

## ORIGINAL ARTICLE

## Are Patients' Blood Pressure Levels Being Routinely Measured in Medical Offices?

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### Abstract

**Background:** Blood pressure measurement is recommended in all medical evaluations, regardless of the specialty. It is a simple and easy-to-do procedure, but usually neglected or performed incorrectly.

**Objectives:** To assess if blood pressure is being measured routinely and compare the values obtained in the usual ambulatory consultations to those obtained when following the adequate techniques.

**Methods:** Cross-sectional and observational study that included adult (age >18 years) outpatients treated in clinical and surgical specialties of a teaching hospital. Subjects answered a specific questionnaire and then three blood pressure measurements were performed according to the current guidelines by trained research staff. After that, the patients had their appointments and at the end, the medical charts were checked to see if blood pressure was measured and, if so, the observed value was recorded.

**Results:** We included 129 consecutive patients with a mean age of 53 years ( $\pm 15.92$ ) predominantly females (61.2%). Most of the appointments occurred in clinical specialties (70.5%) and 49.6% reported themselves as hypertensive. Blood pressure was not measured in 38.8% of the patients, more frequently in surgical specialties (72.5% vs. 27.5%;  $p < 0,001$ ). The previous diagnosis of hypertension did not influence the chance of a patient having his blood pressure measured ( $p = 0,082$ ). There were no differences between the blood pressure measured by the researchers and those recorded at the medical charts (118 mmHg vs. 117 mmHg;  $p = 0,651$ ; 72 mmHg vs. 75 mmHg;  $p = 0,055$ ).

**Conclusions:** The patients' blood pressure levels were not measured in many of the medical appointments, especially at outpatient clinics of surgical specialties. (Int J Cardiovasc Sci. 2017;30(4):293-298)

**Keywords:** Blood Pressure; Outpatient Service; Ambulatory Care; Hypertension; Physician's Offices.

### Introduction

Systemic Arterial Hypertension (SAH) is, by definition, diagnosed by the detection of high and sustained levels of Blood Pressure (BP) obtained during a casual measurement.<sup>1</sup> Additionally, much of the knowledge about such a prevalent condition derives from observational and/or intervention data obtained at the approach of hypertensive patients acquired with the use of casual BP measurement.<sup>2</sup>

Although some guidelines that address the SAH topic suggest the superiority of the Ambulatory Blood Pressure

Measurement (ABPM) in relation to outpatient measures for the disease diagnosis,<sup>1-4</sup> the casual BP measurement is recommended in any medical assessment, regardless of the specialty.<sup>1,2,4</sup> It consists of a simple and easy to perform procedure, but it is often performed inadequately.<sup>1</sup>

The indirect manual measurement techniques, available and disseminated in our country, are the auscultatory (mercury or aneroid column sphygmomanometers) and oscillometric techniques using semi-automatic devices.

The problems of manual measurements at the office result from factors such as the use of inadequate or uncalibrated devices,<sup>5-7</sup> measurements that do not

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follow the protocol adequately, by applying inadequate techniques,<sup>8</sup> the white coat effect,<sup>9,10</sup> the rounding of the values found<sup>11</sup> and intraobserver variations.<sup>12</sup>

In addition to these situations, there is also a growing concern about the non-routine performance of BP measurement by health professionals. This fact implies serious problems in hypertension diagnosis, since it is an oligo- or asymptomatic condition, for which BP measurement is the only available tool for establishing the diagnosis.<sup>1-4</sup>

Therefore, it becomes increasingly more important to study BP measurement techniques routinely used in our health services, focusing both on the technical aspect of the measurement and on its performance. With this objective, we analyzed whether BP measurement was routinely being carried out in outpatient settings of a school hospital. Moreover, we compared the values of the BP measured in the waiting room, using the correct technique according to recommendations of guidelines,<sup>1-4</sup> by trained researchers, with the values obtained by the measurements performed at the offices by the professionals responsible for patient care.

## Methods

This is a cross-sectional, observational and non-intervention study, carried out in adult patients (age > 18 years) treated at the outpatient (internal medicine, cardiology, pneumology, rheumatology, gastroenterology, nephrology, hematology, and endocrinology) and surgical (general surgery, coloproctology, urology, vascular and thoracic surgery) clinics of a university tertiary hospital.

The project was approved by the Research Ethics Committee of the institution and followed the guidelines of Resolution 466/2012 of the National Health Council. Before signing the Free and Informed Consent Form (FICF) and data collection, all subjects were informed of the study purpose and the procedures they would undergo, in addition to possible risks.

Sample size calculation, considering a previous publication<sup>13</sup> on the subject, which showed that approximately 60% of the patients did not have their BP measured, and considering an absolute precision of 10%, with a significance level of 5%, was of at least 92 patients.

Patients treated at the aforementioned outpatient clinics that filled out the FICF were consecutively included in the study, and those who were not able to

answer the formulated questions and/or those who did not wish to undergo BP measurements were excluded.

