

# Interest of Therapeutic Education in Improving the Practice of Self-Measurement of Blood Pressure at the Abidjan Cardiology Institute (Côte d'Ivoire)

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## Abstract

**Introduction-Aim:** Therapeutic education of the patient aims to help patients acquire or maintain the skills they need to better manage their lives with a chronic disease. The objective of the study was to evaluate the value of therapeutic education in the practice of blood pressure self-measurement in patients followed at the Institute of Cardiology of Abidjan. **Materials and Methods:** This study was conducted for 15 months at the Institute of Cardiology of Abidjan. The study included hypertensive patients at least 18 years old for at least 6 months and followed up in outpatient clinics. The data were collected on an individual survey form with several items based on information from the medical records and questioning of the patients. The analyzed parameters were: socio-demographic features, other cardiovascular risk factors, clinical and preclinical data, antihypertensive treatment, and information on self-measurement. **Results:** The study population consisted of 300 patients with a male predominance (sex ratio of 1.46). The mean age of the patients was  $59.5 \pm 12.7$  years old. Among the patients, 68.3% said that they knew about the self-measurement of blood pressure. 36.3% of the subjects, who were interviewed, had already performed a blood pressure self-measurement. 40.3% were trained in blood pressure self-monitoring. 71.9% of physicians provided blood pressure self-measurement training to patients. Medical staff talked to the patient about self-monitoring in 52.1% and encouraged the patient to perform it in 37.2% of cases. Among those who had received training in blood pressure self-measurement, 31.4% said they were familiar with the 3-step rule and in

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whom 39.5% gave a correct explanation. Only 25.7% of patients had self-measurement devices at the time of the survey, and the majority of blood pressure monitors or devices were upper arm ones (65.5%). The patients acquired blood pressure monitors by medical prescription in 41.6% of cases. Patients holding electronic blood pressure monitors used them regularly in 55.8% of cases. Among them, 71.4% performed self-measurement at least once during their follow-up and 63.6% had insurance. 74.6% of complications occurred in patients who did not perform self-measurement. Therapeutic education improved considerably the practice of self-monitoring of blood pressure. **Conclusion:** The practice of self-measurement of blood pressure was low. However, the practice of therapeutic education has positive effects on patients' self-measurement of blood pressure.

### Keywords

Therapeutic Education, Blood Pressure, Self-Measurement, Institute of Cardiology, Abidjan

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## 1. Introduction

Hypertension is the most important cardiovascular risk factor (CVRF) worldwide. Hypertension is a major modifiable CVRF that affects 14 to 15 million people in France [1]. The prevalence of this condition is 31% and increases with the aging of the population in France [2] [3]. In a study carried out by Kramoh *et al.* [4] in Côte d'Ivoire in 2017, the prevalence of hypertension was 20.4%. According to data from the Observatory of Medical Practice in 2009, it represented 13.1% of consultations by the general practitioner [5]. Although the clinical care of hypertension is regularly improved by new therapies, its management is closely linked to the patient as an individual who needs to learn to live with his disease. This is why the patient must be actively involved in the follow-up of his disease. Therefore, patient adherence to treatment is an important point to improve in the management of hypertension. This fundamentally requires an improvement in knowledge [6]. Self-measurement of blood pressure (SMBP) is a recent technique that has already been studied and validated; however, it is still not widely used. It is well-known as part of the clinical management of hypertension and of the recommendations of scientific societies [7] [8]. All agree to promote ambulatory measurement and, particularly, SMBG because the reproducibility of blood pressure (BP) measurement is better in SMBG (and in ABPM) than in the doctor's office [9] [10]. Therapeutic patient education (TPE) aims to help patients acquire or maintain the skills they need to best manage their lives with a chronic disease [11]. This study was conducted to evaluate the impact of therapeutic education in the practice of blood pressure self-measurement in patients followed at the Institute of Cardiology of Abidjan for integration of blood pressure self-measurement into the care of hypertensive patients in Côte d'Ivoire.

