Unattended Versus Attended Blood Pressure Measurement
Relationship With Preclinical Organ Damage

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Abstract—It has been suggested that measurement of unattended or automated oscillatory blood pressure (BP) values may provide advantages over conventional BP measurement. Some international guidelines now suggest automated oscillatory BP as the preferred approach for measuring BP. Data on the relationship between automated oscillatory BP and cardiovascular events are much less solid as compared to those obtained with the standard approach; preliminary data suggested that automated oscillatory BP might be more strictly correlated with organ damage. The aim of our study was to evaluate the relationship between attended or unattended BP and organ damage in 564 subjects undergoing an echocardiogram and carotid ultrasound at an European Society of Hypertension Excellence Center.Both unattended BP (patient alone in the room, an oscillometric device programmed to perform 3 BP measurements, at 1-minute intervals, after 5 minutes) and attended BP were measured with the same device, on the same day of the ultrasonographic examination, in random order. In 564 patients (age 61±15 years, 41% female 78% hypertensives) systolic unattended BP was lower as compared with attended BP (128.0±15.5 versus 134.5±19.9 mm Hg). Left ventricular mass index was similarly correlated with attended and unattended systolic BP (r=0.205 and r=0.194, respectively). Carotid intima-media thickness was also significantly correlated with both attended and unattended systolic BP (mean max intima-media thickness: r=0.206 and r=0.194, respectively, P<0.0001). The differences between correlations were not statistically significant. Our results suggest that attended and unattended BP values are similarly related with hypertensive organ damage. **(*Hypertension*. 2019;73:736-742. DOI: 10.1161/HYPERTENSIONAHA.118.12187.)** • **Online Data Supplement**

Key Words: automated office blood pressure measurement ■ blood pressure ■ carotid intima media thickness ■ echocardiography ■ hypertension ■ left ventricular hypertrophy ■ unattended blood pressure measurement

A large amount of data clearly indicate that high blood pressure (BP) represents the most important risk factor for morbidity and mortality worldwide[1]; therefore, accurate measurement of BP values represents a crucial step in the evaluation of cardiovascular risk. In spite of the growing evidence that out of office BP may add relevant clinical information for cardiovascular risk assessment, measurement of BP values in the physician's office still represent a cornerstone for the diagnosis and treatment of arterial hypertension,[2–5] because of the robust evidence of its prognostic significance derived from large observational studies and randomized clinical trials. Although being so important, a simple procedure such as BP measurement is often poorly executed and is a relevant source of inaccuracy in cardiovascular risk assessment. In fact, office BP is often measured only once, in crowded rooms, by busy physicians and nurses, without adequate antecedent rest, often using aneroid sphygmomanometers. In addition to the insufficient adherence to recommendations, the variability of BP values and the well-known white coat effect represent major drawbacks of this approach.[2,6,7] In recent years, mercury sphygmomanometers have been progressively replaced by oscillometric devices for BP measurement, because of environmental issues; these devices have already been used for BP measurement in several randomized trials. In clinical practice routine BP measurement with these devices is usually performed by physicians and nurses, although some oscillometric devices may allow multiple automated readings performed with the patient alone, thus making possible the so called automated office BP measurement (AOBP), in which multiple automated readings are performed using an oscillometric device with the patient sitting alone in the office.[4,8,9] This approach, also known as unattended BP measurement,[10] has been used in the majority of patients enrolled in SPRINT (Systolic Blood Pressure Intervention Trial),[11] as reported by Johnson et al,[12] and implies several theoretical advantages over conventional BP measurement; in fact, the absence of the medical staff in the room may reduce, or even abolish, the alerting reaction, eliminates the risk of conversation during the measurement, requires less training, and makes it possible a better standardization of the procedure, with measurements taken at fixed intervals.[4,8]

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On the contrary, we have recently reported[13] that BP values recorded by the attended or unattended approach with the same oscillometric device are not completely interchangeable, as had been previously suggested also by other authors.[8,14–16] Even more important, only few data are available on the prognostic significance of AOBP[4,11,12,17,18] or on the relationship with cardiovascular organ damage[19–21] which represents an intermediate step in the continuum of cardiovascular disease and is strictly correlated to cardiovascular risk.[2,22,23]

Therefore, we considered it worthwhile to assess the relationship between preclinical hypertensive organ damage (OD) and BP values obtained by the unattended approach and BP values measured by the physician, in the same environment, on the same day using the same automated oscillometric device (attended BP).

