to being associated with subclinical CVD (52), masked hypertension is associated with an increased risk of CVD events. In a meta-analysis of 7 studies (n=11,502; 5 studies with ABPM and 2 studies with HBPM, 6 studies included treated participants) (53), the multivariable adjusted hazard ratio (HR) for CVD events, comparing masked hypertension to sustained normotension was 2.00 (95% CI: 1.58–2.52). These findings are similar to results from a second meta-analysis of individual-level data from four population samples of ABPM (n=7,030; 21.8% were taking antihypertensive medications) (30), and a study of untreated individuals undergoing HBPM (47). Among individuals taking antihypertensive medication, treated masked hypertension on ABPM or HBPM has been associated with an increased risk of CVD events and mortality compared with sustained normotension (24, 47).

Other Measures and Phenotypes that ABPM or HBPM Captures

Non-dipping blood pressure and nocturnal hypertension

There is a diurnal pattern of blood pressure (54), which normally falls to its lowest level during nighttime hours (Figure 1**, top panel**). Some individuals do not experience a normal decline in blood pressure at night, and those whose blood pressure does not decline between daytime and nighttime by 10% or more on ABPM are considered non-dippers (2, 4). Individuals can have nocturnal hypertension, which is commonly defined as mean nighttime SBP/DBP ≥ 120/70 mm Hg (55). Several studies have reported that non-dipping blood pressure and nocturnal hypertension are associated with increased risk for CVD events and all-cause mortality, independent of clinic and daytime blood pressure (31, 56).

Morning surge

The morning surge refers to the increase in blood pressure that normally occurs from the nighttime to the early morning (Figure 1). This time period corresponds to the time during which the incidence of CVD events are increased (57). Some studies have identified an association between an exaggerated morning surge on ABPM and increased stroke risk (57).

Blood pressure variability

Blood pressure variability on 24-hour ABPM is generally reported using two metrics, day-night standard deviation which captures the variability a patient experiences around their mean daytime and nighttime blood pressure, and average real variability which captures variability in blood pressure between successive measurements (58, 59). Although 24-hour blood pressure variability using these metrics was associated with an increased risk for CVD events and mortality in a meta-analysis (25), the clinical applicability of blood pressure variability may be limited given its relatively low reproducibility (60) and a modest increase in absolute CVD risk (25). HBPM can be used to capture long-term (day-to-day) blood pressure variability. In a systematic review (26), higher day-to-day blood pressure variability was associated with an increased risk of CVD events and/or mortality.

Hypotension

ABPM or HBPM can be used to assess postural hypotension, postprandial hypotension, drug-induced hypotension, and hypotension from autonomic dysfunction (4). Either approach can also be used to evaluate syncope, vertigo, or dizziness (61, 62). Although ABPM and HBPM only provide intermittent BP measurements, they offer the ability to obtain measurements at a time when a patient is symptomatic. ABPM can be combined with Holter monitoring for simultaneous recording of blood pressure and the electrocardiogram to evaluate hypotension or symptoms (4).

Clinical Indications for Using ABPM and HBPM

Guidelines, scientific statements, and position papers most commonly recommend ABPM to exclude white coat hypertension in individuals with elevated clinic blood pressure (Appendix Table 1, available at www.annals.org). In a recent draft statement from the USPSTF (63), ABPM was endorsed for confirming the diagnosis of hypertension and excluding white coat hypertension, except in patients for which immediate treatment initiation may be indicated including SBP/DBP ≥180/110 mm Hg, evidence of end-organ damage, and/or those with a diagnosis of secondary hypertension. Other indications for ABPM include the monitoring of antihypertensive medication efficacy in treated hypertensive patients who have elevated clinic blood pressure in order to determine blood pressure control over the course of the day. Less common recommendations include the assessment of masked hypertension, treated masked hypertension, diurnal blood pressure patterns, 24-hour blood pressure variability, and hypotension. HBPM is not recommended as often as ABPM (Appendix Table 2, available at www.annals.org). HBPM is most commonly recommended for diagnosing white coat hypertension or assessing treatment resistant hypertension. The draft statement from USPSTF (63) did not officially endorse using HBPM to exclude white coat hypertension, but did state that the “confirmation of

