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Nurses' knowledge on the classification, prevalence and consequences of arterial hypertension

Abstract

Introduction. Arterial hypertension, the prevalence of which in the adult population of developed countries varies from 20-50%, is one of the most significant risk factors of cardiovascular disorders, being the principal cause of mortality in Europe and leading to a deterioration in the quality of life and to disability.

Aim. The purpose of this study was to assess nurses' knowledge on the current classification of BP levels and hypertension as well as of its prevalence and clinical consequences.

Material and methods. The study included 1,108 participants (W-1,089, M-19, aged 21-60, 0-37 years of work experience). The study was conducted in 2007-2009 using the diagnostic survey method.

Results. Half of the respondents correctly defined the prevalence of arterial hypertension in Poland and indicated the levels of optimal blood pressure and the arterial hypertension threshold. The best-known consequences of hypertension were stroke (93.5%), coronary heart disease (86.1%) and heart failure (84.6%). Sex, place of residence, length of service, holding a Bachelor's diploma and completion of specialization training were not found to significantly affect the respondents' answers. Significantly more correct answers were given by respondents aged 20-25 who had not started to work yet, those who were not married, and graduates from master's degree studies in nursing.

Conclusions. The study subjects demonstrated a moderate level of knowledge of the prevalence rate, classification of BP levels and diagnostic criteria for arterial hypertension, and an acceptable level of knowledge of hypertension complications.

Keywords: arterial hypertension, blood pressure, classification, knowledge, nurses.

DOI: 10.12923/j.0044-2011/123-3/a.02

INTRODUCTION

Despite considerable progress, the management of arterial hypertension is still unsatisfactory in most countries and its prevalence in the population of developed countries varies from 20-50% [1-3], while in developing countries it is steadily increasing [2,4,5]. It is estimated that by 2025, hypertension will affect 1.56 billion people, which is mainly associated with the aging of the population, the growing incidence of obesity [2,6] and abandonment of a former traditional lifestyle [2]. Furthermore, hypertension is becoming an increasingly frequent health concern among young people under 18 [7].

Cross-sectional studies conducted in Poland have demonstrated an increase in the prevalence of hypertension in the population. In the NATPOL-PLUS study (Arterial Hypertension in Poland), conducted in 2002, it was found to affect 29% of adult Poles, whereas in 2011, the percentage was already 31% (approx. 9 million people). High-normal blood pressure was diagnosed in 30% of Poles [8-11].

Increased BP (blood pressure) levels increase the risk of cardiovascular morbidity and mortality [2,12-14]. The BP level plays a fundamental role in the stratification of cardiovascular risk, which forms the basis for the introduction of further therapeutic management [15,16]. It is believed that a comprehensive assessment of risk factors should be performed at least every five years from the age of 18, and in patients with an increased cardiovascular risk – more frequently [17,18]. However, risk stratification is not always implemented in the daily professional practice of healthcare staff [19-21].

Today, nurses provide care to patients of varying ages and health, in different areas of their life activities. Their professional duties are focused not only on active participation in their patients' therapeutic processes, but also on health promotion and prevention. It is currently proposed that we strengthen the participation of nurses and other healthcare employees in the effective diagnosing, monitoring and treatment of arterial hypertension and in the reduction of cardiovascular risk, which, however, would require solid and constantly updated knowledge [22-26].

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AIM

The purpose of this study was to assess nurses' knowledge of the current classification of BP levels and arterial hypertension as well as of its prevalence and clinical consequences.

MATERIAL AND METHODS

The study was conducted in 2007-2009, on a group of 1,108 nurses, who were predominantly women (98.29%), city dwellers (82.85%) and married (75.72%). The respondents' age ranged from 21-60 years (x=38.67, SD=7.79), with the highest percentage in the 36-40 age bracket (29.15%), and the lowest among people aged 26-30 (4.33%). The general profile of the respondents is presented in Table 1.

TABLE 1. General profile of respondents.

Characteristic	Value n (%)
Sex: women/men	1089 (98.3%) / 19 (1.7%)
Age	21-60 (x=38.7; SD=7.8)
Place of residence: town/country	918 (82.8%) / 190 (17.2%)
Family situation – married: yes/no	839 (75.7%) / 269 (24.3%)
Length of service	0-37 (x=17.05; SD=8.6)

The largest group (26.53%) included persons with a seniority of 16-20 years, whereas 5.23% of the respondents had not yet started working, and 3.70% had worked in the profession for up to a year. The average seniority was 17.05 years (SD=8.56).