Data were collected between October and December 2015 by three teams consisting of two previously trained researchers. The data were obtained during the consultations in the outpatient and surgical specialty clinics, in the morning or in the afternoon.

A questionnaire was created to collect anthropometric and clinical data from the patients, such as age (in full years), gender, self-reported ethnicity, and presence or absence of a previous hypertension diagnosis (according to the patient's self-reporting, without confirmation in medical records).

The study subjects, immediately before entering the office for the consultation, were submitted to three BP measurements with a validated and calibrated device (Omron Hem 7200 semi-automatic; Kyoto, Japan), with an interval of at least 1 minute between them, according to the recommendation of the VI Brazilian Hypertension Guidelines.<sup>1</sup> After the consultation, the medical record was checked to verify whether the BP was measured and, when it had been measured, this value was documented, as recorded in the medical file.

## Statistical analysis

The data were stored in a database, created using Microsoft Excel™ and analyzed comparatively. Statistical analysis was performed using the software Statistical Package for Social Sciences (SPSS), version 21.0 (Chicago, IL, USA). The Kolmogorov-Smirnov test was used to verify the normality of data and confirmed that the continuous variables had a normal distribution. Student's *t*-test for paired samples was used to compare continuous study variables, expressed as mean and standard deviation. The comparative analysis between the categorical variable measurement or not of the BP was performed using the chi-square test. Values of  $p < 0.05$  were considered significant.

## Results

A total of 129 patients treated at local outpatient clinics were consecutively selected, 91 (70.5%) from clinical specialties and 38 (29.5%) from surgical specialties. Patient age ranged from 18 to 88 years, with a mean of 53 years ( $\pm 15.92$ ). Most of the individuals (61.2%) were female and 49.6% reported a previous diagnosis of hypertension (Table 1).

**Table 1 – General characteristics of patients**

Characteristic	n (%)
Female gender	79 (61.2)
Ethnicity	
Black	12 (9.3)
White	63 (48.8)
Mixed-race	54 (41.9)
Previous systemic arterial hypertension	
Yes	64 (49.6)
No	65 (50.4)
Outpatient clinic specialty	
Clinical	91 (70.5)
Surgical	38 (29.5)

The number of patients in which the BP measurement was not performed was very significant (38.8%), with an even higher percentage of non-BP measurement in outpatient clinics of surgical specialties (Table 2).

**Table 2 – Patient description regarding blood pressure (BP) measurement in clinical and surgical specialty consultations**

Outpatient clinic specialty	BP measurement		p value*
	Yes n (%)	No n (%)	
Clinical	66 (72.5)	25 (27.5)	< 0.001
Surgical	13 (34.2)	25 (65.8)	

\* Significant chi-square test at  $p < 0.05$ .

When the previous diagnosis of SAH was compared with the BP measurement, there was no statistically significant difference (Table 3).

As a strategy to evaluate the real need to recommend that the pressure be measured three times at the consultation and consider the mean of the last two as the final measure, the BP at the first measurement was compared with the mean BP of the last two (Table 4).

The mean values of the last two BP measurements were also compared with the BP measured at the

consultation and recorded in the file, with the purpose of evaluating the quality of the measurements performed in the outpatient clinics (Table 5).

**Table 3 – Distribution of patients regarding the previous diagnosis of systemic arterial hypertension (SAH) and recording of blood pressure (BP) levels in medical files**

Previous SAH	BP recording in medical files		p value*	Total
	Yes n (%)	No n (%)		
Yes	44 (68.8)	20 (31.2)	0.082	64
No	35 (53.8)	30 (46.2)		65

\* Significant chi-square test at  $p < 0.05$ .

## Discussion

The BP measurement in all consultations, regardless of the medical specialty, is a current recommendation of most national<sup>1</sup> and international guidelines<sup>2-4</sup> that address the SAH topic. In spite of this fact, the data found in the present study show that, even in a tertiary referral service, together with the special characteristic of being a school hospital, this recommendation was not followed by professionals in 38.8% of the consultations.

This fact becomes even more alarming when we compare the clinical and surgical specialties. In this case, there was a statistically significant difference between the number of patients in whom the pressure was not measured in the surgical specialty outpatient clinics when compared to the clinical specialties.

Although there is a great deal of data assessing BP measurement techniques,<sup>14-20</sup> few studies have assessed whether the measurement was actually performed.<sup>13,21,22</sup> There is also a marked difference between the studies published on the subject. Most of them used the BP measurement information reported by the physician, finding, with this methodology, percentages of BP measurement between 85 and 97%.<sup>21,22</sup> However, only one study<sup>13</sup> effectively verified whether BP was being measured, with data closer to those found in the present study. This study<sup>13</sup> analyzed 500 medical records and found annotation of BP values in only 39% of the consultations. This value is even lower than the 61.2% of measurement records we found; however, closer if

**Table 4 – Comparison between the first measurement of systolic blood pressure (SBP) and diastolic blood pressure (DBP) with the arithmetic mean of the last two measurements**

Variable	First measurement (mmHg)	Mean of the last two measurements (mmHg)	p value*
SBP, mean (SD)	121.56 (± 18.99)	119.04 (± 18.03)	< 0.001
DBP, mean (SD)	73.64 (± 12.12)	73.11 (± 11.55)	0.269

\* Student's *t* test – significant at  $p < 0.05$ . SD: standard deviation.