hypertension using HBPM may be acceptable." For clinical practice, it is reasonable that out-of-clinic blood pressure monitoring be primarily undertaken using ABPM to rule out white coat hypertension in individuals with elevated clinic blood pressure. HBPM can be performed if ABPM is not available or poorly tolerated by the patient. In the clinic, automatic blood pressure devices are preferred over manual devices, given the closer agreement between clinic and out-of-clinic blood pressure levels (64). For patients taking antihypertensive medication, ABPM and secondarily HBPM are sometimes performed for the assessment of treated white coat hypertension, the white coat effect, and the determination of whether out-of-clinic blood pressure is controlled in patients with treatment resistant hypertension based on clinic blood pressure. ABPM and HBPM could be used for the assessment of treated masked hypertension and the masked hypertensive effect. Use of ABPM and HBPM in these situations should be weighed in context with the large body of evidence supporting the cardiovascular benefits of antihypertensive treatment using clinic blood pressure thresholds to guide therapy (2). The evidence supporting the achievement of blood pressure goals using ABPM or HBPM compared with targeting a clinic blood pressure goal on reducing CVD events and mortality is limited.

Challenges in using ABPM and HBPM in Clinical Practice

ABPM is not widely available in primary care settings and is generally only offered in specialized hypertension centers (65, 66). Insurance companies do not commonly reimburse for indications other than white coat hypertension. Also, the amount of reimbursement for ABPM is low (4, 67). Some patients may have difficulty wearing ABPM devices at night (68). There is also lack of formal training or certification for ABPM that may make it difficult for physicians set up these services in their practices.

In contrast to ABPM, HBPM devices are more widely available. Other advantages for using HBPM rather than ABPM include potentially greater patient acceptability and tolerability, and better reproducibility of blood pressure phenotypes (5, 13, 39, 69). HBPM may also be associated with an improvement in antihypertensive medication adherence (70). However, many devices are being sold that have not been validated (71). Further, although cheaper than ABPM devices, the cost of HBPM devices is not commonly reimbursed by insurance companies (5, 72). Therefore, HBPM may be inaccessible to low income individuals. Some devices do not record blood pressure readings leading to reliance on the patient to document their blood pressure measurements (73). HBPM requires a long-term commitment from patients in taking their blood pressure over days, weeks or even longer periods, which may be challenging for many patients. Physicians are concerned about the use of non-validated HBPM devices, lack of knowledge of where to purchase validated devices, lack of established measurement protocols, and the patient's preoccupation with his or her own blood pressure, which may lead to anxiety (74-78). Additional issues relate to the lack of proper training of the patient in HBPM procedures (75). Patients with hypertension may not have access to adjunctive strategies for HBPM such as one-to-one counseling, remote telemonitoring, and educational classes, which may be essential for achieving and maintaining blood pressure control while using HBPM (72, 79).

Clinical Core Competency Requirements for the Conduct of ABPM and HBPM

Clinical core competency requirements for the conduct of ABPM and HBPM do not exist in the US. Appendix Table 3 (available at www.annals.org) includes proposed clinical core competency requirements for ABPM and HBPM with an emphasis on increasing medical knowledge and improving patient care and procedural skills. Three areas need further development: structured training in the use of ABPM and HBPM, tests evaluating proof of competence, and requirements for maintenance of competence. Training for the proposed clinical core competency requirements could take place during medical school clerkships, residency or fellowship training for physicians, and during professional programs for other practitioners (e.g. nurses, nurse practitioners, etc.). Workshops or conferences on ABPM and HBPM could also play a role in training practicing physicians or other practitioners. Documentation of ABPM and possibly HBPM competence could be achieved by successfully passing an exam, and the implementation and interpretation of a minimum number of ABPM and HBPM procedures. Maintenance of competence should require ongoing continuing medical education and conduct of a minimum number of ABPM and HBPM recordings annually.