Methods

The procedures followed were in accordance with institutional guidelines, and informed consent was obtained from each patient. The study protocol was in accordance with the ethical guidelines of 1975 the Declaration of Helsinky and approved by the Institution's Human Research Committee. The data that support the findings of this study are available from the corresponding author on reasonable request. This study does not involve animals.

Five hundred sixty-four consecutive outpatients undergoing a diagnostic work-up for arterial hypertension (known or suspect), which included at least an echocardiogram, were prospectively included in the study. All patients were included at the European Society of Hypertension Excellence Center in Brescia (Italy) from June 15, 2017 to June 15, 2018 and, among them, a subgroup of 396 patients, on request of the attending physician, also underwent carotid ultrasound for the detection of plaques and for the measurement of intima-media thickness (IMT) for cardiovascular risk evaluation. All patients also underwent a throughout clinical examination, including anthropometric measurements. Cardiovascular risk factors were carefully assessed in each individual, including the presence of diabetes mellitus and dyslipidemia, smoking status and a documented clinical history was collected. All individuals were in a fasting state, refrained from alcohol and caffeine-containing beverages or from smoking in the past 3 hours. All BP measurements and evaluation of OD were performed on the same day.

BP Measurement

BP values were measured according to a standardized protocol by a physician in a controlled environment at 22±1°C, at the upper arm, with cuff and bladder dimensions adapted to the arm circumference with an automated oscillometric device (Omron HEM 9000Ai).[24] All patients underwent unattended BP measurement (the patient was left alone, and the oscillometric device was programmed by the physician, before living the room, to automatically perform, after 5 minutes of rest, 3 BP measurements with 1-minute intervals). All patients also underwent attended BP measurement as follows: the physician was sitting in front of the patient and, after 5 minutes of rest, manually activated the device that automatically measured BP 3×at 1-minute intervals; the physician did not interact with the patient during all this time lapse. The unattended and attended measurements were performed in random order with the same oscillometric device. Both measurements were performed in alternating sequence in successive participants (attended first and unattended afterward in one patient, and vice versa, in the subsequent patient). For both BP measurements, systolic BP (SBP) and diastolic BP (DBP) were calculated as the mean of 3 consecutive readings.

Echocardiography

In all patients, an echocardiogram was performed using a Philips Epiq 7 with X5-1 XMatrix array transducer (Philips Ultrasound, Bothwell, Washington). The left ventricular internal dimensions, interventricular septum, and posterior wall thicknesses were measured at the end of diastole according to the recommendations of the American Society of Echocardiography.

Left ventricular mass (LVM) was calculated according to the formula: LVM=0.8×1.04×([left ventricular wall thicknesses+internal dimension]^3−[internal dimension]^3)+0.6 g and indexed to body surface area (BSA). LV hypertrophy (LVH) was considered according to European Society of Hypertension–European Society of Cardiology hypertension guidelines (LVM index [LVMI]>115 and 95 g/m^2 BSA in men and women, respectively).[2] An additional criterion of LVMI was obtained by normalization of LVM for height to the 2.7 power[5,23] and LVH was prospectively defined as a value of LVMI >50 g/m$^{2.7}$ in males and 47 g/m$^{2.7}$ in females. Relative wall thickness was calculated as (2×posterior wall thickness)/(left ventricular internal diameter at end diastole).[23]

Carotid Ultrasound

B-mode imaging of carotid arteries was performed using a linear L12-3 array transducer. Patients were investigated lying in supine position, with slight hyperextension of the neck, and the common carotid artery, the carotid bifurcation and the extracranial portions of internal and external carotid arteries were identified. Measurements included IMT of the near and far walls (leading edge to the leading edge) and end diastolic internal diameter of all the segments explored. The MeanMax IMT was defined as the average of maximum IMT of near and far wall of common carotid artery, the carotid bifurcation, and the internal carotid arteries; the carotid bifurcation mean maximum (CBMax) was defined as the average of maximum IMT of near and far wall of common carotid artery and of the carotid bifurcation; the Tmax was defined as the maximum IMT of near and far wall of common carotid artery, the carotid bifurcation, and the internal carotid arteries. The Plaque was considered in the presence of a focal IMT >1.3 mm.[2,25]

Statistical Analysis

All data are expressed as mean±SD. Relationships between variables were assessed by the calculation of Pearson correlation coefficients. Steiger *Z* statistic was used for the comparison of the correlation coefficients of BP values with LVM, indexed LVM, and composite parameters of IMT. We created receiver operator curves of considered parameters (attended and unattended BP values), and we calculated the area under the curve (AUC) to estimate their predictive power of the presence of LVH and of a carotid plaque. All statistical tests were 2-tailed. A value of P <0.05 was considered statistically significant. All analyzes were performed with IBM SPSS software (version 23; SPSS Inc, Chicago, IL) and MedCalc for Windows, version 15.0 (MedCalc Software, Ostend, Belgium).