**Table 5 – Comparison between the arithmetic mean of the last two measurements of systolic blood pressure (SBP) and diastolic blood pressure (DBP) with the values recorded in the medical files**

Variable	Mean of the last two measurements	Recorded blood pressure	p value*
SBP, mean (SD)	118.70 (± 18.57)	117.89 (± 16.72)	0.651
DBP, mean (SD)	72.76 (± 11.16)	75.20 (± 10.80)	0.055

\* Student's *t* test – significant at  $p < 0.05$ . SD: standard deviation.

we consider only the surgical specialties, in which only 34.2% of the consultations had the results of BP values.

Another finding that is worth mentioning is the fact that the previous diagnosis of SAH did not positively influence BP measurement at the medical office. In the aforementioned study of Alavarce,<sup>13</sup> the previous diagnosis of SAH seemed to influence BP measurement (79% of hypertensive patients with BP measured at the consultation vs. 46% among non-hypertensive patients), a fact not reproduced with statistical significance in our findings. These data indicate a greater need for publications on the subject, which would enable the improvement of knowledge, defining whether the fact that the individuals are previously known to be hypertensive increases or not the chance of having their BP checked during a medical appointment.

There was also a statistically significant difference when comparing the mean of the last two measurements performed by the investigators with the first measurement of its systolic component alone, but not the diastolic component. This difference, even if significant only for the systolic component, is in agreement with the recommendation of the VI Brazilian Hypertension Guidelines,<sup>1</sup> as well as most of the international guidelines on SAH,<sup>2,4</sup> to perform at least three BP measurements at each consultation, considering the mean of the last two measures as final

value. This strategy has been extensively assessed,<sup>17,23-25</sup> and has shown to be efficient in determining the most accurate BP of patients undergoing outpatient care and should always be reinforced.

The BP values collected by the researchers followed the correct calibration technique and considered as the final value the mean of the last two measures. Nonetheless, when compared to the consultation environment, they did not differ in the systolic, or in the diastolic component. A possible explanation is the fact that the patients were treated at a school-hospital, which would hypothetically favor the correct BP measurement. However, as the researchers did not participate in the consultations, we cannot affirm that the values recorded in the medical record were the result of an isolated measurement or of more than one measurement, and that the mean values of these measures were recorded.

One of the study limitations that deserves to be emphasized is the fact that the measurements were performed before the consultations in the waiting rooms of the clinics and, consequently, less subject to the white coat effect.<sup>26</sup> However, this fact did not generate significant differences between the BP measured by the researchers when compared to that measured by the physicians responsible for the care.

Another potential limitation is the fact that the study was carried out in a school-hospital setting.

Such institutions, in which most of the consultations are carried out with an academic purpose by professionals directly involved in medical education would, in theory, offer a better-quality service.<sup>27,28</sup> Thus, the chance of not following the recommendation to measure BP would be lower than in other service environments. This rationale increases the concern regarding the data obtained in this study, as they may be underestimated in relation to outpatient care in general, outside the academic environment.

The data of this study clearly show that the recommendation to measure the patients' BP at all medical evaluations, regardless of the medical specialty, is not being followed. Moreover, they suggest that the recommendation to measure BP at least three times and use the mean of the last two measures as the BP value is a desirable approach. Measures to raise the awareness of the medical profession in this sense should be taken immediately and as comprehensively as possible. Perhaps, in doing so, we will be able to offer to all the patients, at the doctor's offices, a low-cost, easy-to-apply BP screening and monitoring tool.

## Conclusions

Blood pressure was not measured in many medical consultations, especially in surgical outpatient clinics. There was no difference between the blood pressure

values obtained after following the correct technique in relation to those recorded in patients' files.

## Author contributions

Conception and design of the research: Maynarde IG, Jardim TSV, Jardim PCBV. Acquisition of data: Maynarde IG, Rocca AR, Lin LYC, Santos NMC, Serafim XLM. Analysis and interpretation of the data: Maynarde IG, Jardim TSV, Sousa ALL, Rocca AR, Lin LYC, Santos NMC, Serafim XLM, Jardim PCBV. Statistical analysis: Maynarde IG, Jardim TSV, Sousa ALL. Writing of the manuscript: Maynarde IG, Jardim TSV, Sousa ALL. Critical revision of the manuscript for intellectual content: Maynarde IG, Jardim TSV, Souza WKS, Sousa ALL, Rocca AR, Lin LYC, Santos NMC, Sampaio DPS, Serafim XLM, Jardim PCBV.

## Potential Conflict of Interest

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

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## Study Association

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