## 2. Materials and Methods

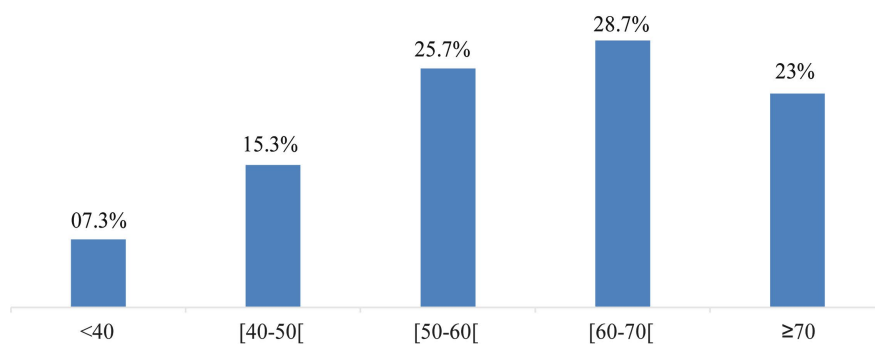
The descriptive prospective study was conducted between February 1, 2019, and May 1, 2020, at the Institute of Cardiology of Abidjan Heart in the Ivory Coast. The study included hypertensive patients aged at least 18 years old having hypertension for at least 6 months and receiving outpatient consultations for their follow-up. Patients had to be in sinus rhythm on electrocardiogram. Thus, considering the prevalence of hypertension at 20.4% [4], taking a confidence level of 95% and a margin of error of 5%, the minimum sample size calculated by SPSS software should be 250 patients increased to 300 patients for this study. Patients who had only one consultation and for whom the diagnosis of hypertension was suspected but could not be confirmed by a second consultation and/or additional investigations and patients with permanent atrial fibrillation on the electrocardiogram were not included. Data was collected on a simple survey form consisting of several items based on information from the patients' medical records and their questioning. The studied parameters were socio-demographic parameters, other cardiovascular risk factors, clinical and paraclinical features, antihypertensive treatment, and information on self-measurement. As part of this study, 300 patients were selected. They received "OMRON" brand blood pressure monitors and about four educational sessions on the benefits of self-measurement of blood pressure. The patients were divided into five groups supervised by one of three people, including a doctor. Each patient should do research on blood pressure and monitor blood pressure and record it in a diary. Data analysis and processing were performed using SPSS software version 22. Categorical variables, presented as numbers and percentages, were compared with Pearson's Chi-Square Test. Quantitative variables, presented as means  $\pm$  standard deviation, were compared with the Reduced Error Test for large samples and the Student's t-test for small samples ( $n < 30$ ). The results were considered significant when  $p < 0.05$ .

For ethical considerations, the patients gave their informed consent. The results were analyzed in accordance with the laws on the protection of patients' data and with the ethical principles regarding the Declaration of Helsinki. This work was approved by the ethics committee of the Abidjan Institute of Cardiology.

