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Nurses' Knowledge and Skills Regarding Blood Pressure Measurement Technique in a Teaching Hospital, Bharatpur

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Abstract *- The blood pressure (BP) measurement technique is an effective health assessment technique that is commonly performed by nurses in every health institute. The objective of the study was to assess the knowledge and skills regarding BP measurement techniques among nurses in a teaching hospital, Bharatpur. A descriptive, cross-sectional research design was used among 137 nurses of a teaching hospital. Probability, proportionate stratified simple random sampling technique was used to select the sample. Data was collected by using a structured, self-administered questionnaire and observational checklist from 2nd June to 16th June 2019, and the data were analyzed using descriptive and inferential statistics.*

The findings of the study revealed that only 33.6% and 28.5% of nurses had an excellent level of knowledge and skills regarding BP measurement techniques, respectively. The level of knowledge was statistically significant with the nurses' professional qualification (p=0.005), whereas, level of skills was statistically significant with the nurses' participant in in-service education (p=0.013). This study explored that there is no relationship between knowledge score and skills score (p=0.271) regarding BP measurement technique.

The majority of the nurses had inadequate knowledge and skills regarding BP measurement techniques. Health institutions should be conducting skill-based training programs on a regular basis.

Keywords - *Blood Pressure measurement technique, Knowledge, Nurses, Skills, Teaching Hospital*

I. INTRODUCTION

Blood pressure (BP) measurement is a basic skill that is taught to the nurses early in their academic years, which involves accurate measurement, documentation, interpretation, and intervention as needed. BP can be measured either manually or by using electronic devices. Among both, the manual technique demands maximum practice to develop competencies [3]. Since the technique is usually not reviewed after student life, the health professionals, when it come to the clinical setting, can have a high chance of incorrect performance of BP measurement technique [11].

Abnormality in blood pressure reading can be the indicator of a different chronic condition such as coronary heart disease, kidney disease, and diabetes [1]. Untreated or poorly treated hypertension is a major contributor to the overall burden of adult disease in any population [12]. The measurement and interpretation of blood pressures recordings are extremely important for early identification, management, and prevention of different complications [17].

The errors in measuring BP may have a significant impact on the investigation and treatment of the patient [2]. Observer bias, faulty equipment, and failure to standardize technique of measurement despite clear guidelines are the three major errors identified by the American Heart Association in BP measurement procedure [9]. Other studies have revealed several common sources of error such as incorrect position, failure to ask influencing factor, use of incorrect cuff size, not maintaining the arm at the heart level, too fast deflation rate, digit preference (rounding the reading to nearest 5 or 10 mmHg) & not allowing patient to rest [2] [5] [6].

Studies have reported that about 3-10 mmHg of BP will be increased in supine than in the sitting position. If the patient's back is not supported, there is a chance of an increase in systolic BP by 5-15 mmHg and diastolic BP by 6 mmHg. Similarly, if the patient's legs are crossed during BP measurement, there will be the chance of an increase in systolic BP by 5-8 mmHg and diastolic BP by 3-5 mmHg. Studies have also reported that if the upper arm of a patient is below the level of heart, the readings will be too high, and if the arm is supported by the patient him/herself, then BP will be raised. Influencing factors such as patient talking during measurement, smoking, full bladder, alcohol, or caffeine will also increase the systolic pressure by 10-15mmHg, 5-

8mmHg, 10-15mmHg, 5-8 mmHg, respectively [9].

Despite advances in the monitoring of blood pressure techniques, knowledge of blood pressure measurement techniques is still poorly understood in both medical and nursing professions [15]. A prospective, observational study conducted on "Blood pressure measurement practices among community health providers in the northern district of India" among 204 doctors and 196 nurses study showed that only 5.85% doctors had excellent knowledge, 74.5% had good knowledge, and 19.61% had poor knowledge regarding BP measurement technique. Similarly, only 1% of nurses had a piece of excellent knowledge, 31% had good knowledge, and 68% had poor knowledge regarding BP measurement techniques. The study also showed that only 1.47% of doctors and 0.5 % of nurses had the accurate practice of blood pressure measurement techniques [7].

Similarly, a descriptive, cross-sectional study on "Knowledge of Blood Pressure Measurement among Tertiary Hospital Staff in southwest Nigeria and its Related Socio-demographic Determinants" among 211 respondents (82 doctors and 129 nurses) showed that only 18.4% of the respondents provide the correct answer of selection of both arm at the initial visit, 20.9% were aware of the auscultatory gap, 23% knew the influencing factor of BP measurement, 27% knew about Korotkoff sound, only 12% knew the correct of waiting time between two consecutive measurements and 5% gave the correct answer of cuff placement and cuff size. The majority of answers were below 25%, which showed poor knowledge among health care providers [10].

II. MATERIALS AND METHODS

A. Research design, setting, and population

A descriptive, cross-sectional research design was used to find out the knowledge and skills regarding blood pressure measurement techniques among nurses at a teaching hospital, Bharatpur. This study was conducted at Chitwan Medical College, Teaching Hospital (CMCTH) Bharatpur, Chitwan, and the population of this study were the nurses who were working in different wards {Tropical, Respiratory, Surgical, Orthopedic, Emergency, Maternity, Neurology, Gastrology, Gynecology, Nephrology, Eye Nose Throat (ENT), Coronary Care Unit (CCU), Psychiatric, post-operative ward, and cabin} of CMCTH.

