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REVIEW

WILEY

The HOPE Asia Network consensus on blood pressure measurements corresponding to office measurements: Automated office, home, and ambulatory blood pressures

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Abstract

For adopting recently introduced hypertension phenotypes categorized using office and out of office blood pressure (BP) for the diagnosis of hypertension and antihypertension drug therapy, it is mandatory to define the corresponding out of office BP with the specific target BP recommended by the major guidelines. Such conditions include white-coat hypertension (WCH), masked hypertension (MH), white-coat uncontrolled hypertension (WUCH), and masked uncontrolled hypertension (MUCH). Here, the authors review the relevant literature and discuss the related issue to facilitate the use of corresponding BPs for proper diagnosis of WCH, MH, WUCH, and MUCH in the setting of standard target BP as well as intensive target BP. The methodology of deriving the corresponding BP has evolved from statistical methods such as standard deviation, percentile value, and regression to an outcome-based approach using pooled international cohort study data and comparative analysis in randomized clinical trials for target BPs such as the SPRINT and STEP studies. Corresponding BPs to 140/90 and 130/80 mm Hg in office BP is important for safe and strict achievement of intensive BP targets. The corresponding home, daytime, and 24-h BPs to 130/80 mm Hg in office BP are 130/80, 130/80, and 125/75 mm Hg, respectively. However, researchers have found some discrepancies among the home corresponding BPs. As tentative criterion for de-escalation of antihypertensive therapy as shown in European guidelines was 120 mm Hg in office BP, corresponding home, daytime, and 24-h systolic BPs to 120 mm Hg in office systolic BP are 120, 120, and 115 mm Hg, respectively.

KEYWORDS
ambulatory blood pressure/home blood pressure monitor, antihypertensive therapy, corresponding blood pressures, masked uncontrolled hypertension, hypertension guidelines, white-coat hypertension

1 | INTRODUCTION

Hypertension is the leading risk factor for cardiovascular (CV) events and deaths worldwide.[1] Prevention of cardiovascular events by blood pressure (BP) control is a proven treatment.[2] Additional benefits of BP control have also been demonstrated when systolic BP is lowered below the intensive therapeutic targets.[3] In general, intensive BP targeting is recommended for high-risk patients, represented by a 10-year CV event rate of ≥10% according to atherosclerotic CV disease risk or by a 10-year CV mortality of ≥5% according to the Systematic Coronary Risk Evaluation system.[2,3]

Despite these successes, there are well-known discrepancies between office BP (OBP) and out-of-office BP (OOBP), such as ambulatory BP (ABP) and home BP (HBP), in terms of the BP level and phenotype category. This occurs because different BP measurement techniques pick up different BP values in different settings and over different time windows and are thus influenced by different behavioral and environmental factors. In response, recent hypertension guidelines highlight the assessment of BP using OOBP combined with OBP using different thresholds to define hypertension in these different settings.

At the time of hypertension diagnosis (≥140/90 mm Hg), there is a 5-mm Hg difference between the threshold for OBP and that for HBP or daytime ABP.[3] As a result, unrecognized white-coat hypertension (WCH) may result in unnecessary antihypertensive medical treatment (AHMT). In contrast, unrecognized masked hypertension (MH) may result in untreated hypertension. Recently, for patients on AHMT, white-coat uncontrolled hypertension (WUCH) and masked uncontrolled hypertension (MUCH) have received special attention in European guidelines.[2] However, with different reference OBP thresholds and different corresponding OOBPs depending on American and European guidelines, the prevalence of the above-mentioned

phenotypes can differ.[4] Using automated OBP (AOBP), a metanalysis showed that the prevalence of WCH was lower than using OBP, but more studies are needed.[5]

There are three important reasons for determining that the OOBPs correspond to OBP of 130/80 and 120/80 mm Hg. First, according to the 2017 American Heart Association/American College of Cardiology (AHA/ACC) hypertension guidelines, WCH and MH can be diagnosed via OOBP corresponding to an OBP of ≥130/80 mm Hg, even though other international hypertension guidelines still maintain an OBP threshold of ≥140/90 mm Hg. Second, for AHMT strategies to be safely implemented for intensive BP targeting below 130/80 mm Hg in non-US guidelines, WUCH and MUCH need to be diagnosed by using the OOBPs corresponding to an OBP of 130/80 mm Hg.[6] Third, owing to safety concerns, guidelines recommend de-escalation of AHMT when the systolic OBP drops below 120 mm Hg[2]. Hence, OOBPs corresponding to an OBP of 120 mm Hg are important in accurate decision-making for de-escalation. Such BPs were recommended in the 2017 AHA/ACC guidelines, but there is no consensus among the different international guidelines.[2,7] The purpose of this review is therefore to summarize the literature and resolve related issues to expedite the use of the corresponding OOBPs for proper diagnosis of WCH, MH, WUCH, and MUCH in the setting of standard target BP as well as intensive target BP.