Results

Demographic characteristics and the prevalence of cardiovascular risk factors of all patients included in the study are detailed in Table. The mean age was 61±15 years, 59% of all patients were males, 78% were hypertensive and, among them, 63% were treated with dihydropyridinic calcium channel blockers, β-blockers, angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, and diuretics. The prevalence of dyslipidemia and diabetes mellitus were 50% and 14%, respectively; active smokers were 13%.

Both systolic and diastolic unattended BP was lower as compared to attended BP (SBP, 134.5±16.9 versus 128.0±15.5 mm Hg; DBP, 78.1±11.6 versus 76.6±11.1 mm Hg). The mean differences between the values obtained using the 2 approaches were 6.5±7.1 mm Hg for SBP and 1.6±4.7 mm Hg for DBP (median, 5.0 and 1.0 mm Hg, respectively) (Figure S1 in the online-only Data Supplement). The coefficient of correlation between the 2 methods of BP measurement was r=0.906 (P<0.0001) for systolic values and r=0.914 (P<0.0001) for diastolic values.

Table. Demographic and Clinical Characteristics of the Population

Variables	N=564 Patients
Age, Years	61±15
Sex (males/females; %)	334/230 (59%, 41%)
Height, cm	170±9
Weight, kg	76±15
BMI, kg/m^2	26±4
Hypertension, n (%)	439 (78%)
Antihypertensive treatment (%)	355 (63%)
Diuretics, n (%)	138 (25%)
β-Blockers, n (%)	153 (27%)
CC-blockers, n (%)	164 (29%)
ACE-i or ARB, n (%)	271 (48%)
Potassium-sparing diuretics, n (%)	36 (6%)
α-Blockers, n (%)	74 (13%)
Dyslipidaemia, n (%)	283 (50%)
Diabetes mellitus, n (%)	79 (14%)
Smoking (no/yes/ex) (%)	325 (58%)/75 (13%)/164 (29%)

ACE-i indicates angiotensin-converting enzyme inhibitors; ARB, angiotensin receptor blockers; BMI, body mass index; and CC-blockers, dihydropyridinic calcium channel blockers.

Cardiac Organ Damage

A positive and statistically significant correlation was observed between LV mass, and both attended and unattended SBP values (*r*=0.127 and *r*=0.130, *P*<0.005) and attended and unattended pulse pressure (PP) values (*r*=0.165 and *r*=0.188, *P*<0.001); no significant correlation was observed with DBP. Indexed LVM (LVM/BSA) was significantly related to attended and unattended SBP values (*r*=0.205 and *r*=0.194, *P*<0.0001) (Figure 1) and attended and unattended PP values (*r*=0.295 and *r*=0.301, *P*<0.0001); a negative correlation was observed with DBP (*r*=−0.095 and *r*=−0.095, *P*<0.05). Similar results were observed also when we considered LVMI for height to the 2.7 power.

The comparison of the coefficient of correlation using Steiger *Z* test showed that the correlation between attended and unattended systolic, diastolic, and PP values and LVM and indexed LVM was not statistically different (Figure S2 in the online-only Data Supplement).

Similarly, relative wall thickness was significantly correlated with both attended and unattended SBP values (*r*=0.104, *P*<0.05 and *r*=0.107, *P*<0.05, respectively) and with both attended and unattended PP values (*r*=0.084, *P*<0.05 and *r*=0.085, *P*<0.05, respectively). No difference was observed between the correlation coefficients (Steiger *Z* test, *P*=ns [nonsignificant]).

