Impact on Hypertension Reclassification by Ambulatory Blood Pressure Monitoring (ABPM) According to the V Brazilian Guidelines on ABPM

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Abstract

Background: New recommendations on reference values for normal test results in ambulatory blood pressure monitoring (ABPM) were proposed by the V Brazilian Guidelines on Ambulatory Blood Pressure Monitoring, based mainly on the IDACO study.

Objectives: This epidemiological study is aimed at evaluating the impact of adopting these new standards in an arterial hypertension referral center.

Methods: The results of 1,567 ABPM tests carried out between 2005 and 2010 were analyzed; 481 patients were excluded from the sample for not meeting minimum quality criteria of the test. Reference values from the IV Brazilian Guidelines on ABPM (2005) were used for the classification of these tests regarding the abnormality and compared with the changes proposed by the V Brazilian Guidelines on ABPM (2011). Statistical analysis was performed by Pearson's chi-square method and p values < 0.05 were considered statistically significant.

Results: For the 1,086 tests evaluated, there was a significant difference in the proportion of patients with altered ABPM results, especially for the variable systolic pressure in the sleeping period: 49% when adopting the cutoff values of 2005 and 71% when adopting the values of 2011, with statistical significance, p < 0.0001.

Conclusions: The recommendations of the new guidelines had a great impact on the hypertension classification by ABPM test results in the study population. The question of thresholds of these tests for therapeutic targets of patients known to be hypertensive is still open and requires further studies, preferably national ones, for better definition of the subject. (Arq Bras Cardiol. 2013;100(2):175-179)

Keywords: Hypertension/classification; Hypertension/epidemiology; Blood Pressure Monitoring Ambulatory; Guidelines

Introduction

Systemic Arterial Hypertension (SAH) is a major modifiable cardiovascular risk factor, being a disease of high prevalence and low control rates[1-4].

Casual blood pressure (BP) measurement at the office, although considered standard procedure for the diagnosis of hypertension and for the monitoring of hypertensive patients, is subject to several sources of error, especially the influence of the observer and of the environment where the measurement is performed. Moreover, it provides a small number of readings that do not have good long-term reproducibility[5].

The measurements obtained by ABPM more accurately establish the risk of major cardiovascular events such as myocardial infarction and cerebrovascular accident (CVA) when compared to casual office measurements. It also has the advantage of allowing the evaluation of the 24-hour therapeutic response[6-13].

In the year 2011, a new guideline was published on ABPM tests. The thresholds of the pressure means for the diagnosis of SAH were decreased (Figure 1).

These changes were prompted by the publication of the IDACO study, which established thresholds for the test based on cardiovascular risk in 10 years[14].

The present study applies the new thresholds to a population with high cardiovascular risk, raising the question: should populations with different cardiovascular risks have the same thresholds for the ABPM test?

Methods

A retrospective analysis of 1,567 ABPM tests carried out between the years 2005 and 2010 at the Instituto Dante Pazzanese de Cardiologia (IDPC) was performed. A total of 481 cases were excluded for not meeting minimum quality

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criteria for the test, which resulted in a sample of 1,086 ABPM tests (Figure 2).

Tests were considered inappropriate and therefore excluded when they had less than 21 hours of recording time, less than 16 measurements during the wakefulness period or eight measurements during the sleeping period.

The quality criteria for the test follow the recommendations of the two ABPM guidelines, except for the percentage of valid measurements, which according to the IV Guideline, must be greater than 80%.

In the population of 1.086 remaining ABPM tests, the change in the prevalence of abnormal tests was assessed according to the thresholds modified in the last guideline. The same analysis was performed in a subgroup of patients (n = 80 tests) without therapy instituted at the time of the test.

Statistical analysis was performed using Pearson's chi-square method and p values < 0.05 were considered significant.

Results

ABPM test results were considered normal or altered according to the criteria in the IV and V Brazilian Guidelines on ABPM. The prevalence of abnormal test results was compared between the two guidelines.