Participation in the study was voluntary and anonymous. The methods applied were diagnostic surveys (random survey technique) and achievement tests (knowledge test technique). The study tool was a custom-made questionnaire, combining elements of a survey and knowledge test. The core section of the questionnaire was a knowledge test comprising 6 questions with cafeteria-style closed checklists (disjunctive questions comprising four items) and 1 dichotomous question. Test reliability was assessed using Cronbach's alpha coefficient, which attained 0.929551, evidencing the adequate reliability of the test questions. In addition, the task easiness coefficient was calculated and it attained 0.45, indicating that rather "difficult" tasks were used in the questionnaire (0.20-0.49).

The research was carried out at institutions organizing post-graduate education of nurses across Pomerania (Gdańsk, Sopot, Elbląg and Słupsk), upon obtaining the consent of the institutions' management, in the presence of the study authors.

The statistical analysis of the data used the STATISTICA 8.0. package and the Excel spreadsheet. For the description of quantitative variables, mean values (x) and their standard deviations (SD) were calculated, while for the description of qualitative variables, their frequency in percentages was provided. The hypothesis on the conformity of quantitative variables with normal distribution was checked by means of the W Shapiro-Wilk test. Inter-group differences for quantitative variables were assessed by means of the t-Student test, and for qualitative variables – by means of the U Mann-Whitney test. Qualitative variables were presented as percentage values of correct and incorrect answers, hence non-parametric ANOVA (the Kruskal-Wallis test) was used in the analysis. The relationships between quantitative values were evaluated by means of Spearman's correlation coefficient. The statistical significance was assumed at $p \leq 0.05$.

The findings presented in this article are part of more extensive studies assessing nurses' preparation for identifying the risk factors of hypertension and its prevention.

The study obtained the approval of the Independent Ethics Committee for Scientific Research at the Medical University of Gdańsk (NKEBN/177/2007).

RESULTS

Approximately every fifth respondent represented surgical wards (18.86%), every fourth one - hospital wards with a conservative treatment profile (24.73%), every third one -primary health care (PHC) (28.52%), while emergency care units were represented by 14.44% of the respondents, long-term care entities by 5.32%, and other entities by 2.89%. Over three fourths of the respondents (78.07%) worked as unit nurses (in primary health care for families), 5.42% as coordinating nurses, 0.45% as specialist nurses and 2.35% as surgical nurses. Furthermore, 6.32% of the respondents were employed in managerial roles, and 2.17% in other roles.

On average, every third respondent (31.86%) had a bachelor's degree in nursing, and 3.43% had a master's degree in nursing. Nearly half of the respondents (46.21%) declared that they had completed a qualifying course, of which 25.27% were in fields whose framework programs included issues related to arterial hypertension (such as family nursing, conservative nursing, workers' health protection, teaching and educational settings), and 20.94% in other fields. Merely 5.32% of the study participants stated that they had completed specialization training, 2.17% of whom had done so in fields related to the above issues.

Knowledge of Prevalence and Classification of BP (Table 2).

Almost half of the respondents correctly defined the prevalence of arterial hypertension in Poland and stated the optimal blood pressure and threshold blood pressure in arterial hypertension (47.74%, 46.75% and 54.06%, respectively). Thirty-seven percent stated a higher prevalence of arterial

TABLE 2. Prevalence and classification of BP levels in the respondents' opinion.

Element of knowledge	Correct answer		Wrong answer		"Don't know" answer	
	n	%	n	%	n	%
Prevalence of hypertension in Poland	529	47.74	497	44.86	82	7.40
Optimal pressure levels	518	46.75	567	51.17	23	2.08
Hypertension diagnostic criterion	599	54.06	498	44.94	11	0.99
White coat hypertension	125	11.28	934	84.29	49	4.42
BP daily rhythm	688	62.09	316	28.52	104	9.39
Number of BP measurements necessary to diagnose hypertension	678	61.19	415	37.45	15	1.35

hypertension, and 7.40% gave the answer "don't know". As regards the pressure considered normal, every third participant of the study (33.7%) identified the "optimal" blood pressure with levels corresponding to the normal blood pressure category, and 15.3% with high-normal blood pressure.