Receiver operator curves were built for attended and unattended SBP to predict the presence of LVH. No significant difference could be appreciated between the discrimination value of attended or unattended SBP for the presence of LVH, either defined as LVM/BSA (AUC, 0.624; 95% CI, 0.582–0.664 versus AUC, 0.605; 95% CI 0.564–0.646; *P* for the comparison=ns; Figure 2) or as LVM/h$^{2.7}$ (AUC 0.609; 95% CI, 0.567–0.649 versus AUC 0.597; 95% CI, 0.555–0.638, *P* for the comparison=ns). The best predictive cutoff for LVH (indexed to BSA), based on highest Youden index (0.26), was 140 mm Hg for attended SBP and 134 mm Hg for unattended SBP (Youden index 0.22). A value >140 mm Hg for attended SBP resulted in 56% sensitivity and 69% specificity for the prediction of LVH; while a value >134 mm Hg for unattended BP had a 51% sensitivity and 72% specificity for the prediction of LVH. Similar results were observed also considering LVH indexed to h$^{2.7}$ (data not shown).

Vascular Organ Damage

In the group of 396 patients who underwent IMT evaluation, we observed a positive statistically significant correlation between MeanMax, CBMax, and Tmax with both attended SBP (*r*=0.206, *r*=0.222, and *r*=0.207; all *P*<0.0001) and unattended SBP (*r*=0.194, *r*=0.208, and *r*=0.189; all *P*<0.0001; Figure 1) and with both attended PP (*r*=0.422, *r*=0.429, and *r*=0.383, all *P*<0.0001) and unattended PP (*r*=0.429, *r*=0.434, and *r*=0.388, all *P*<0.0001); a negative correlation was observed with both attended DBP (*r*=−0.249, *r*=−0.234, and *r*=−0.197, all *P*<0.0001) and unattended DBP (*r*=−0.226, *r*=−0.214, and *r*=−0.186, all *P*<0.0001). No difference in the correlation coefficients was observed between attended and unattended systolic, diastolic and PP values, and all IMT composite parameters (Steiger *Z* test, *P*=ns).

Receiver operator curves were built for attended and unattended SBP to predict the presence of a plaque. No significant difference between the discrimination value of attended or unattended SBP for the presence of plaque was observed (attended SBP: AUC 0.561; 95% CI, 0.518–0.602 versus unattended SBP: AUC 0.555; 95% CI, 0.513–0.597; *P* for the comparison=ns).

The best predictive cutoff for the detection of carotid plaques was 130 mm Hg for attended SBP and 121 mm Hg for unattended SBP. A value >130 mm Hg for attended SBP had a 65% sensitivity and a 48% specificity for the prediction of plaque; while a value >121 mm Hg for unattended BP had a 71% sensitivity and 42% specificity for the prediction of plaques.

Considering simultaneously cardiac and vascular damage (presence of LVH and/or carotid plaque), attended and unattended BP values have similar predicting value (attended SBP: AUC 0.570; 95% CI, 0.528–0.612 versus unattended SBP: AUC 0.562; 95% CI, 0.519–0.603, *P* for the comparison=ns). A value >132 mm Hg for attended SBP had a 59% sensitivity and a 55% specificity for the prediction of any OD; while a value >121 mm Hg for unattended BP had a 71% sensitivity and 43% specificity for the prediction of the presence of any OD.

Discussion

The publication of the results of the SPRINT study have called attention on the value of unattended BP measurement as compared with the more conventional attended approach. The difference of 6.5 mm Hg between the attended and unattended BP readings that we have observed is similar to the difference reported previously for research quality BP versus AOBP; other studies found larger or smaller differences, probably because

