THE INTEREST OF THERAPEUTIC EDUCATION IN THE PRACTICE OF BLOOD PRESSURE SELF-MEASUREMENT AT THE INSTITUTE OF CARDIOLOGY OF ABIDJAN

Comment [ɔ.1]: The impact

Abstract

Introduction: Self-measurement of blood pressure is a recent technique, already studied and validated, but it is still underused in the management of hypertension. Therapeutic education of the patient aims at helping patients acquire or maintain the skills they need to best 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 in order to integrate this technique into the management of hypertensive patients in Côte d'Ivoire.

Material and methods

We conducted a descriptive prospective study during 15 months at the Institute of Cardiology of Abidjan. Our study included patients aged at least 18 years old who were diagnosed with hypertension 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 paraclinical data, antihypertensive treatment, and information on self-measurement.

The analysis and processing ofData were performed by the SPSS software version 22. Qualitative variables were presented as numbers and percentages and compared by Pearson's Chi SquareTest. Quantitative variables were described as means ± standard deviation and compared by the Reduced Error Test for large samples and by the Student's t test for small samples ($n<30$). The results were statistically significance when $p<0.05$.

Results

Our study population was consisted of 300 patients with a male predominance (sex ratio of 1.46). The mean age of the patients was 59.5±12.7 years old. 65.3% of patients were uninsured. Other cardiovascular risk factors were dyslipidemia (35%) and overweight (30.3%). Patients with hypertension had complications in 39.3% of cases. Heart failure was the most common complication (14.7%).

Patients presented 38.3% and 26.3% left ventricular hypertrophy on the electrocardiogram and rhythm disorders, respectively. Echocardiographic data revealed 56.3% of left atrial dilatation. The geometry of the left ventricle was abnormal in 50.7% of cases. Among our 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 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 holdingelectronic blood pressure monitors or tensiometersused themregularly 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 various results show that few patients had self-measurement tensiometers. The insured patients own these devices. The practice of self-measurement of blood pressure was low. However, when properly practiced, it reduced the occurrence of cardiovascular complications. The practice of therapeutic education has positive effects on patients' self-measurement of blood pressure.

Comment [ɔ.2]: showed

Keywords: Therapeutic education–Blood pressure- Self-measurement- Institute of Cardiology - Abidjan

Introduction

The hypertension is the most important cardiovascular risk factor (CVRF) worldwide. The 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 byKramoh et al. [4] in Côte d'Ivoire in 2017, the prevalence of hypertension was 20.4%. According to data of the Observatory Medical Practice in 2009, it represented 13.1% of consultations of 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, the patient adherence to treatment is an important point to improve in the management of hypertension. This requires fundamentally an improvement in knowledge [6]. Self-measurement of blood pressure (SMBG) is a recent technique, already studied and validated; however,it 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

Comment [ɔ.3]: SMBP

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]. We conducted this study to evaluate the interest 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.

Comment [ɔ.4]: impact

Material and methods

The descriptive prospective study was conducted between February 1, 2019 and May 1, 2020 at the Institute of Cardiology of Abidjan Heart, located at the Treichville University Hospital in Ivory Coast. The study included the hypertensive patients aged at least 18 years old having hypertension for at least 6 months and were received in 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 our study. Patients who had only one consultation and for whom the diagnosis of hypertension was suspected but it 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 were collected on asimple survey form consisted of several items based on the information from the patients' medical records and their questioning.The studied parameters were sociodemographic parameters, other cardiovascular risk factors, and clinical and paraclinical features, antihypertensive treatment, and information on self-measurement.

Data analysis and processing were performed using SPSS software version 22. Categorical variables, presented as numbers and percentages, were compared by the Pearson's Chi SquareTest. Quantitative variables, presented as means ± standard deviation, were compared by the Reduced Error Test for large samples andthe Student's t test for small samples (n<30). The results were considered significance 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.