Important Knowledge Gaps and Future Directions

A number of clinically relevant questions remain unanswered. Studies are needed to determine whether using mean blood pressure from ABPM or HBPM to guide antihypertensive medication initiation and titration leads to a reduction in clinical outcomes compared with using clinic blood pressure alone (80, 81). Scarce information is available on the CVD risk reduction benefits of treating ABPM or HBPM phenotypes (e.g. non-dipping blood pressure) besides mean out-of-clinic blood pressure. There are few data on the mechanisms underlying ABPM and HBPM phenotypes, which may help identify treatment targets. There are many newer devices or technologies, which hold promise for the assessment of out-of-clinic blood pressure, but they require further evaluation in rigorous studies. Devices worn on the wrist, which are less burdensome to patients, may have broad appeal. These devices are currently not recommended for routine clinical use as some studies indicate the presence of a systematic error when compared with upper arm measurements (2, 82). These devices may benefit individuals with a large arm circumference in whom upper arm devices may provide an inaccurate reading (2). Another emerging area is self-measurement devices that are linked to mobile health applications that allow individuals to monitor and manage their own blood pressure (83, 84). Validating these methods for assessing out-of-clinic blood pressure is important given the widespread availability of mobile technology.

Conclusions

Evidence has accumulated over the past several decades that mean out-of-clinic blood pressure measured by ABPM and HBPM maintains a stronger association with CVD and mortality risk than clinic blood pressure. Given the high prevalence of white coat hypertension and its benign prognosis in most observational studies, it may be reasonable to

use ABPM and secondarily HBPM to identify white coat hypertension in untreated individuals with elevated clinic blood pressure. Data on the prognostic value of using ABPM or HBPM compared to clinic blood pressure in guiding antihypertensive medication use and titration are needed. There are limited data on using ABPM or HBPM to identify and treat blood pressure phenotypes other than white coat hypertension. Randomized controlled trials of ABPM and HBPM on outcomes are needed to address these knowledge gaps. Interventions that address barriers to ABPM and HBPM will also help translate the large body of research on ABPM and HBPM into clinical practice.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

None.

Grant Support

This work was supported by the National Institutes of Health (HL047540, HL117323, HL117323-02S2, K24-HL125704) from the National Heart, Lung, and Blood Institute, Bethesda, MD.

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Take-Home Points

- ABPM assesses blood pressure during routine daily activities typically during one 24-hour period, whereas HBPM assesses blood pressure at specific times during the day and night over a longer period of time while the patient is seated and resting.
- Blood pressure measures on ABPM and HBPM have a stronger association with CVD outcomes than clinic blood pressure.
- ABPM and HBPM can quantify mean out-of-clinic blood pressure and can be used to identify white coat hypertension, masked hypertension, blood pressure variability, and hypotension. ABPM can also assess nighttime blood pressure and diurnal blood pressure patterns.
- Most guidelines, scientific statements, and position papers recommend that out-of-clinic blood pressure monitoring be primarily undertaken using ABPM to rule out white coat hypertension in individuals with elevated clinic blood pressure. HBPM is recommended if ABPM is not available or poorly tolerated by the patient.
- Barriers exist which have limited the implementation of ABPM and HBPM in clinical practice. Core competency requirements may be essential for the successful conduct of ABPM and HBPM.
- There is a need for randomized controlled trials to test whether treating blood pressure determined by ABPM or HBPM is more advantageous than treating clinic blood pressure on CVD outcomes.

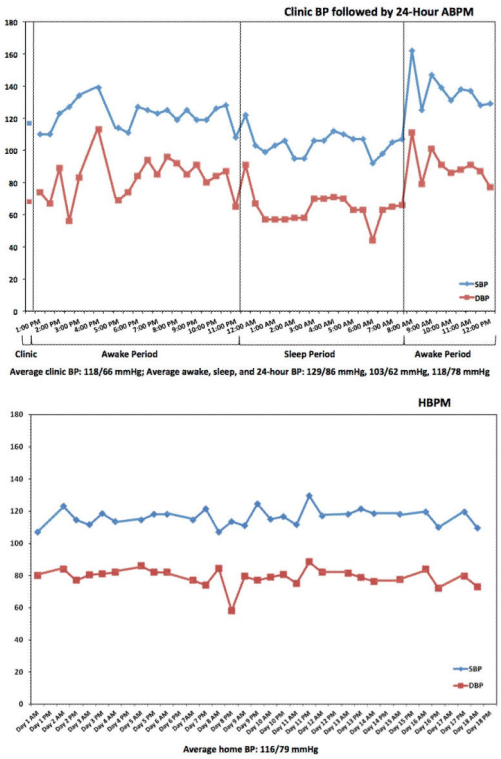

Figure 1.