According to every fifth respondent (20.3%), arterial hypertension was evidenced by levels higher than those published in the current classifications of scientific societies, while every fourth person (24.64%) indicated higher levels of diastolic pressure.

According to 61.2% of the participants, arterial hypertension is diagnosed on the basis of the results of multiple BP measurements taken during at least two consecutive visits, while according to 34.8% – on the basis of measurements carried out by the patient in their home setting. Only 2.3% of the participants were of the opinion that just a few measurements taken during a single examination were sufficient to diagnose hypertension, and 0.4% respondents considered the result of a single BP measurement to be a sufficient diagnostic criterion for hypertension.

More than half of the participants (62.1%) correctly indicated the statement describing the daily rhythm of BP, while in the opinion of every fifth person the time of day or night did not affect the BP level significantly, and every tenth respondent had no view on the question.

Correct knowledge of isolated arterial hypertension in doctor's office measurements (the "white coat effect") was presented merely by 11.3 of the respondents. The study respondents much more frequently (81.7%) pointed to the "white coat effect" in relation to patients with diagnosed arterial hypertension.

Knowledge of Consequences of Hypertension (Table 3)

The best-known consequences of hypertension in the study group proved to be: cerebral stroke (93.5%), coronary heart disease (86.1%) and cardiac failure (84.6%) – 88% correct answers on average, followed by renal failure (72.4%) and atherosclerosis (68.1%) – 70% correct answers on average. The study participants associated the impact of high arterial blood pressure with the risk of peripheral vascular diseases to a lesser degree (54.0% of correct answers), while the least-known complication of hypertension was encephalopathy, indicated by 21.8% of the respondents.

It seems interesting that the "don't know" answer was chosen the most frequently for questions concerning the increased risk of encephalopathy, diseases of peripheral vessels of the limbs and renal failure.

TABLE 3. Consequences of hypertension in the respondents' opinion.

Arterial hypertension complications	Correct answer		Wrong answer		"Don't know" answer	
	n	%	n	%	n	%
Atherosclerosis	755	68.14	134	12.09	219	19.76
Cerebral stroke	1036	93.50	15	1.35	57	5.14
Coronary heart disease	954	86.10	15	1.35	139	12.54
Diseases of peripheral vessels of the limbs	598	53.97	148	13.36	362	32.67
Cardiac failure	937	84.57	20	1.81	151	13.63
Renal failure	802	72.38	64	5.78	242	21.84
Encephalopathy	242	21.84	218	19.68	648	58.48

Impact of Socio-Demographic Factors (Table 4)

The most correct answers were given by persons aged 26-30, significantly more often than by respondents aged 31-35, 36-40 and over 45 ($p<0.05$). No significant impact of gender and place of residence was found in the course of the analysis ($p>0.05$).

The analysis confirmed the significant impact of the family situation on the study participants' answers ($p<0.05$), since unmarried persons gave correct answers more frequently than married respondents, which probably reflects the respondents' age difference.

TABLE 4. Impact of socio-demographic factors on the respondents' answers.

	x	valid	SD	min.	max.	median	p-value
Sex[1]							
women	0.45	1089	0.08			0.46	>0.05
men	0.46	19	0.07			0.46	
Age[2] (stated in years)							0.002
20-25	0.59	101	0.13	0.21	0.93	0.57	
26-30	0.62	48	0.17	0.14	0.93	0.64	
31-35	0.54	191	0.14	0.14	0.86	0.57	
36-40	0.54	323	0.14	0.00	0.86	0.57	
41-45	0.56	237	0.14	0.14	0.93	0.57	
>45	0.54	208	0.15	0.14	0.86	0.57	
Place of residence[1]							
town	0.56	918	0.15	0.00	0.93	0.57	0.126
country	0.54	190	0.15	0.21	0.93	0.57	
Family situation[1]							
married	0.55	839	0.15	0.00	0.93	0.57	0.014
single	0.57	269	0.14	0.14	0.93	0.57	

[1] U Mann-Whitney test, [2] Kruskal-Wallis test

Impact of Work-Related Factors and Education (Tables 5 and 6)

The position and place of work were also found to affect the correctness of the respondents' answers. Differences were observed only between persons without professional experience who gave correct answers significantly more frequently and persons employed in surgical wards ($p<0.05$), and in comparison with coordinating nurses ($p<0.05$). The length of professional service was not shown to have any effect on the percentage of correct answers (Table 5).