1.1 | Definition of corresponding BPs

Corresponding BPs can be defined as BP levels measured by techniques other than OBP, at which the risk of outcomes is similar to the risk associated with corresponding OBP. Practically, it does not mean that the absolute error/individual difference is zero. Many factors including aging and arterial stiffening in addition to the BP level itself have been reported to be associated with individual differences between OBP and OOBP.[2,8] Thus, corresponding BP measurements are needed in countering the diagnostic problems of WCH or WUCH, and MH or MUCH.

1.2 | Methodology for corresponding BPs

Corresponding BPs can be determined using different methods.[9] (1) Descriptive statistics may be used to explore the distribution (percentiles) and deviation from the mean (standard deviation [SD]), or regression analysis may be used to calculate the OOBP values relative to the predefined OBP thresholds. (2) Outcome-driven corresponding BPs may be defined according to CV event rates comparable to those of the predefined OBP thresholds.[10] (3) Another outcome-driven approach that may be used in randomized controlled trials (RCTs) is to determine the BP achieved with specific drug regimens by comparing OBP and OOBP. (4) RCTs may also be designed to achieve and maintain the standard versus intensive target BPs using the up- or down-titration protocol.

1.3 | Corresponding ABP

As shown in Table 1, in previous studies of corresponding BPs using statistical distribution,[11–15] corresponding ABPs depend on the characteristics of the study population and parameters used. The prevalence of patients with an increased risk due to increased BP compared with that of the optimal BP group is at least 15%–20% in the general population.[16] Therefore, +2-SD or 95th-percentile thresholds, representing approximately 5% of the population, may not be sufficiently accurate to define hypertension associated with an increased CV event risk. This discrepancy represents the gap between the statistically defined threshold and outcome-based thresholds.[16] As shown in Table 1, the corresponding ABPs derived from the corresponding threshold for similar CV outcomes were studied using the data of 5682 participants in four international population cohorts including the Japanese Ohasama study, and they provide the evidence for the current recommendations in the guidelines.[10,16–19] In the previous guidelines, the ABPs for the hypertension thresholds were a little higher or not clearly defined.[20–22] According to the current guidelines, the corresponding ABPs for the diagnosis of hypertension are 135/85, 130/80, and 120/70 mm Hg in daytime, 24 h, and nighttime, respectively.

Given that the AHMT status may influence the corresponding BPs as shown in the observational CV-outcome data,[10] the corresponding values may differ before and after treatment in RCTs. The corresponding BPs may also differ between the RCTs of the drug-naïve patients or the patients with drug wash-out and the RCTs of patients with ongoing AHMT. During the RCTs for BP targeting in which the evaluations are performed over several months or years, borderline hypertension or WCH may be eliminated because of habituation to the OBP measurement[23,24] (Table 2). In an Australian study of patients treated for hypertension, the corresponding daytime ABPs to the target OBPs of 130/80 and 120/80 mm Hg were 128/78 and 120/78 mm Hg, respectively.[25]

The corresponding BPs may differ between the target BP-driven up-titration protocol versus a fixed specific-drug regimen. The proportion of patients with WCH may also affect the relationship between the OBPs and OOBPs, thereby affecting the corresponding BPs (Table 2).

The white-coat effect was predominantly observed in RCTs in which the patients had a higher OBP, those with a placebo-controlled design, and those in which a fixed drug regimen was used without a target BP-driven up-titration protocol (Figure 1).

1.4 | Corresponding HBP

As shown in Table 3, the studies for home corresponding BPs for 140/90 mm Hg in OBP were using the 95th percentile, and the regressions were 129/84 and 125/79 mm Hg, respectively.[9,26] The outcome-driven corresponding home BPs for 140/90 and 130/80 mm Hg in OBP were 133.4/82.2 and 127/4/77.7 mm Hg, respectively.[27] Therefore, the corresponding HBP for the diagnosis of hypertension

TABLE 1 Ambulatory corresponding blood pressures according to the statistical distribution, regression and outcome-driven methods.