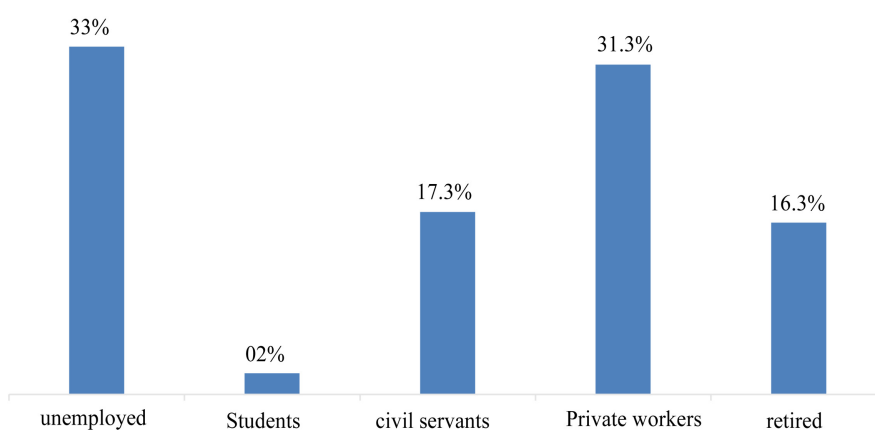
## 3. Results

### 3.1. Sociodemographic Data

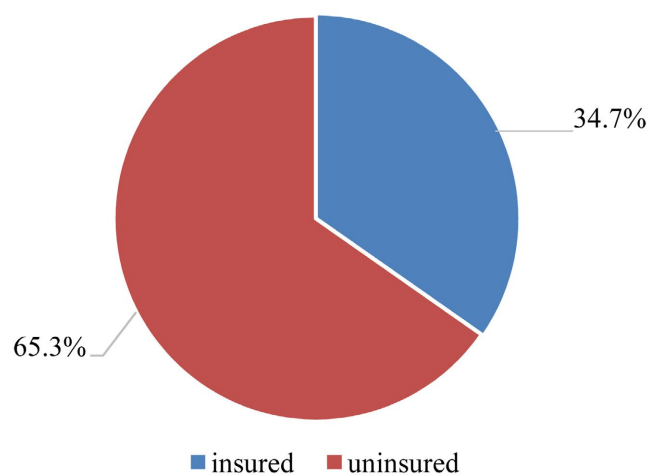
The inclusion and non-inclusion criteria allowed us to select a population of 300 patients. In this study population, men represented 59.3% with a sex ratio of 1.46. The mean age of the patients was  $59.5 \pm 12.7$  years old (extremes: 20 - 89 years). The median age was 60 years old. Patients over 50 years (77.3%) were the majority of the study population (Figure 1). The unemployed and employed were 33% and 31%, respectively, in the private sector (Figure 2). 65.3% of patients were uninsured (Figure 3).



**Figure 1.** Distribution of patients by age groups (n = 300).



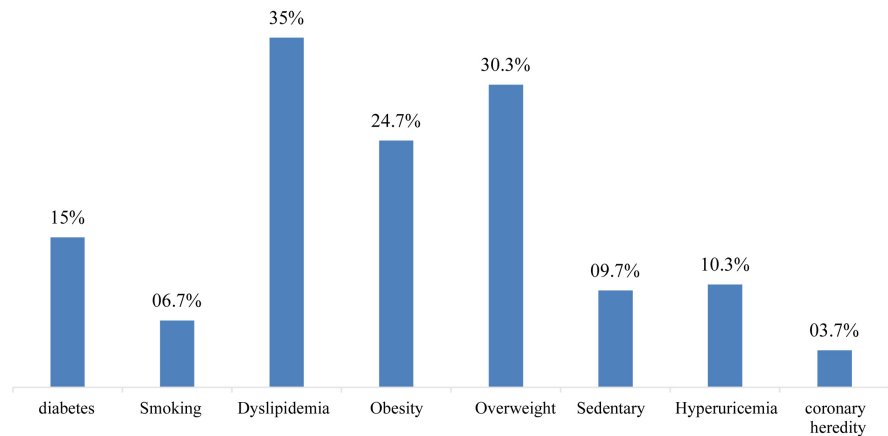
**Figure 2.** Distribution of patients by occupation (n = 300).



**Figure 3.** Distribution of patients by health coverage (n = 300).

### 3.2. Clinical Data

Besides the high blood pressure, the other cardiovascular risk factors were dyslipidemia (35%), overweight (30.3%), obesity (24.7%), and diabetes (15%). Patients with arterial hypertension presented complications in 39.3% of cases (**Figure 4**). Heart failure (14.7%) was the most common complication, followed by obliterative arterial disease of the lower limbs (8.3%) (**Table 1**).



**Figure 4.** Proportion of cardiovascular risk factors.

**Table 1.** Distribution of patients by complication.

	Number of cases	Percentages
Heart failure	44	14.7
Accident vasculaire cérébral	24	8.0
Kidney failure	19	6.3
Coronary artery disease	24	8.0
✓ Angor	8	2.7
✓ Myocardial infarction	16	5.3
OALL	25	8.3
Hypertensive retinopathy	14	4.7

OALL: Obliterative arteriopathy of the lower limbs.