B. Sampling Procedure

Probability, proportionate stratified simple random sampling technique was used to find out the nurses' knowledge and skills of blood pressure measurement technique. The total population was divided into two strata, i.e., Proficiency Certificate Level (PCL) & Bachelor level, and a random tabulation method was used to select the proportionate sample from each strata.

C. Research Instrument

A structured, self-administered questionnaire and an observational checklist were prepared by the researcher to measure nurses' knowledge and skills respectively regarding blood pressure measurement techniques. The research instruments consisted of 3 parts:

Part I: Question related to socio-demographic characteristics of the respondents.

Part II: Question-related to the knowledge of blood pressure measurement technique. The questionnaire consisted of 21 items, and each item was rated by 1 score. The total score was calculated by summing all items. The level of knowledge was classified into 3 categories on the basis of total score excellent, good and poor respectively.

Part III: Observation checklist related to blood pressure measurement technique.

It consisted of 31 items, and each item was rated by 1 score. The total score was calculated by summing all items. The level of skills will be classified into three categories on the basis of total score excellent, good and poor respectively.

D. Ethical Considerations

Ethical approval was obtained from Chitwan Medical College, Institutional Review Committee (CMC-IRC), Bharatpur 10, Chitwan. Written informed consent was obtained from each respondent by clarifying the purpose of the study prior to data collection. Respondent's dignity was maintained by giving the right to reject or discontinue the research study at any time without any penalty. Confidentiality was maintained by giving code numbers and not disclosing the information of respondents except for the study purpose.

E. Data Analysis Procedure

All the collected data were checked, reviewed, and organized daily for its accuracy, completeness, and consistency. Then the data were organized, coded, and entered in the statistical package for social science (IBM SPSS), version 20, and analysis was done by using descriptive statistics (frequency, mean, median, and percentage) and inferential statistics: chi-square and fisher exact test was used to find out the association between knowledge and skills regarding BP measurement technique and selective variables, and Spearman's correlation coefficient was used to find out the relationship between knowledge score and skills score regarding BP measurement technique.

III. RESULT

A. Sociodemographic Characteristics

As shown in Table 1, out of 137 respondents, 65.7% of respondents are from the age group 21 years, and above, 83.9% of the respondents had an academic degree in PCL nursing, 79.6% of respondents had completed their study from an institute affiliated to CTEVT, 94.2% of the respondents were working as a staff nurse, and 60.6% of

respondents had six or more than six months of professional experience. Similarly, 50.4% of the respondents reported that they have not participated in any in-service education regarding BP measurement technique, 67.2% of respondents reported that they have a protocol regarding BP measurement technique in their working place, and 75.9% of respondents answered that they have the habit of self-directed learning.

Table 1: Sociodemographic Characteristics n=137

Variables	n	%
Age group (in the year)		
≥21	90	65.7
<21	47	34.3
Professional qualification		
PCL nursing	115	83.9
Bachelor level in nursing	22	16.1
Educational institute		
Council for Technical Educational and vocational Training (CTEVT)	109	79.6
Tribhuvan University (TU)	14	10.2
Purbanchal University (PU)	11	8.0
Kathmandu University (KU)	3	2.2
Professional designation		
Staff nurse	129	94.2
Senior staff nurse	8	5.8
Total professional experience		
≥6 months	83	60.6
< 6 months	54	39.4
Participation in in-service education		
No	69	50.4
Yes	68	49.6
Availability of protocol		
Yes	92	67.2
No	45	32.8
The habit of self-directed learning		
Yes	104	75.9
No	33	24.1

B. Nurses' level of knowledge regarding BP measurement technique

As shown in figure 1, only 33.6% of respondents had an excellent level of knowledge, 17.50% of respondents had a good level of knowledge, and about half (48.9%) of respondents had a poor level of knowledge regarding BP measurement techniques.

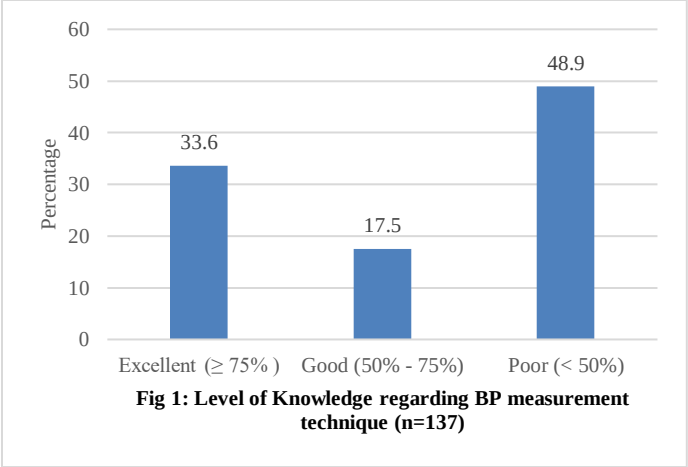

Fig 1: Level of Knowledge regarding BP measurement technique (n=137)

C. Nurses' level of skills regarding BP measurement technique

As shown in figure 2, only 28.5% of the respondent had an excellent level of skills, 21.9% had a good level of skills, and more than half (49.6%) of the respondents had a poor level of skills regarding BP measurement technique.