Results

Sociodemographic data

The inclusion and non-inclusion criteria allowed us to select a population of 300 patients. In our study population, men represented 59.3% with a sex ratioof 1.46.

Comment [ɔ.5]: exclusion

The mean age of the patients was 59.5±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 study the 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).

Comment [ɔ.6]: The studied

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). The heart failure (14.7%)was the most common complication, followed by obliterative arterial disease of the lower limbs (8.3%) (Table 1).

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 in50.7% of cases (Table 3).

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 a 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 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 II). Among those who received the training in blood pressure self-measurement, 31.4% said that they knew the 3-step rule and in whom39.5% gave a correct explanation (Table 4). Only 25.7% of our 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 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).

Impact of therapeutic education on AMT

Complications occurred in 74.6% within 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).

Discussion

The general objective of our study was to evaluate the interest of therapeutic education in the practice of blood pressure self-measurement and on the compliance of antihypertensive treatment at the Instituteof Cardiology of Abidjan. Our study showed that 68.3% of patients said they knew about SMBG before the therapeutic education; However, only 36.3% had already performed it. In the majority of cases, training on TMA(**abbreviation non mentionnee au prealable dans le texte)**was 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 education, 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 during our survey, 68% of the patients reported having knowledge about SMBP of which 36.3% were aware of performing SMBP.

Only 25.7% of our study population had an electronic blood pressure monitor, 71% of whom performed SMBP. These proportions were lower than those observed in France [13] and in Guadeloupe [14], where more than 40% and 43% of hypertensive patients respectively had self-measurement devices.

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 [15]. [15]. Annual Belgian statistics show that the majority of self-measurement monitors sold in pharmacies are validated tools [16].

Most of patients who had an electronic blood pressure monitor had health insurance (68.64%). The SMBGwas 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 patient owned a blood pressure monitor compared with 12% of those who did not receive antihypertensive treatment in 2009 in France [17].These findings are comparable to that of Great Britain, where 10% of the general population uses a self-tensiometer [18].

However, the possession of a blood pressure monitor is not synonymous with its correct use. Thus, the devices used are not in the most of cases the best ones, and the measurement procedures are very poorly understood by uneducated patients: 40% think that a single measurement is sufficient, and 45% believe that the measurement is done in the supine position [19].

In contrast, the practice of health care providers still does not seem to be better because, the methodology used remains too far from those recommended in the guidelines despite the increasing use of self-measurement by physicians: only 11% of physicians, who use self-measurement,advise their patients to perform at least 3 days of measurements with a blood pressure monitor equipped with a humeral cuff, and calculate the average according to Boivin [20]. On the contrary, it has been demonstrated for more than a decade that self-measurement is easily achievable, even in elderly patients in general practice [21].

Conclusion

The different results found in our work show 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 to its extension result from the cost of the devices in a

Comment [ɔ.7]: showed

country where health insurance coverage is low and self-tensiometers are not reimbursed by health insurance.

The practice of the therapeutic education has had a positive effect onboth the realization of self-measurement of blood pressure by patients andthe 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 the coronavirus disease.

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Annexes

Figure 1 : Distribution of patients by age groups (n=300)**REMPLACE VIRGULE (,) QUI EST DANS LES POURCENTAGES PAR UN POINT (.) Ex : 07,3% devient 07.3%**

Comment [ɔ.8]: Figure 1: Distribution of the study population by age groups

Figure 2: Distribution of patients by occupation (n=300)**REMPLACE VIRGULE (,) QUI EST DANS LES POURCENTAGES PAR UN POINT (.) Ex : 17,3% devient 17.3%**

Remplace Sans emploi par unemployed ; etudiants par students ; fonctionnaires par civil servants ; travailleurs du prive par privateworkers ; retraites par retired

Comment [ɔ.9]: Use English language only. You can merge figures 1,2, and 3 in one figure or one table