Significantly more correct answers were given by Masters of nursing ($p<0.05$), but the completion of a bachelor's course or specialization training in nursing was not shown

TABLE 5. Impact of work-related factors on the respondents' knowledge.

	x	valid	SD	minimum	maximum	median	p-value
Length of service1 (in years)							0.064
Lack of work experience	0.61	58	0.10	0.43	0.93	0.57	
<1	0.58	41	0.16	0.21	0.86	0.61	
2-5	0.56	50	0.16	0.29	0.93	0.50	
6-10	0.57	89	0.15	0.14	0.86	0.57	
11-15	0.54	189	0.14	0.14	0.79	0.50	
16-20	0.54	294	0.14	0.00	0.93	0.57	
21-25	0.55	212	0.15	0.14	0.86	0.57	
>25	0.55	175	0.15	0.14	0.86	0.57	
Place of work[1]							0.022
Lack of work experience	0.61	58	0.10	0.43	0.93	0.57	
Primary Healthcare/ specialist outpatient care	0.55	316	0.15	0.21	0.93	0.57	
Conservative treatment wards	0.56	274	0.15	0.14	0.86	0.57	
Life-threatening conditions	0.54	160	0.15	0.14	0.86	0.57	
Surgical wards	0.54	209	0.14	0.00	0.93	0.50	
Long-term care	0.59	32	0.13	0.36	0.86	0.61	
Other entities	0.54	59	0.16	0.14	0.79	0.57	
Job position[1]							0.028
No work experience	0.61	58	0.10	0.43	0.93	0.57	
Ward nurse	0.55	865	0.14	0.00	0.93	0.57	
Manager	0.55	70	0.16	0.14	0.93	0.57	
Specialist	0.47	5	0.20	0.29	0.71	0.43	
Coordinating nurse	0.52	60	0.16	0.14	0.86	0.50	
Surgical nurse	0.55	24	0.14	0.14	0.79	0.57	
Other	0.59	26	0.14	0.36	0.86	0.57	

[1] Kruskal-Wallis test

to have a significant impact. At the same time, it was noted that the respondents' completion of qualification courses attained the borderline of statistical significance (p=0.05) (Table 6).

TABLE 6. Impact of completed forms of education on the study participants' answers.

	x	valid	SD	minimum	maximum	median	p-value
Qualifying course[2]							
No course	0.56	596	0.14	0.14	0.93	0.57	0.05
Including BP-related issues	0.56	280	0.15	0.14	0.93	0.57	
Other	0.53	232	0.15	0.00	0.86	0.54	
Specialization training[2]							
No course	0.55	1049	0.15	0.00	0.93	0.57	0.768
Including BP-related issues	0.54	24	0.14	0.21	0.79	0.57	
Other	0.54	35	0.13	0.29	0.79	0.50	
Bachelor's degree studies[1]							
No	0.55	755	0.15	0.00	0.93	0.57	0.081
Yes	0.57	353	0.14	0.14	0.93	0.57	
Master's degree studies[1]							
No	0.55	1070	0.15	0.00	0.93	0.57	0.041
Yes	0.60	38	0.13	0.36	0.86	0.57	

[1] U Mann-Whitney test, [2] Kruskal-Wallis test

DISCUSSION

The respondents demonstrated a moderate knowledge of the classification of BP levels. Every attempt at BP classification is arbitrary, yet important, as a linear relationship between the BP level and cardiovascular risk has been found [2,13,16,27,28], which necessitates better education of healthcare employees and the public [6,29]. The guidelines of the European Society of Cardiology and the European Society of Hypertension (ESC/ESH) of 2007 – valid in Poland too – included a division of normal BP levels into optimal (<120/<80 mm Hg), normal (120-129/80-84 mm Hg) and high-normal BP (130-139/85-89 mm Hg) [16]. The same classification of BP levels are recommended by scientific societies in Great Britain [14] and Latin America [30]. In Australia, there are normal (<120/<80 mm Hg) and high-normal (120-139/80-89 mm Hg) BP categories [31], while the American guidelines (JNC 7 – 7, a Joint National Committee report) include a division into normal blood pressure (<120/<80 mm Hg) and pre-hypertension (120-139/80-89 mm Hg) [32]. The Canadian classification describes two categories of normal blood pressure: optimal BP (<120/<80 mm Hg) and pre-hypertension (120-139/80-89 m Hg) [33].