Parameters	Correspondence	Population	Number of the participant	24 h ABP	Daytime ABP	Nighttime ABP	References
+2SD	HTN threshold	Non-hypertensive, from 23 studies	3476	139/87	146/91	127/79	11
	HTN threshold	Non-hypertensive, general population	2400	130/81			11
+1SD	HTN threshold	General population	705	135/79			14
95th percentile	HTN thresholds	Non-hypertensive, from 24 studies	4577	133/82	140/88	125/76	12
	HTN thresholds	Non-hypertensive, general population	729	129/80	137/88	121/72	13
Regression	140/90, OBP	General population	2400	127/80 in men, 123/79 in women		-	16
	140/90, OBP	General population	2650	125/80	129/84		18
Outcome-driven	140/90, OBP	General population	1542	134/79	–	–	19
	140/90, OBP	International pooled cohorts	5682	131.0/76.4	138.2/82.6	119.5/70.8	10
	130/85, OBP	International pooled cohorts	5682	123.9/76.8	129.9/82.6	110.2/68.1	10
	120/80, OBP	International pooled cohorts	5682	116.8/74.2	121.6/78.9	100.9/65.3	10

Note: All values are in mm Hg.
Abbreviations: ABP, ambulatory BP; BP, blood pressure; HTN, hypertension; SD, standard deviation.

TABLE 2 Office and ambulatory BPs in randomized clinical trials.

Trial	Office BP (mm Hg)	24-h ABP (mm Hg)	Daytime ABP (mm Hg)	Nighttime ABP (mm Hg)	AOBP (mm Hg)
HOT					
Baseline ($n = 277$)	170/105	146/90	148/92	136/81	
On-treatment ($n = 347$)	136/81	134/80	136/82	125/73	
Syst-Eur					
Baseline ($n = 808$)	173.3/86.0	145.8/79.3	151.4/84.1	134.0/70.2	
Placebo ($n = 265$)	160.5/82.2	143.7/76.7	147.7/80.5	134.0/68.9	
On-treatment ($n = 271$)	149.8/78.0	135.1/72.9	140.2/77.1	124.3/64.8	
HYVET					
Baseline ($n = 112$)	172/90	133/77	136/78	124/72	
Placebo ($n = 84$)	162/86	131/77	133/80	123/72	
On-treatment ($n = 94$)	146/78	123/72	126/74	115/68	
VALUE					
Baseline-valsartan ($n = 332$)	153.1/87.0	132.5/74.8	135.7/77.8	125.8/68.5	
Baseline-amlodipine ($n = 327$)	152.4/86.8	131.5/75.2	134.8/78.2	125.1/69.1	
ONTARGET					
Baseline-R ($n = 142$)	139.4/79.4	126.7/71.9	129.0/74.9	119.1/65.8	
Baseline-T ($n = 139$)	138.3/80.1	124.6/72.3	127.2/74.7	117.3/66.4	
Baseline-R+T ($n = 141$)	139.4/80.6	125.7/73.1	128.0/75.4	118.9/67.4	
Follow-up-T ($n = 275$)	136.3/78.4	127.1/71.9	128.5/74.0	121.7/66.6	
Follow-up-R ($n = 284$)	135.5/77.1	124.0/70.8	126.0/72.9	117.6/65.3	
Follow-up-R+T ($n = 271$)	131.9/76.6	122.7/70.6	123.7/72.4	117.9/65.6	
SPRINT					
Standard ($n = 444$)	138.0/76.2	134.0/74.7	138.8/78.6	125.5/68.5	135.5/73.6
Intensive ($n = 453$)	136.4/75.8	122.7/68.8	126.5/72.0	115.7/63.4	119.7/65.9
QUARTET					
Baseline, intervention ($n = 300$)	153/89	144/84			142/86
Baseline, control ($n = 291$)	152/88	143/84			140/83
Follow-up, intervention	128/75**				121/71
Follow-up, control	136/79**				128/77

Abbreviations: ABP, ambulatory BP; AOBP, automated office BP; BP, blood pressure; HOT, Hypertension Optimal Treatment study; HYVET, Hypertension in the Very Elderly Trial; OH, orthostatic hypotension; ONTARGET, Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial; QUARTET, quadruple ultra-low-dose treatment for hypertension trial; R, ramipril; SPRINT, Systolic BP Intervention Trial; Syst-Eur, Systolic Hypertension in Europe trial; T, telmisartan; VALUE, Valsartan Antihypertensive Long-term Use Evaluation trial; WCE, white-coat effect.