### 3.3. Paraclinical Data

Left ventricular hypertrophies were 38.3% of the complications on the electrocardiogram and rhythm disorders were 26.3% (Table 2). Echocardiographic data presented 56.3% of left atrial dilatation. Left ventricular geometry was abnormal in 50.7% of cases (Table 3).

### 3.4. Self-Measurement Data

Among patients, 68.3% said they were familiar with self-measurement of blood pressure (Figure 5) and 36.3% had already performed self-measurement (Figure 6). 40.3% of hypertensive patients had received training in blood pressure self-measurement (Figure 7). Blood pressure self-measurement training was provided by physicians in 71.9%. The patient was self-trained in 14.9% of cases (Figure 8). More than half of the medical staff (52.1%) talked to the patients about blood pressure self-measurement and encouraged them to perform it in 37.2% of cases (Table 2). Among those who received the training in blood pressure self-measurement, 31.4% said that they knew the 3-step rule and of whom 39.5% gave a

**Table 2.** Distribution of patients by ECG findings.

ECG findings	Number of cases	Percentages
LVH	115	38.3
LAH	65	21.7
Repolarization abnormality	79	23.00
Rhythm disorder	79	26.3
✓ Paroxysmal AF	3	1.0
✓ Atrial flutter	6	2.0
✓ VT	8	2.7
✓ VES	20	6.7
✓ AES	38	12.7
Conduction disorder	56	18.7
✓ AVB1 and AVB2 Mobitz	12	4.00
✓ High degree AVB	11	3.6
✓ Complete RBB	13	4.3
✓ Complete LBB	8	2.6
✓ HLAB	11	3.6

LVH: Left Ventricular Hypertrophy; VT: Ventricular Tachycardia; LAH: Left Atrial Hypertrophy; AF: Atrial Fibrillation; AES: Auricular Extrasystole; VES: Ventricular Extrasystole; AVB: Auriculo-Ventricular Block; HLAB: Hemi Left Anterior Block; LBB: Left Branch Block; RBB: Right Branch Block.

**Table 3.** Distribution by doppler echocardiography findings.

	Number of cases	Percentages
Dilatation LA	169	56.3
LV Dilatation	28	9.3
LV Dysfunction (LVEF < 40%)	35	11.7
LV Geometry		
✓ Normal	134	49.3
✓ Concentric remodeling	42	15.4
✓ LVH		
▪ Eccentric hypertrophy	39	14.3
▪ Concentric hypertrophy	57	21.00

LA: Left Atrium; LVEF: Left Ventricular Ejection Fraction; LV: Left Ventricle; LVH: Left Ventricular Hypertrophy.

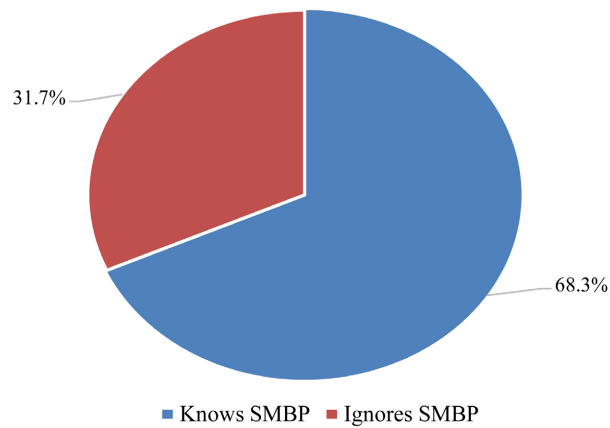
correct explanation (**Table 4**). Only 25.7% of this study population had self-measurement devices, which were mostly upper arm monitors (65.5%) at the time of the survey (**Table 5**). The patients acquired these devices by medical prescription in 41.6% of cases (**Figure 9**). People holding electronic blood pressure