The population of 1,086 patients had a mean age of 57 ± 13 years; 61% were men and 39% were women. All thresholds modified in 2011 reclassified the exams significantly, especially for the variable systolic blood pressure during the sleeping period: 49 *versus* 71%, $p < 0.0001$ (Table 1).

The change in systolic thresholds increased the prevalence of abnormal results on average by 2% for every 1 mmHg decreased in the systolic thresholds, and by 3% for every 1 mmHg decreased in the diastolic threshold (Table 2).

In the subgroup with no instituted therapy, the mean age of the 80 patients was 46 ± 17 years, 45 men (56%) and 35 women (44%). The difference in the prevalence of abnormal tests by the modification of the diastolic blood pressure threshold in the sleeping period was not statistically significant in this group (Table 2).

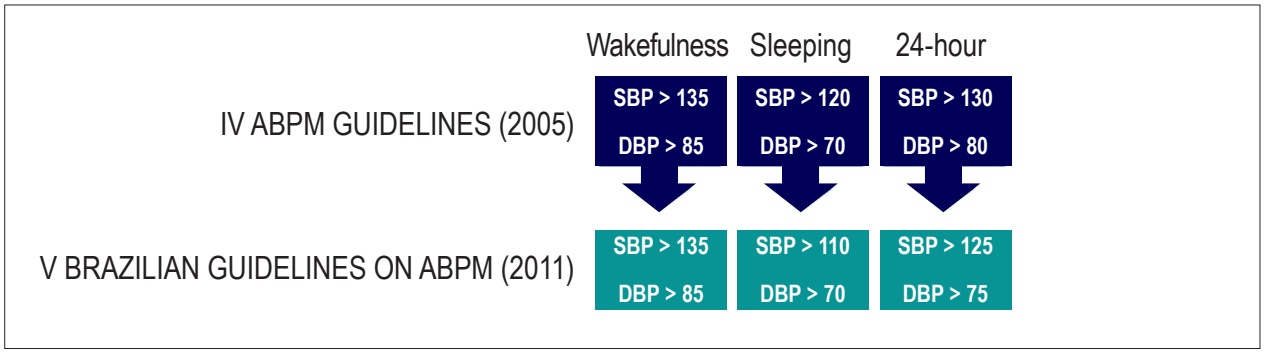

Figure 1 – *Changes in mean blood pressure thresholds.*

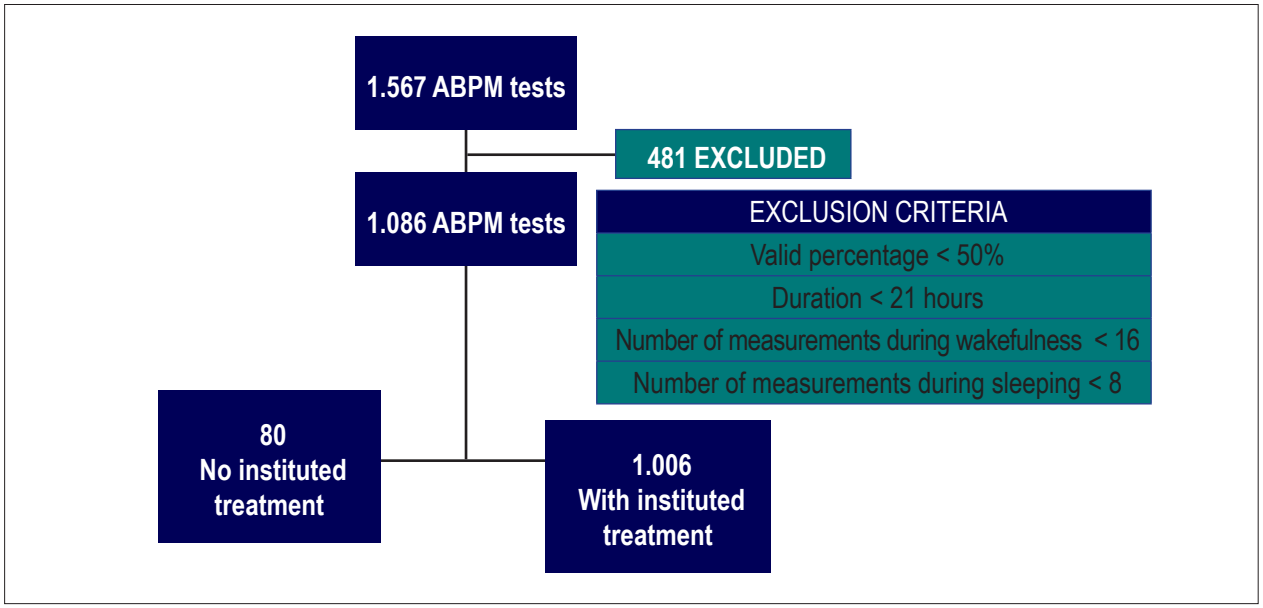

Figure 2 – *Methodology: study sample selection.*

Discussion

After two decades since the early ABPM studies were started, the thresholds were still based on arbitrary definitions. These early studies were essential to separate arterial hypertension into isolated arterial hypertension and sustained arterial hypertension, with the latter being associated with major adverse clinical outcomes of SAH[6-14].