would be rounded up to the nearest 5 as 135/85 mm Hg. For the difference according to the treatment status and ethnicity, there is some debate in the literature[27–30]; therefore, the patient needs further study. The corresponding HBP is at least 5 mm Hg lower than the OBP when the systolic OBP is higher than 130 mm Hg, and the difference becomes more pronounced as the OBP increases to 160 mm Hg or higher. These findings suggest that a clinically significant white-coat effect and regression to the mean are the major reasons for the differences between HBP and OBP. For an OBP ≤130 mm Hg, the corresponding HBP is largely comparable to the OBP; therefore, the white-coat effect and masking effects should be considered comparably with regard to their contribution to the mean difference.

The Hypertension Optimal Treatment (HOT) study is seemingly the only RCT for CV outcomes according to target BPs in which the HBPM data are available in parallel with the OBP data. Therein, the OBP and HBP differed by ≤1 mm Hg, regardless of the achieved BPs in each target BP group.[31]

The Strategy of BP Intervention in the Elderly Hypertensive Patients (STEP) study, another RCT of BP targeting using HBPM, revealed an OBP and morning HBP in the intensive treatment group of 126.7 and 129.6 mm Hg, respectively, and 135.9 and 137.5 mm Hg,

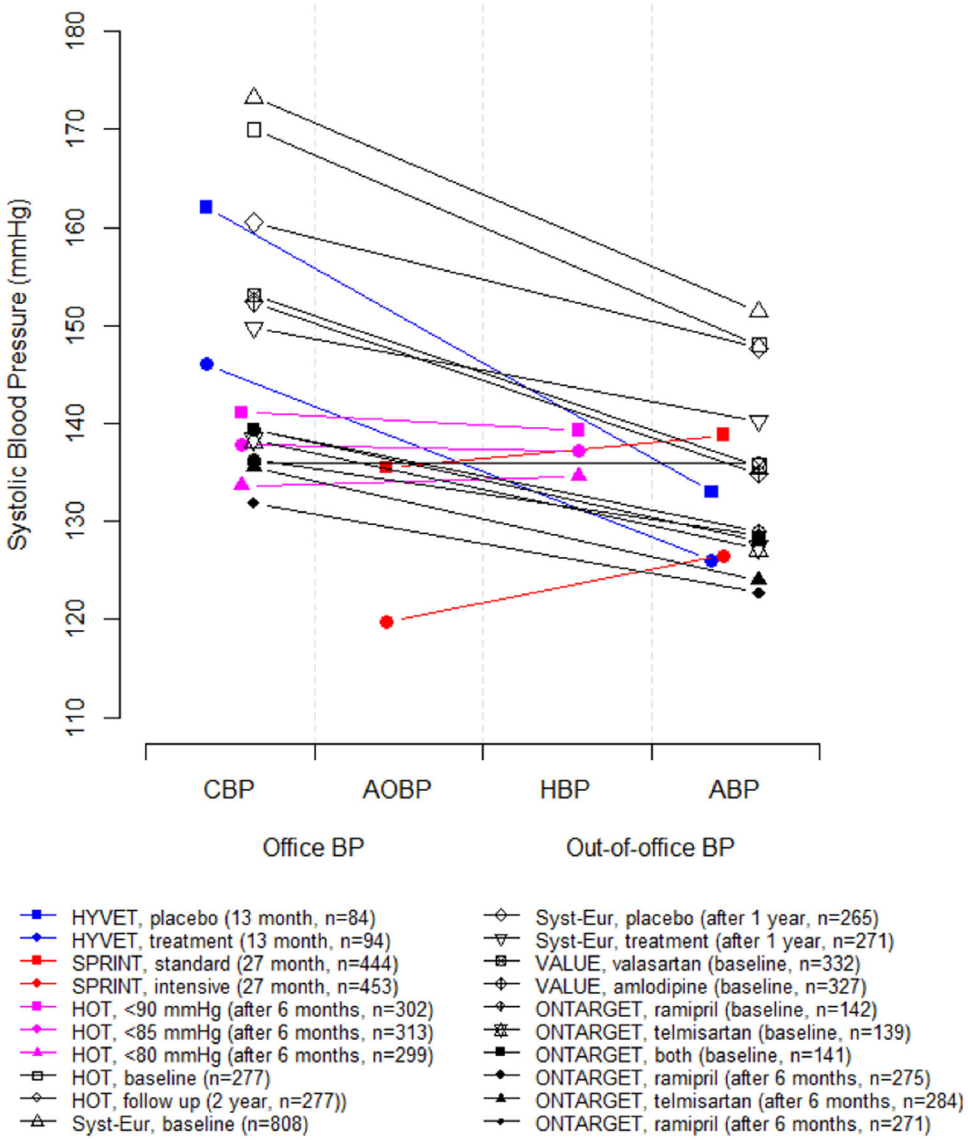

FIGURE 1 Comparison between office BPs and out-of-office BPs in randomized controlled trials for hypertension. White-coat effects were universally observed across the office BP ranges except in two target BP-driven up-titration studies, that is, the HOT study and the SPRINT. In the remaining four studies, the out-of-office BPs were comparable to or lower than office BPs or AOBPs. White-coat effects were more predominant in the higher office BP ranges. ABP, ambulatory BP; AOBP, automated office BP; BP, blood pressure; HBP, home BP; HOT, Hypertension Optimal Treatment study; HYVET, Hypertension in the Very Elderly Trial; ONTARGET, Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial; OBP, office BP; SPRINT, Systolic Blood Pressure Intervention Trial; Syst-Eur, Systolic Hypertension in Europe trial; VALUE, Valsartan Antihypertensive Long-term Use Evaluation trial.

respectively, in the standard treatment group.[32,33] Therefore, determination of the corresponding HBPs according to the characteristics of the study participants or the monitoring protocol warrants further research.