Previous studies reported an unsatisfactory level of knowledge of the current classification of blood pressure levels both among nurses and physicians and medical faculty students. In studies in Italy, even though blood pressure was considered a risk factor by 70% of nursing students (n=98) and 57% of cardiological nurses (n=84), the knowledge of the upper limits of normal blood pressure in both study groups was found to be relatively low [34].

Studies conducted among 125 physicians in Poland (age x=45.2 years; SD=8.1) have demonstrated that many physicians use higher limits for diagnosing hypertension, especially with respect to total cardiovascular risk. General practitioners were the ones who ignored the high-normal blood pressure level to the greatest extent. The authors of the above studies suggest that the category of high-normal BP is probably misleading because of the term "normal" and perhaps the phrasing from the American guidelines, "pre-hypertension", would be more helpful [35].

Studies on a similar subject were also conducted by Gryglewska, who assessed the knowledge of hypertension in a group of 6th year students of the medical faculty (144) . The above condition was known by a group of 56.3% of the students, and the diagnostic criteria for high-normal blood pressure by 63.9% of them [36]. Studies conducted among a group of Australian nurses (n=78) have shown that correct levels of systolic blood pressure (SBP) were pro-

vided by 61%, and those of diastolic blood pressure (DBP) by 71% of the study participants [37]. Nurses in a hospital in Jordan (n=50) correctly stated the upper limit of normal SBP in a healthy adult at the level of 34% (SBP) and 46% (DBP) correct answers [38], as did 145 Jordanian physicians (36.6%) [39] and a group of 1,418 nurses from 10 hospitals in northern Taiwan [40]. Every third PHC physician (n=107) in Saudi Arabia correctly stated the levels attributed to hypertension [41].

Hypertension cannot be identified on the basis of a single measurement or during a single visit [42]. Diagnosis should be based on multiple BP measurements taken on different occasions [31]. According to ESC/ESH guidelines, all adults should have their BP measured as a routine at least once a year, regardless of their previous BP levels [16], and the Australian and Canadian guidelines suggest measuring BP (in normotensive persons) every 2 years [17,33]. According to the British (and Australian) guidelines, the annual BP measurement should apply only to people with high-normal BP and those who had high BP levels in previous measurements [17,22]. Many experts signal the need for screening tests in the general population to track individuals with high BP and take up treatment aimed at, for example, reducing the risk of stroke [43].

In our study, the proportion of participants pointing to the necessity of taking several BP measurements of a patient during at least 2 visits (being an absolute minimum requirement for identifying hypertension), was lower than that in 6th-year medical students in studies in Spain (61.2% vs. 67%), but greater than in 3rd year medical students (24.0%) or 3rd year nursing students (55.2%) in Spain [44].

Over half of the respondents correctly described the daily BP variation, characterized by a decreased BP for several hours during nighttime sleeping and a sudden increase in the early morning hours, which leads to the frequent occurrence of cardiac and cerebrovascular disorders in the morning [42,45].

The least known phenomenon in the study group proved to be isolated hypertension in the doctor's office ("white coat hypertension") referring to constant increased BP levels (>140/90 mm Hg), found during clinical measurements, without observing an increase in ABPM or home measurements, which may be a precursor of the development of permanent hypertension and increased cardiovascular risk [16,22,42].

The participants in the present study generally presented satisfactory knowledge of the consequences of high BP levels – with an average score of 68.6%, which is similar to the scores obtained by the students of Wrocław universities (including 50 students of the medical university) [46], and the employees of the Ibadan University in Nigeria [47], but slightly higher in comparison with Taiwanese nurses [40] and PHC physicians in Saudi Arabia [41].

CONCLUSIONS

1. The study participants presented a moderate score of knowledge of the prevalence and classification of BP levels and the diagnostic criteria for hypertension, and a satisfactory level of knowledge of hypertension complications.
2. Correct answers were significantly more frequently given by respondents who were the youngest, unmarried Masters of nursing.

Implications for Practice

It seems reasonable to promote regular updating courses for nurses in Poland (undertaken as part of institutional postgraduate education, in-company training and self-education) in the current classification of BP levels, hypertension and its clinical consequences. The implementation of knowledge by nurses in their professional activities can contribute to a higher detectability of high BP and more effective health education in the Polish society.

Acknowledgements

This paper was prepared with the support of the Medical University of Gdańsk (the authors' own work/research W-517).

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