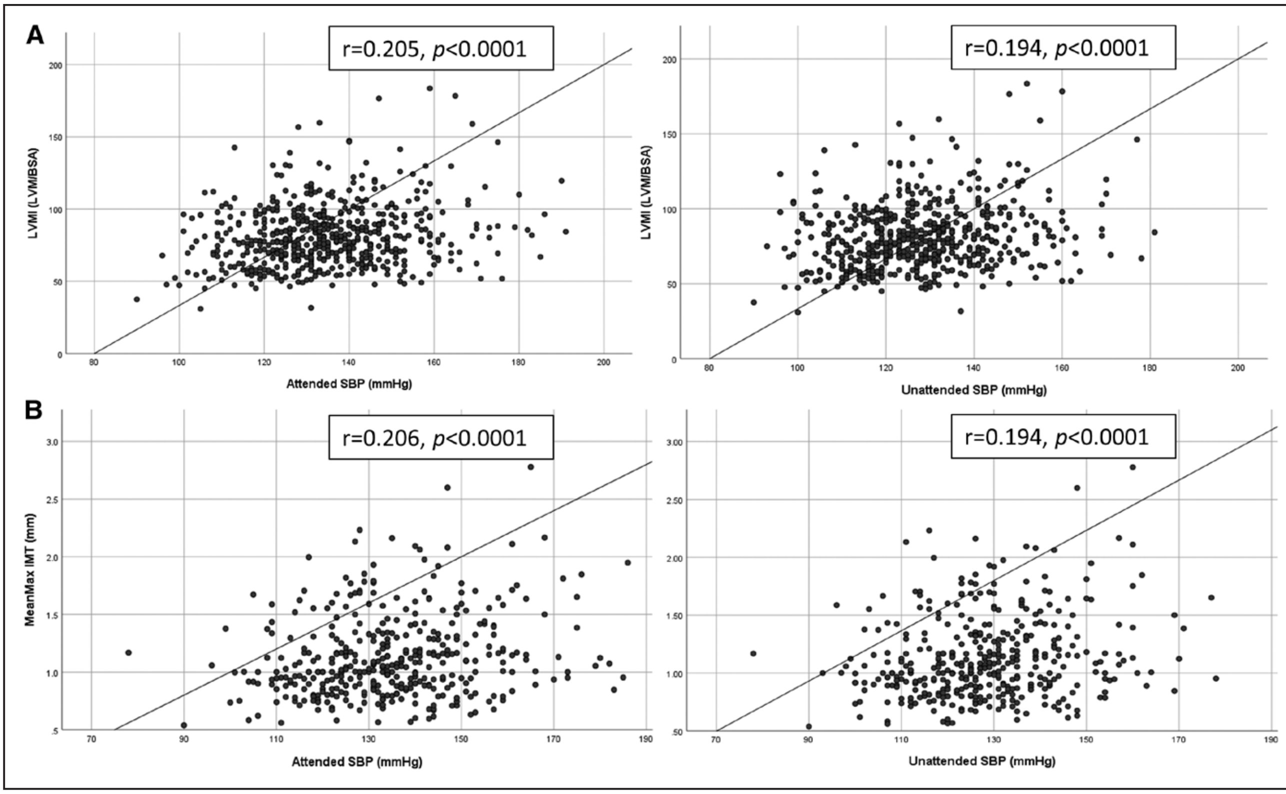

Figure 1. **A**, correlation between attended and unattended systolic blood pressure (SBP) values and left ventricular hypertrophy (LVM)/body surface area (BSA); (**B**) correlation between attended and unattended SBP values and MeanMax intima-media thickness (IMT).

of the different approach used for BP measurement (auscultatory versus oscillometric), of the number of measurements considered, and of the setting in which the measurement was performed (real life versus research setting).[13,16,19–21,26–28]

The main finding of our study is represented by the fact that, despite the 2 approaches for BP measurement provide different mean values, they are similarly correlated to LVMI and relative wall thickness and to carotid artery IMT or plaque. LVMI is positively correlated to SBP and PP, and the correlation coefficients between BP values obtained by the 2 approaches and LVMI are almost superimposable. Furthermore, the receiver operator curve analysis further confirm that the 2 measures of BP are similarly related to the presence of LVH. Similar results have also been observed for relative wall thickness, a robust index of left ventricular concentric remodeling. Few studies have tried to analyze the correlation of unattended BP with hypertensive organ damage. Andreadis et al[21] used the same oscillometric device for the measurement of both attended and unattended BP and observed similar correlation coefficients between LVMI and daytime ambulatory BP or unattended office BP, although attended office BP values were not significantly correlated to LVMI, thus suggesting that unattended BP measurement could provide a better estimate of the effect of BP load on the heart. However, this well-designed study included a relatively small sample of patients (n=90) and unattended BP was not measured on the same day as attended BP.[21] More recently, in 275 hypertensive patients with chronic kidney disease, Agarwal et al[20] analyzed the correlation between LVMI as assessed by echocardiography and BP values measured by the attended or by the unattended approach. The strength of the correlation of unattended (or, according to the authors definition, research grade) SBP and daytime ambulatory SBP with LVM was similar and stronger than the relationship between routine (attended) SBP and LVM. However, the authors measured attended BP only once in the supine position after the echocardiogram, although unattended BP was measured 3 times in the sitting position, and 2 different devices (Omron HEM 705 CP for the attended measurement and Omron HEM 907 for the unattended recording) were used. All these methodological aspects could have significantly influenced the results and explain the discrepancy with our findings. No other study, to the best of our knowledge, assessed the relation between the 2 approaches for BP measurement in the same visit with the same oscillometric device and LV mass and geometry.