In the HONEST study, morning hypertension was reportedly more variable and more useful in the prediction of CV outcomes, but the differences between the corresponding morning and evening HBPs remains unknown.[28] As lifestyle and cultural factors have a greater effect in the evening than the morning BP, further studies are needed to determine whether corresponding HBPs differ between the morning and evening. Further study is also necessary to determine whether evening BP has a greater influence on average HBP than morning BP.

1.5 | Corresponding AOBP

Standard AOBP measurements follow the unattended protocol even though there is disagreement surrounding the differences between unattended AOBP (U-AOBP) and attended AOBP.[34] Cross-sectional studies for U-AOBP corresponding to the office hypertension diagnostic threshold have revealed that U-AOBP measurements may be

TABLE 3 Home corresponding blood pressures according to the statistical distribution, regression, and outcome-driven methods.

Methodology	Correspondence	Population	Number of participants	Average home BP	Morning home BP	Evening home BP	References
+2SD	Hypertension threshold	Metanalysis, 13 studies, normotensive only	3494	137/89			23
95th percentile	Hypertension threshold	Metanalysis, seven studies, normotensive only	2449	135/86			23
	Hypertension threshold	International pooled cohorts, normotensive only	2401	137/85	136/85	139/86	24
	140/90 mm Hg, OBP	Metanalysis, three studies	1865	129/84			23
Regression	140/90 mm Hg, OBP	Metanalysis, three studies	2800	125/79			23
Outcome-driven	140/90 mm Hg, OBP	International pooled cohorts, IDHOCO	6407	133.4/82.2	–	–	25
	130/85 mm Hg, OBP	International pooled cohorts, IDHOCO	6407	127.4/79.9	+	–	25
	120/80 mm Hg, OBP	International pooled cohorts, IDHOCO	6407	121.4/77.7	–	–	25

Note: All values are in mm Hg.
Abbreviations: ABP, ambulatory BP; BP, blood pressure; HTN, hypertension; SD, standard deviation.

comparable to daytime ABP measurements. In a study of patients treated for hypertension, U-AOBP and OBP were largely comparable for an OBP around 130 mm Hg, but for an OBP <130 mm Hg, AOBP tends to be lower than OBP.[35] In the intervention and active control groups in the quadruple ultra-low-dose treatment for hypertension (QUARTET) study, the U-AOBPs were 121 and 128 mm Hg, respectively, and OBPs were 128 and 136 mm Hg, respectively, at 12 months. These results suggest that the U-ABOP is 5 mm Hg lower than the OBP when the achieved OBP is below 130 mm Hg.[36]