**Table 4.** Distribution of patients by medical staff role in patient practice (n = 121).

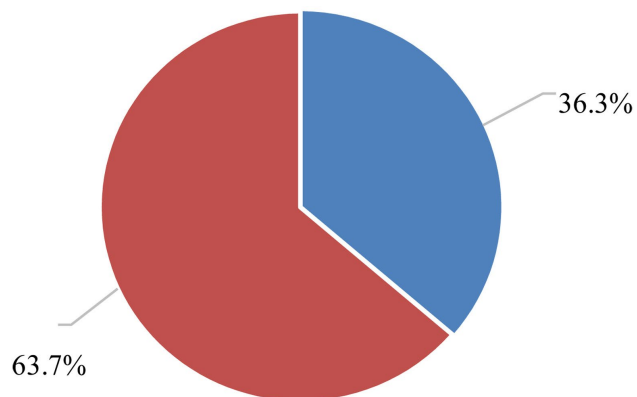
	Number of cases	Percentages
Neutral	13	10.7
Information on self-measurement	63	52.1
Incentives for self-care	45	37.2

**Table 5.** Distribution of patients according to knowledge of the 3-step rule (n = 121).

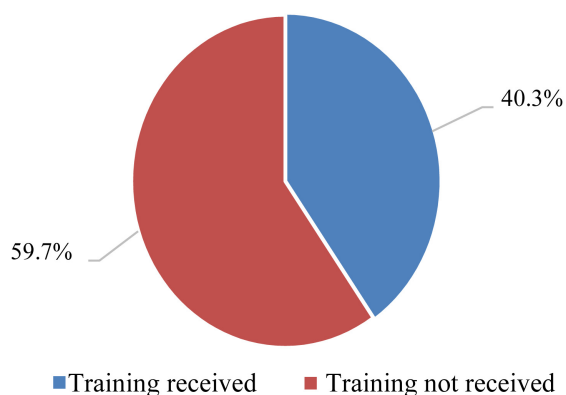
	Number of cases	Percentage
Ignorance of the three-measure rule	83	68.6
Ignorance of the three-measure rule	38	31.4
✓ Incorrect explanation	23	60.5
✓ Correct explanation	15	39.5



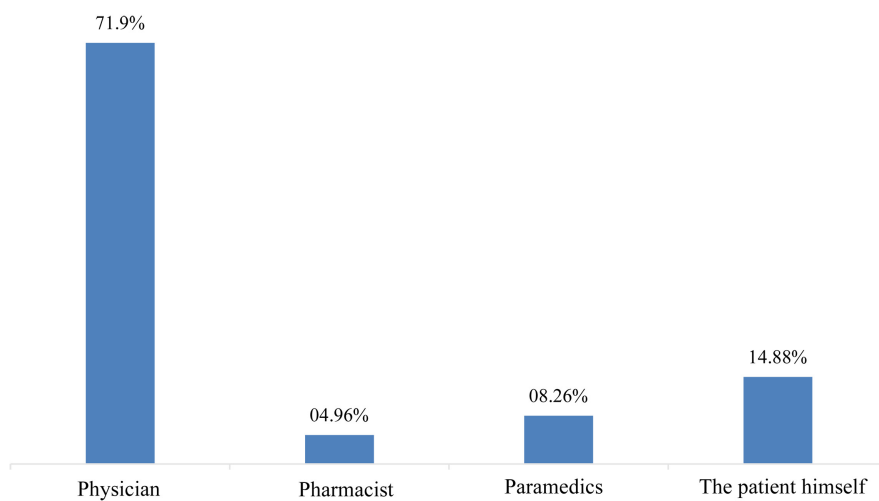
**Figure 5.** Distribution of patients by knowledge of blood pressure self-measurement (n = 300). 1. Knows SMBP 68.3%; 2. Ignores SMBP 31.7%.