In addition, our study is the first that analyzed simultaneously cardiac and vascular preclinical damage as related to attended or unattended BP. As for LVH, several measures of carotid atherosclerosis, such as Meanmax, CBMeanmax, and Tmax are all significantly correlated to BP values and the correlation coefficients between the 2 types of BP measurement (attended or unattended) and IMT are not different. Furthermore, the AUC for the prediction of the presence of a plaque is not different for attended or unattended BP. No other study analyzed the correlation between carotid artery damage and BP values measured by the attended or unattended approach with the same oscillometric device. In 176 firefighters in Canada,[19] the automated oscillometric BP readings obtained by the use of BpTRU device (VSM MedTech Ltd, Coquitlam, Canada) resulted significantly correlated to

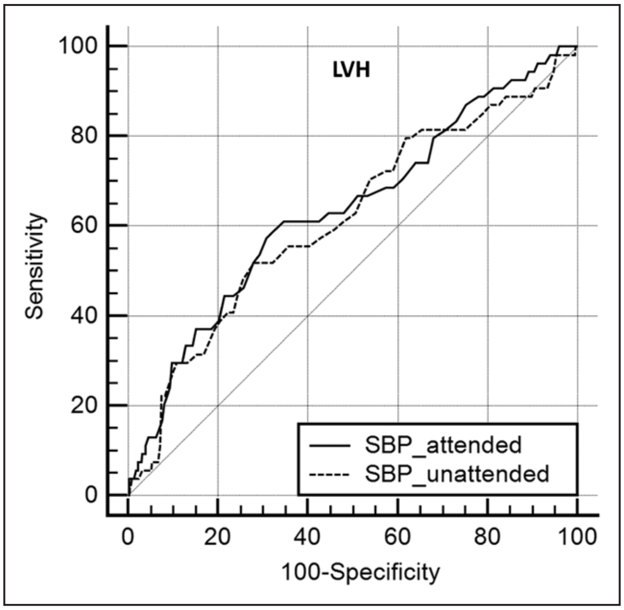

Figure 2. Receiver operator curves (ROC) curves for attended (thick line) and unattended systolic blood pressure (SBP; dotted line) for the prediction of left ventricular hypertrophy (LVH).

carotid IMT, while attended BP readings, measured with the traditional auscultatory technique, were not, when a multiple linear regression analysis was performed. Nevertheless, the different approaches used for BP measurements does not allow a comparison with our results.

Our results might add information on the clinical usefulness of the measurement of unattended BP. This approach for BP measurement, proposed for the first time in 1997 by Myers et al[29] with the aim of eliminating the white coat effect, has gained progressively more attention, also thanks to the availability of devices specifically designed for this purpose. In 2016 the Canadian Hypertension Guidelines indicated for the first time AOBP as the preferred method of performing in-office BP measurement (Grade D recommendation),[4] also suggesting a specific cutoff value of >135/85 mm Hg for the identification of high BP, maintaining a cut off of 140/90 mm Hg for auscultatory BP and these recommendations have been confirmed in 2018. The American Heart Association 2017 Hypertension Guidelines[3] underline the potential advantages of the measurement of AOBP for minimizing the white coat effect, without giving clear preference for attended or unattended BP measurements. The use of oscillometric devices, in addition to avoiding the negative impact of mercury on the environment, offers the advantage of eliminating errors in the correct identification of Korotkoff sounds, in the velocity of deflation of the cuff, and prevents errors related to digit preference. In addition, the unattended approach has other theoretical advantages, possibly reducing patient's anxiety, eliminating the possibility of conversing with the patient, providing fixed measurement intervals and, therefore, making it possible a better standardization of the procedure. Interestingly, it has been demonstrated that AOBP provides values that are more closely correlated with daytime BP as assessed by ABPM[30] and to home BP. Despite its advantages, few data are available on the prognostic significance of AOBP. In a large group of 3627 untreated Canadian elderly subjects enrolled in the Cardiovascular Health Awareness Program, AOBP was measured in a community pharmacy with subjects seated alone, and during a follow up of about 5 years the authors observed a direct correlation between BP values and cardiovascular events, and, based on their data, proposed a possible cut off of >135/85 mm Hg for the diagnosis of arterial hypertension. In a group of treated hypertensive patients enrolled in the same project, in-treatment systolic AOBP in the range of 110 to 119 mm Hg was associated with the lowest cardiovascular event rate during 4.6 years of follow-up. In SPRINT, in which BP was measured in most patients by the unattended approach, a significant reduction in the risk of cardiovascular events was observed in patients randomized to a target of <120 mm Hg. However, it should be kept in mind that these results do not provide information on the incremental prognostic value of unattended BP over attended BP. Only a recent study, in 236 untreated hypertensive patients, directly compared the prognostic significance of conventional office BP, AOBP, and home BP.[31] Conventional office BP was significantly higher than AOBP and home BP and the 3 measures of BP were equally predictive of cardiovascular events. Indeed, these results need further confirmation in larger groups of patients.