Figure 3: Distributionof patients by healthcoverage (n=300)**REMPLACE VIRGULE (,) QUI EST DANS LES POURCENTAGES PAR UN POINT (.) Ex : 65,3% devient 65.3%**

Remplace assures par insured et non assures par uninsured

Figure 4: Proportion of cardiovascular risk factors

REMPLACE VIRGULE (,) QUI EST DANS LES POURCENTAGES PAR UN POINT (.) Ex : 09,7% devient 09.7%

REMPLACEdiabete par diabetes ; tabagisme par smoking ; dyslipidemies par dyslipidemia ; Obesite par obesity ; surpoids par overweight ; sedentarite par sedentary ; hyperuricemia ; heridite coronaire par coronaryhereditary

Comment [ɔ.10]: Use English language only

Table 1: Distribution of patients by complication

	Number of cases	Percentages (%)
Heartfailure	**44**	**14.7**
Accident vasculaire cérébral	24	8.0
Kidneyfailure	19	6.3
Coronarydiésasse	24	8.0
✓ Angor	8	2.7
✓ **Myocardialinfarction**	16	5.3
OALL	**25**	**8.3**
Hypertensive retinopathy	14	4.7

OALL :*Obliterative arteriopathy of the lower limbs*

Table 2: Distributionof patients by ECG findings

ECGfindings	Number of cases	Percentages (%)
LVH	**115**	**38.3**
LAH	65	21.7
Repolarizationabnormality	79	23.00
Rhythmdisorder	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 AVB2Mobittz	12	4.00
✓ High degreeAVB	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 Extrasystol; 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**
LVDilatation	28	9.3
LVDysfunction (LVEF<40%)	35	11.7
LV Geometry		
✓ **Normal**	**134**	**49.3**
✓ Concentricremodeling	42	15.4
✓ **LVH**		
• Eccentrichypertrophy	39	14.3
• **Concentrichypertrophy**	**57**	**21.00**

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

Figure 5: Distribution of patients by knowledge of blood pressure self-measurement (n=300)

1. Knows SMBP 31.7% 2. Ignores SMBP 68.3 %

Figure 6: Distribution of patients according to the performance of blood pressure self-measurement by hypertensive patients. (n=300)

AMT REALISEE =SMBP achieved; SMBP not achieved 35.3% et 53.7%

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

1. Training received (FORMATION RECUE); 2. Training not received (FORMATION NON RECUE)
2. 40.3% ET 59.7%

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

1. Physician; 2. Pharmacist; 3. Paramedics; 4.The patient himself
2. 71,9% devien 71.9%.....

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

Table5 : 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		
✓ Correct explanation	23	60.5
	15	39.5

Table6: Distribution of patients by ownership of electronic blood pressure monitor and its type (n=300).

	Number of cases	**Percentages (%)**
No	**223**	**74.3**
Yes	77	25.7
✓ Upper arm tensiometer	50	65
✓ Wristtensiometer	27	35

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

Medical prescription 58.4% The patient himself 41.6%

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

23,4% devient 23.4% et …..

Pas d'utilisation=no use ; utilisation rare=rare use ; utilisation reguliere= regular use

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)

REMPLACE 28,6% PAR 28.6% ET 71,4% PAR 71.8%

Achievement of SMBP et No achievement of SMBP

Table7 :Distribution of patients according to the occurrence of complications and performance of SMBP

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

Table8 : Distribution of patients with electronic blood pressure monitors and health coverage.

		ElectronicTensiometer		
		Yes	No	p value
Insurance	Yes	49(63.6%)	55(24.7%)	<0,001
	No	28(36.4%)	168(75.3%)	

Table9: Distribution of patients according to the results of therapeutic education on blood pressure self-measurement

SMBP	Withouttherapeuticeducation	Aftertherapeuticeducation	p
Achieved	109 (36.3%)	273(91%)	<0.001
Not achieved	191(63.7%)	27(9%)	<0.001

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