Two authors, Massahiro Kikuya et al[14] and Ohkubo et al[11] have strived to search for specific thresholds of the ABPM test based on cardiovascular outcomes. The IDACO study results led to the modification of our ABPM guideline. In this study, 5,682 patients were evaluated for a mean follow-up of 9.7 years, with 814 cardiovascular outcomes being recorded, all hard endpoints with 377 CVAs and 435 cardiovascular events: acute myocardial infarction (AMI), death from myocardial infarction, sudden death and surgical or percutaneous revascularization, emergence of congestive heart failure (CHF) and death from CHF.

To define the thresholds, the authors correlated the cardiovascular outcomes at several intervals of mean blood pressure measurements through a statistical technique known as Bootstrap, a trial-and-error analysis that tested 1,000 intervals.

The values defined for normality were then approximated by the study authors to the 0 or 5 decimal points, with these values being exactly the ones adopted in the V Brazilian Guidelines on ABPM[5].

Table 1 – Characteristics of the study population, with analysis of the mean pressure per category of ABPM of the entire population

Age (years) ± SD	57 ± 13	
Sex	424 (39%) women and 662 (61%) men	
	Overall mean pressure (mmHg)	Standard deviation
Systolic pressure in the wakefulness period	134.4	18.9
Diastolic pressure in the wakefulness period	80.5	13.8
Systolic pressure in the sleeping period	122.6	20.7
Diastolic pressure in the sleeping period	68.8	14.3
24-hour Systolic pressure	131.2	19.2
24-hour Diastolic pressure	77.3	13.5

SD: standard-deviation.