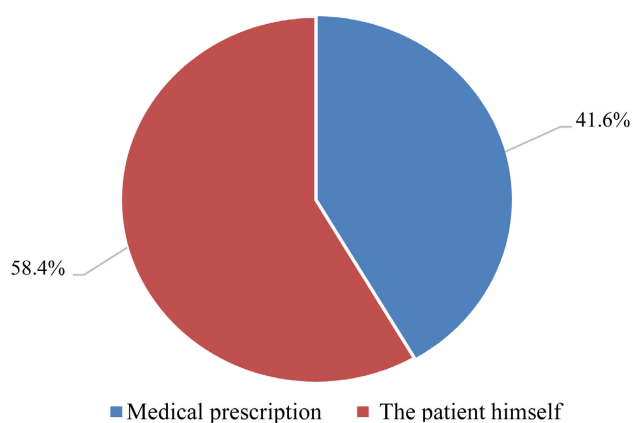
**Figure 6.** Distribution of patients according to the performance of blood pressure self-measurement by hypertensive patients (n = 300). AMT REALISEE = SMBP achieved 36.3%; SMBP not achieved 63.7%.



**Figure 7.** Distribution of patients by training received (n = 300).

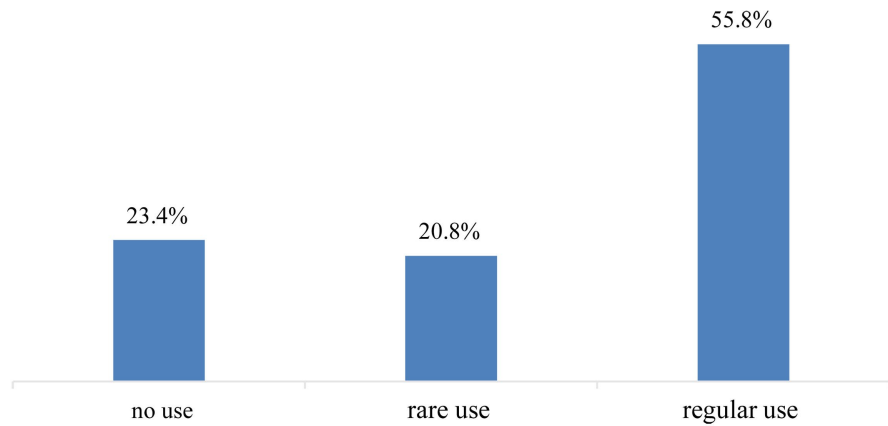


**Figure 8.** Distribution of patients by training provider (n = 121).

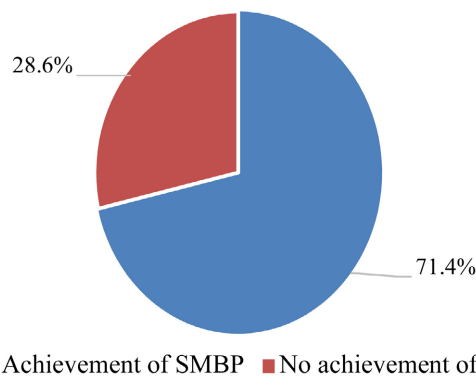


**Figure 9.** Distribution of patients according to how the electronic blood pressure monitor was obtained (n = 77).

monitors used them regularly in 55.8% of cases (**Figure 10**). Among them, 71.4% performed self-measurement at least once during their follow-up (**Figure 11**) and 63.6% had insurance (**Table 6**).



**Figure 10.** Distribution of patients by the use of electronic blood pressure monitor (n = 77).



**Figure 11.** Distribution of patients according to the performance of self-measurement of blood pressure in patients with an electronic blood pressure monitor (n = 77).

**Table 6.** Distribution of patients by ownership of electronic blood pressure monitor and its type (n = 300).

	Number of cases	Percentage
No	223	74.3
Yes	77	25.7
✓ Upper arm tensiometer	50	65
✓ Wrist tensiometer	27	35

### 3.5. Impact of Therapeutic Education on AMT

Complications occurred in 74.6% of those who did not perform any blood pressure self-measurement (Table 7). The therapeutic education significantly improved the practice of blood pressure self-measurement in a statistically significant way (Table 8).