While awaiting for more data based on hard end points, our results may add information on the clinical relevance of unattended BP measurement. In fact, preclinical OD represents an intermediate step in the chain of events that, from high BP values and other cardiovascular risk factors, leads to cardiovascular complications. Current hypertension guidelines emphasize the importance of assessing subclinical OD, underlining its usefulness for a better stratification of cardiovascular risk.[2,3,5] Furthermore, the reduction of preclinical OD occurring during treatment is strictly associated to the reduction of cardiovascular events,[22,23,32] and has also been proposed as a tool for the evaluation of the efficacy of antihypertensive treatment.

Limitations

When interpreting our results it should be considered that our population was composed mostly by whites (99.5%), apparently free from cardiovascular disease, and that the prevalence of diabetes mellitus was 14% and, therefore, cannot be directly extrapolated to patients with different demographic characteristics.

In our study attended BP measurement was always performed by a physician; it could be worthwhile, in future studies, to analyze the relationship between preclinical OD and unattended BP values and attended BP measured by nonphysicians.

Measurements of attended BP were performed according to our European Society of Hypertension Excellence Center outpatients clinic standard procedures. It is conceivable that AOBP could provide different results in settings in which less attention is usually paid to attended BP measurement. Furthermore, no comparison with auscultatory BP is provided by our study.

The design of the present study was cross-sectional; future studies should evaluate the relationship between changes in attended or unattended BP and changes in measures of preclinical organ damage.

Conclusions

The results of our study suggest that BP values accurately measured by the oscillometric technique in the presence or in the absence of the physician are equally correlated to cardiac and carotid vascular OD. These findings may provide useful information on the clinical value of unattended BP.

Perspectives

The publication of the results of the SPRINT study have called attention unattended BP measurement (or AOBP), in which the patient is seated alone and unobserved. This approach for BP measurement, proposed 2 decades ago by Myers et al[29] with the aim of eliminating the white coat effect, has gained progressively more attention and some international hypertension guidelines now indicate it as the preferred method for in-office BP measurement. A major drawback of this approach is represented by the fact that data on the prognostic value of unattended office BP measurements are limited. The results of the present study suggest that attended and unattended BP values are similarly correlated with robust measures of hypertensive OD such as LVM and carotid artery IMT and plaque. This seems to indicate that BP values accurately measured by the oscillometric technique in the presence or in the absence of the physician may be similarly associated to the risk of cardiovascular events. While awaiting for more data based on hard end points, our results may add information on the clinical relevance of unattended BP measurement.

Disclosures

None.

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Novelty and Significance

What Is New?

- Measurement of unattended blood pressure (BP; or automated office ambulatory BP) provides values that are lower as compared with those observed by the attended approach.
- Cardiac and vascular preclinical organ damage are similarly correlated with attended and unattended BP.

What Is Relevant?

- Only few data are available on the prognostic significance of unattended BP.
- Our results suggest that attended and unattended BP have the same predictive value for left ventricular hypertrophy and carotid plaque.

Summary

Measurement of unattended or automated oscillatory BP has been proposed as an alternative approach for the assessment of BP values. However, few data are available on the prognostic significance of unattended BP. Our results suggest that attended and unattended BP values are similarly correlated with hypertensive organ damage, which represents an intermediate step in the continuum of cardiovascular disease and is strictly associated to cardiovascular risk. These findings may provide useful information on the clinical value of unattended BP.