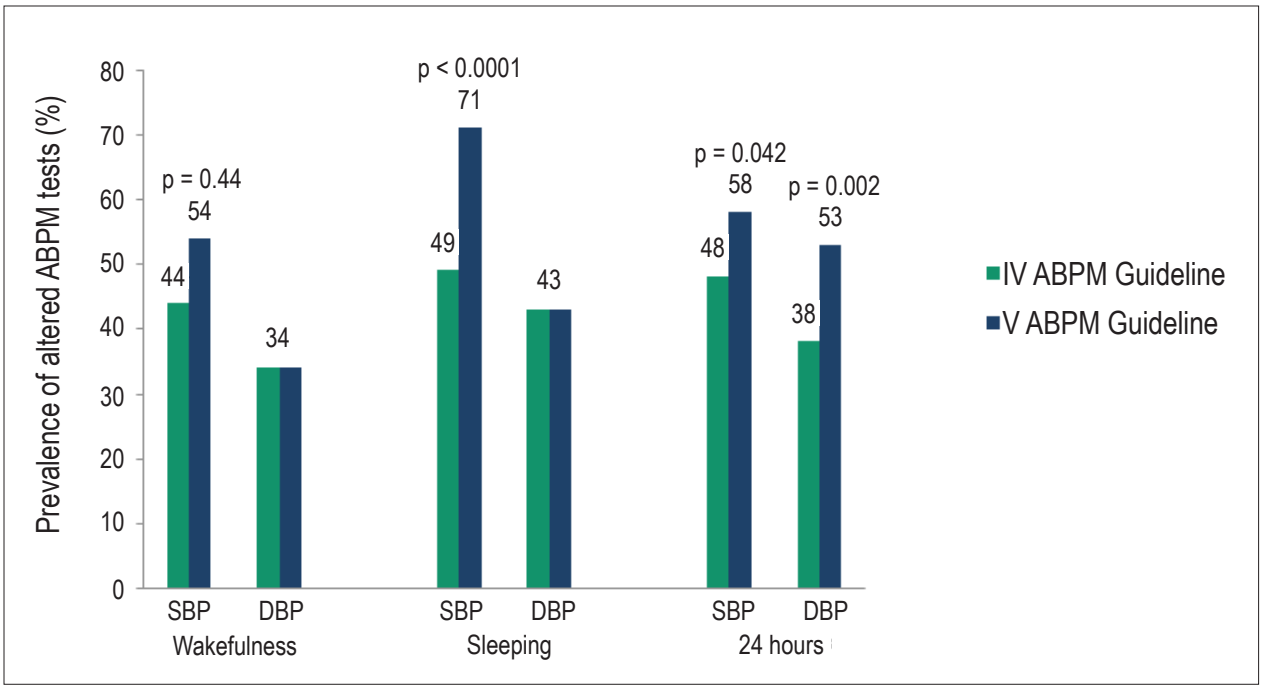

Chart 1 – *Prevalence of abnormal tests comparing the thresholds of the two Guidelines and their statistical significant values. SBP: systolic blood pressure; DBP: diastolic blood pressure.*

The population of this study involved only northern European countries and Japan, and only 510 patients (9%) of the population already had cardiovascular disease and other 1,338 (23.5%) patients used some type of antihypertensive drug[14].

It should be noted that, in our analysis, some ABPM measurements were included even though they had a percentage of valid measures < 80%; this fact, however, does not bring limitations to the study, as it has a higher correlation with the current clinical practice.

The hypertension outpatient clinic population at IDPC has low socio-educational level, which we believe promotes a high number of ABPM tests with a lower percentage of valid measurements than the recommended one. Moreover, there is great demand for the exams, which prevents the practice to rescheduling ABPM tests with a valid percentage < 80%. Therefore, in our institution, other quality criteria for the ABPM are taken into account. The V Brazilian Guideline on ABPM[5] emphasizes the 16 measurements during the wakefulness period and the eight measurements during the sleeping period to detriment of the valid percentage of measurements[5].

Table 2 – Increased prevalence of altered tests (%) for each mmHg unit decreased in ABPM threshold

Systolic threshold of the wakefulness period	2%
Systolic threshold of the sleeping period	2,2%
Systolic threshold of the 24-hour period	2%
Diastolic threshold of the sleeping period	3%

Thus, the definition of these thresholds by the IDACO study contributed much to the context of arterial hypertension diagnosis, but did not specify the values for therapeutic goal in patients with known SAH or established target-organ disease[15].

Conclusions

The change in thresholds caused significant increase in the prevalence of abnormal tests in all categories of ABPM, except for 24-hour diastolic blood pressure in the subgroup of patients without treatment.

The methodology to define cutoff values for the test based on cardiovascular outcomes resulted in lower ABPM thresholds. Further studies using this methodology, preferably national ones, will be able to identify patients with increased cardiovascular risk.

Perhaps, in the near future, the cutoff values for ABPM can be individualized for different populations with cardiovascular risk, incorporating to the test thresholds risk scores as the Framingham's for better definition of therapeutic targets.