In the ABPM sub-study of the SBP Intervention Trial (SPRINT), for a U-AOBP of 119.7/65.9 mm Hg measured at 27 months in the intensive treatment group, the corresponding 24-h, daytime, and nighttime ABPs were 122.7/68.8, 126.5/72.0, and 115.7/63.4 mm Hg, respectively.[37] In the standard treatment group, for a U-AOBP of 135.5/73.6 mm Hg measured at 27 months, the corresponding 24-h, daytime, and nighttime ABPs were 134.0/74.7, 138.8/78.6, and 125.5/68.5 mm Hg, respectively. Considering the corresponding ABPs for patients treated for hypertension, the ABPM profiles of the standard treatment group in the SPRINT are comparable to those in the HOT study, as the study designs and ABPs are similar.[23,38] For achieved daytime ABPs around 135 mm Hg in these target-driven interventional trials, U-AOBPs and OBPs were similar to daytime ABPs. However, for achieved OBPs in the Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial (ONTARGET) of 130–135 mm Hg, the daytime ABP profiles were approximately 10 mm Hg lower than the OBPs (Table 2). Potential factors plausibly related to these differences may have been the magnitude of WCH and the white-coat effect. The difference in the proportion of the drug naïve patients between SPRINT (~10%) and ONTARGET (~30%) seems to be consistent with this idea that WCH is likely to be excluded by a clinician's experience, and the white-coat effect will likely be decreased by patients' adaptations.

Given that the recommended target OBP of <130 mm Hg with intensive treatment, according to guidelines,[3,39] is the same as the recommended target daytime ABP, and a U-AOBP of 120 mm Hg corresponds to a daytime ABP of 126.5 mm Hg, the current evidence is insufficient to recommend corresponding U-AOBPs for OBPs of 130/80 mm Hg or below (Table 3). It is uncertain whether AOBP can be used to categorize patients into BP subtypes or hypertension phenotypes, as AOBP measurement may increase the rate of MUCH. For example, with reference to OOBP targets for intensive BP control lowering below 130/80 mm Hg, the prevalence of MUCH would be higher when using U-AOBP than when using OBP whereas the prevalence of WUCH would be the opposite.

1.6 | Corresponding BPs in the major guidelines

The recommendations for corresponding BPs in the 2017 AHA/ACC hypertension guidelines are largely based on the abovementioned observational IDACO, IDHOCO, and the Australian study.[3] The corresponding OOBPs for an OBP of 140/90 mm Hg are consistent between the 2017 AHA/ACC guidelines and other guidelines, as shown in Table 4.[2,7,40] There were no changes in OOBP thresholds for hypertension in the 2023 European guidelines compared with the 2018 guidelines.[39] The corresponding daytime ABP for an OBP of 160/100 mm Hg was suggested as 150/95 mm Hg in the UK guidelines.[41] According to the 2018 ESH/ESC guidelines, the systolic OBP and OOBP converge at 120 mm Hg in both the general population and in patients treated for hypertension, but there is no recommendation for the corresponding ABP for an OBP ≤ 130/80 mm Hg.[2] As the corresponding 24-h ABP is calculated via the following equation: (16–18 × daytime ABP + 6–8 × nighttime ABP)/24, the corresponding 24-h ABP for an OBP of 160/100 mm Hg may be more likely to be lower

TABLE 4 Corresponding blood pressures in the major guidelines.

	Office BP (mm Hg)	24-hr ABP (mm Hg)	Daytime ABP (mm Hg)	Nighttime ABP (mm Hg)	Home BP (mm Hg)
2017 AHA/ACC guidelines	160/100	145/90	150/95	130/80	150/95
	140/90	130/80	135/85	120/70	135/85
	130/80	125/75	130/80	110/65	130/80
	120/80	115/75	120/80	100/65	120/80
2011 NICE guidelines	160/100		150/95		150/95
	140/90		135/85		135/85
2023 ESH/ESC guidelines	140/90	130/80	135/85	120/70	135/85
2020 AHA/AMA joint statement	160/100				145/90
	140/90				135/85
	130/80				130/80
	120/80				120/80

Abbreviations: ABP, ambulatory blood pressure; AHA/ACC, The American Heart Association/The American College of Cardiology; AHA/AMA, The American Heart Association/The American Medical Association; BP, blood pressure; ESH/ESC, The European Society of Hypertension/The European College of Cardiology; NICE, The National Institute for Health and Care Excellence.