## 4. Discussion

The general objective of this study was to evaluate the interest in therapeutic

**Table 7.** Distribution of patients according to the occurrence of complications and performance of SMBP.

		Complications		p-value
		Yes	No	
SMBP	Yes	30 (25.4%)	79 (43.4%)	0.002
	No	88 (74.6%)	103 (56.6%)	

**Table 8.** Distribution of patients with electronic blood pressure monitors and health coverage.

		Electronic Tensiometer		p value
		Yes	No	
Insurance	Yes	49 (63.6%)	55 (24.7%)	<0.001
	No	28 (36.4%)	168 (75.3%)	

**Table 9.** Distribution of patients according to the results of therapeutic education on blood pressure self-measurement.

SMBP	Without therapeutic education	After therapeutic education	p value
Achieved	109 (36.3%)	273 (91%)	<0.001
Not achieved	191 (63.7%)	27 (9%)	<0.001

education in the practice of blood pressure self-measurement and the compliance of antihypertensive treatment at the Institute of Cardiology of Abidjan. The study showed that 68.3% of patients said they knew about SMBG before the therapeutic training. However, only 36.3% had already done it. In the majority of cases, training on TMA is given by physicians (71.9%). The patient was self-taught in 14.9% of cases. The medical staff talked to the patients about SMBG in 52.1% of cases and encouraged them to perform it in 37.2% of cases. 25.7% of the patients had self-measurement devices at the time of the survey and the majority of them were upper arm monitors (65%). Blood pressure monitors were prescribed to patients in 41.6% of cases. Complications occurred most often in patients who had not benefited from SMBG (74.6%). After the therapeutic training, 91% of the patients performed SMBG compared with only 36.3% before the training. Although in-office BP measurement remains the cornerstone of the diagnosis of hypertension, out-of-office BP measurements, when used appropriately, are also effective in accelerating diagnosis and blood pressure control [12]. During the interviews conducted as part of the survey, 68% of patients reported having knowledge about SMBP, of which 36.3% were aware of the practice of SMBP, observed in **Table 9**. Only 25.7% of this study population had an electronic blood pressure monitor, 71% of whom performed SMBP. These proportions were lower than those observed in the United States [13], France [14] and in Guadeloupe [15], where more than 40% and 43% of hypertensive patients respectively had self-measurement de-

vices. Most of the time, training on self-measurement was provided by the physician (71.9%). Paramedical personnel were involved in only 5% of cases. The involvement of paramedical staff could help increase the practice of self-measurement, especially in rural and semi-rural areas where the proportion of physicians is low. The pharmacist can play an important role at this stage by providing only validated devices, advising the patient on the correct use of the device, and proposing a periodic check of the device [16]. Annual Belgian statistics show that the majority of self-measurement monitors sold in pharmacies are validated tools [17]. Most of the patients who had an electronic blood pressure monitor had health insurance (68.64%). The SMBG is mainly used by patients with jobs. This could be explained by the fact that professional patients were able to afford electronic blood pressure monitors due to the cost of the devices. In 2009 in France, 36% of treated hypertensive patients owned a blood pressure monitor compared with 12% of those who did not receive antihypertensive treatment in 2009 in France [18]. These findings are comparable to that of Great Britain, where 10% of the general population uses a self-tensiometer [19].

## 5. Conclusion

The different results found in this work showed that few patients had self-measurement devices. Those who had them were mainly covered by health insurance. Self-measurement of blood pressure was not widely practiced, although several patients reported having some knowledge of it; however, when it was practiced correctly, it reduced the occurrence of cardiovascular complications. The limits on its extension result from the cost of the devices in a country where health insurance coverage is low and self-tensiometers are not reimbursed by health insurance. The practice of therapeutic education has had a positive effect on both the realization of self-measurement of blood pressure by patients and the promotion of therapeutic observance. Given the benefits of therapeutic education, practitioners should take more interest in it and integrate it into a large program of hypertension management. The promotion of SMBP practice should be appropriate in a health environment dominated today by coronavirus disease.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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