Author contributions

Conception and design of the research: Forestiero D; Acquisition of data: Forestiero D, Gonzaga C, Rodrigues GD, Silveira TB; Analysis and interpretation of the data: Forestiero D, Mauad JL, Forestiero C, Amodeo C; Statistical analysis: Forestiero D, Mauad JL, Forestiero C, Gonzaga C, Cordeiro AC; Writing of the manuscript: Forestiero D, Mauad JL, Forestiero C, Gonzaga C, Cordeiro AC, Rodrigues GD, Silveira TB, Amodeo C; Critical revision of the manuscript for intellectual content: Forestiero D, Peixoto ML, Ganassin FP, Gonzaga C, Cordeiro AC, Amodeo C.

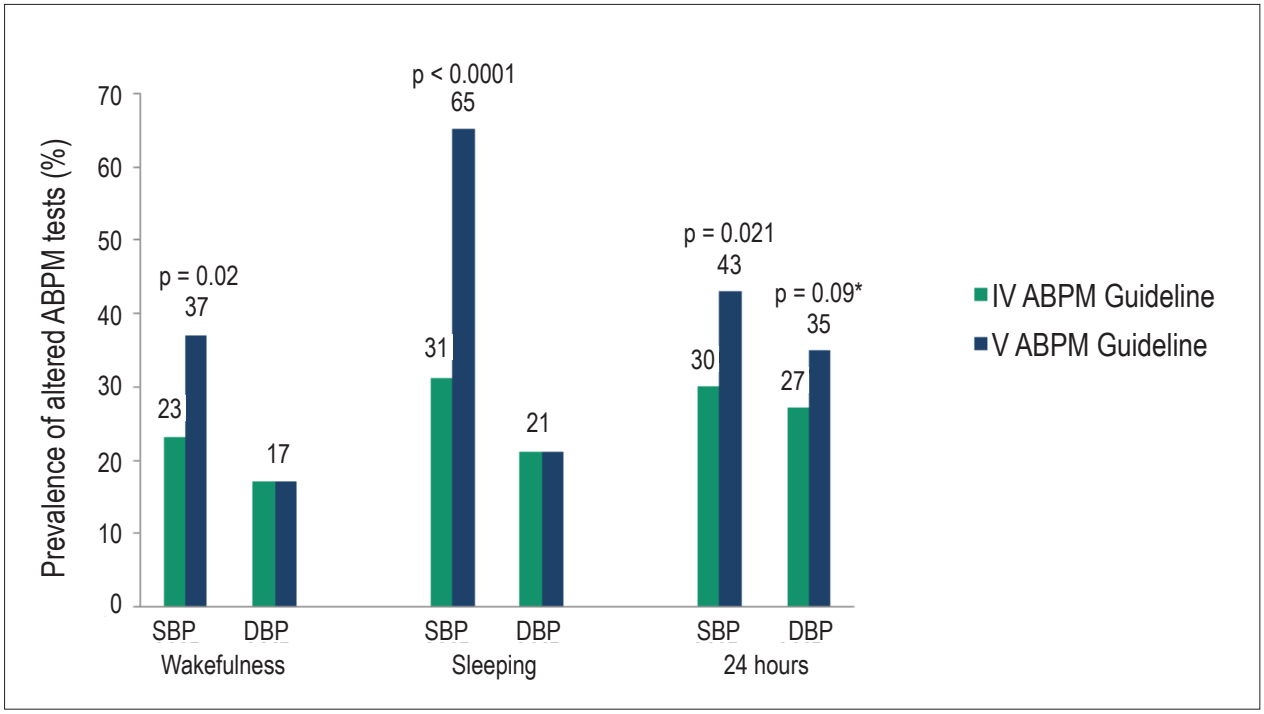

Chart 2 – *Prevalence of abnormal tests in individuals with no instituted therapy (n=80). SBP: systolic blood pressure; DBP: diastolic blood pressure; (*) did not reach statistical significance*

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Study Association

This study is not associated with any post-graduation program.

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