TABLE 5 Summary of ambulatory, home, central, and unattended automated office blood pressures corresponding to specified office blood pressures.

Office BP (mm Hg)	24-h ABP (mm Hg)	Daytime ABP (mm Hg)	Nighttime ABP (mm Hg)	Home BP (mm Hg)	U-AOBP (mm Hg)	References
160/100	145/90	150/95	130/80	150/95		[3,41]
140/90	130/80	135/85	120/70	135/85	135/85	[3,39,41,47]
130/80	125/75	130/80	110/65	130/80		[3]
120/80	115/75	120/80	100/65	120/80		[3]

Abbreviations: ABP, ambulatory BP; BP, blood pressure; U-AOBP, unattended automated office BP.

than the daytime ABP and lower than the nighttime ABP[19,42] (Table 3). The corresponding HBP for an OBP of 160/100 mm Hg was suggested as 150/95 mm Hg in the UK guidelines[41] and 145/90 mm Hg in the AHA/AMA joint statement.[43]

In the ESH/ESC guidelines, the corresponding HBP for an OBP of 130 mm Hg is unclear, but speculated to be below 130 mm Hg. In the 2019 Japanese guidelines, the corresponding HBP for an OBP of 130/80 mm Hg was suggested as 125/75 mm Hg.[7,44]

Canadian guidelines suggest an AOBP threshold for hypertension of 135/85 mm Hg. However, there is no recommendation for the corresponding AOBPs, and a systolic target for AOBP was recommended separately for high-risk patients as <120 mm Hg.[45]

From an Asian perspective, the corresponding HBP and U-AOBP values are needed to cope with a variety of clinical settings. From the data we reviewed, we compiled a table with suggested values (Table 5).

As a clinical implication, using OBP thresholds for the diagnosis of hypertension by European versus American guidelines and the corresponding OOBPs, the prevalence of MH in the American guidelines would be lower than the European guidelines whereas the prevalence of WCH would be the opposite.

1.7 | Clinical implications and future perspectives

1. Age-specific corresponding BPs

Age and sex are reportedly related to corresponding BPs but are not regarded as clinically significant.[25] In the observational data of untreated octogenarians, higher corresponding HBPs for thresholds for treatment of BPs, the lowest risk BPs and thresholds for increased mortality during treatment were reported.[46] Even though the corresponding BPs specific to octogenarians are likely to be useful, considering the rapidly increasing octogenarian population, optimal BP thresholds for older adults should not be determined by observational studies, as they are limited by reverse causality bias.

2. Down-titration

Although European guidelines recommended down-titration when the OBP is <120 mm Hg,[2] there is no clear recommendation regarding which BP should be used for such a decision when there are discrepancies among the OBP and OOBPs. As a U-AOBP <120 mm Hg is the target BP in Canadian guidelines,[47] interpretation of the

AOBP obtained during intensive BP control in the context of OBP is vital. Considering the 2018 ESH-ESC guideline recommendation of down-titration when the systolic OBP is <120 mm Hg, a suggestion that the AOBP does not differ from the standardized OBP when it is <120 mm Hg[34] would result in a contradiction between the two recommendations. For perspectives specific to Asia, a study for an optimal down-titration strategy is needed.

3. Benefit of adding OOBP measurement

Overall, the addition of OOBP measurements to repeated OBP measurements is expected to yield only modest benefits in terms of prognostication.[48] As a result of this clinically modest but statistically significant benefit, Taiwanese guidelines recommend HBP measurement as the standard BP modality, and UK guidelines mandate ABPM for a hypertension diagnosis.[41,49] Specific benefits related to MH or MUCH are key components in the prevention of CV events. Clinical benefits related to WCH and WUCH need to be differentiated from the economic benefits to allow for clearer definition of the physiological impact of WCH and WUCH.

2 | CONCLUSIONS

Corresponding OOBPs are the key requirement for the diagnosis of WCH, MH, WUCH, and MUCH. Corresponding ABP in the 2017 AHA/ACC guidelines was consistent with the current evidence. The discrepancy among the corresponding HBPs and the relationship between AOBP and OBP in the scenario of intensive BP control needs to be resolved in the future. In the meantime, the choice of corresponding HBP should be decided by considering the cultural and lifestyle factors related to the HBP readings and the risk profile of individual patients. The usefulness of corresponding AOBP therefore warrants further investigation.

AUTHOR CONTRIBUTIONS

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