Blood pressure data from an untreated healthy individual who underwent clinic blood pressure assessment immediately followed by 24-hour ABPM (upper panel). HBPM was then performed for 18 days (lower panel). The points for clinic blood pressure represent the average of 3 readings. The points on HBPM represent the average of 2 morning or 2 evening readings. Average clinic blood pressure, daytime (awake), nighttime (sleep), 24-hour blood pressure, and home blood pressure are shown in the figure. On ABPM (upper panel), blood pressure falls to its lowest level during at night, followed by a surge in the morning hours coinciding with waking up. Because blood pressure readings on HBPM (lower panel) are obtained at fixed times during the day, and are measured at rest, the variability of blood pressure over time is less than what is observed on ABPM. Unlike ABPM, HBPM cannot measure blood pressure readings during sleep. Abbreviations: ABPM = ambulatory blood pressure monitoring. BP = blood pressure. DBP = diastolic blood pressure. HBPM = home blood pressure monitoring. SBP = systolic blood pressure.

Table 1

Blood pressure thresholds for ambulatory blood pressure monitoring (top panel) and home blood pressure monitoring (bottom panel) recommended by different scientific societies

Recommended systolic/diastolic blood pressure thresholds for ABPM			
2005 AHA Scientific Statement (1)			
	Optimal	Normal	Elevated
Daytime	<130/80 mmHg	<135/85 mmHg	>140/90 mmHg
Nighttime	<115/65 mmHg	<120/70 mmHg	>125/75 mmHg
24-hour	<125/75 mmHg	<130/80 mmHg	>135/85 mmHg
2005 ESH Practice Guidelines (37)			
	Optimal	Normal	Elevated
Daytime	<130/80 mmHg	<135/85 mmHg	>140/90 mmHg
Nighttime	<115/65 mmHg	<120/70 mmHg	>125/75 mmHg
24-hour	--	--	--
2008 ASH Position Paper (38)			
	Optimal	Normal	Elevated
Daytime	--	--	≥135/85 mmHg
Nighttime	--	--	≥120/75 mmHg
24-hour	--	--	≥130/80 mmHg
2013 ESH Position Paper (4)			
	Optimal	Normal	Elevated
Daytime	--	--	≥135/85 mmHg
Nighttime	--	--	≥120/70 mmHg
24-hour	--	--	≥130/80 mmHg

Recommended systolic/diastolic blood pressure thresholds for HBPM	
2008 AHA/ASH/PCNA Call to Action (5)	
Normal	Elevated
--	≥135/85 mmHg
2008 ASH Position Paper (38)	
Normal	Elevated
--	≥135/85 mmHg
2010 ESH Guidelines (39)	
Normal	Elevated
<130/80 mmHg	≥135/85 mmHg
2013 ESH/ESC Guidelines (2)	
Normal	Elevated
--	≥135/85 mmHg

The different guidelines, position papers, and scientific statements use terms like “abnormal”, “limit”, “threshold”, “goal”, “hypertension”, or “elevated” to designate when a diagnosis of hypertension is made or when treatment should be titrated. In this table, we use the term “elevated”.

-- Thresholds were not reported.

AHA = American Heart Association

AHA/ASH/PCNA = American Heart Association/ American Society of Hypertension/Preventive Cardiovascular Nurses Association

ASH = American Society of Hypertension

ESH = European Society of Hypertension

ESH/ESC = European Society of Hypertension/European Society of Cardiology

Table 2

Phenotypes defined by clinic and out-of-clinic hypertension status.

		Ambulatory (or Home) Hypertension	
		No	Yes[†]
Clinic Hypertension	No	Sustained Normotension	Masked Hypertension
	Yes[*]	White Coat Hypertension	Sustained Hypertension

[*] Mean systolic/diastolic blood pressure ≥140/90 mmHg based on clinic measurements.

[†] Commonly, mean daytime (or home) systolic/diastolic blood pressure ≥135/85 mmHg based on ambulatory blood pressure monitoring (or home blood pressure monitoring).