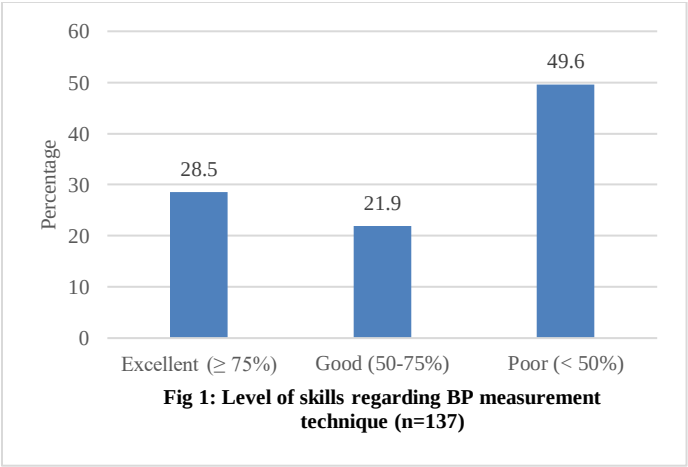

Fig 1: Level of skills regarding BP measurement technique (n=137)

D. Relationship between level of Knowledge regarding BP Measurement Technique and sociodemographic characteristics

As shown in Table 2, there is a statistically significant association between the level of knowledge regarding BP measurement techniques and respondents' professional qualifications ($p = 0.005$). Therefore, it can be concluded that the level of knowledge regarding blood pressure measurement techniques can be influenced by the nurses' professional qualifications. But the table shows no significant association between respondents' level of knowledge and age, professional experience, participation in in-service education, the habit of self-directed learning, and availability of protocols in the working area.

Table2: Association between Level of Knowledge regarding BP Measurement Technique and Sociodemographic Characteristics

Variables	Level of Knowledge			χ^2	*p*-value
	Excellent No. (%)	Good No. (%)	Poor No. (%)		
Age group (in the year)				2.456	0.293
< 22	12(25.5)	8(17.1)	27(57.4)		
≥ 22	34(37.8)	16(17.8)	40(44.4)		
Professional qualification				10.632	0.005
PCL	32(27.9)	22(19.1)	61(53.0)		
Bachelor Level	14(63.6)	2 (9.1)	6(27.3)		
Total Professional experience				0.540	0.764
< 6 months	18(33.3)	11(20.4)	25(46.3)		
≥ 6 months	28(33.7)	13(15.7)	42(50.6)		
Participant in in-service education				1.953	0.377
Yes	22(32.3)	15(22.1)	31(45.6)		
No	24(34.8)	9(13.0)	36(52.2)		
The habit of self-directed learning				5.325	0.070
Yes	36(34.6)	22(21.2)	46(44.2)		
No	10(30.3)	2(6.1)	21(63.6)		
Availability of hospital protocol				1.022	0.600
Yes	29(31.5)	18(19.6)	45(48.9)		
No	17(37.8)	6(13.3)	22(48.9)		

The significant level at 0.05

E. Relationship between level of skills regarding BP measurement technique and Sociodemographic Characteristics

As shown in table 3, there is a statistically significant association between the level of skills regarding BP measurement technique and respondents' participation in in-service education (p = 0.013). Therefore, it can be concluded that in-service education can influence respondent's level of skill regarding BP measurement techniques.

Table3: Association between the level of skills regarding BP measurement Technique and Selected Variables

Variables	Level of Skills			χ^2 value	*p*-value
	Excellent No. (%)	Good No. (%)	Poor No. (%)		
Age group (in the year)				1.851	0.396
< 22	14(29.8)	13(27.6)	20(42.6)		
≥ 22	25(27.8)	17(18.9)	48(53.3)		
Professional qualification				0.306	0.858
PCL	33(28.7)	26(22.6)	56(48.7)		
Bachelor Level	6(27.3)	4(18.2)	12(54.5)		
Professional Designation				1.774	0.399[€]
Staff Nurse	35(27.1)	29(22.5)	65(50.4)		
Senior staff nurse	4(50.0)	1(12.5)	3(37.5)		
Total Professional experience				3.339	0.188
< 6 months	15(27.8)	16(29.6)	23(42.6)		
≥ 6 mont	24(28.9)	14(16.9)	45(54.2)		

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Participant in in-service education				8.670	0.013
Yes	20(29.4)	8(11.8)	40(58.8)		
No	19(27.5)	22(31.9)	28(40.6)		
The habit of self-directed learning				3.833	0.147
Yes	34(32.7)	21(20.2)	49(47.1)		
No	5(15.1)	9(27.3)	19(57.6)		
Availability of hospital protocol				0.891	0.640
Yes	27(29.3)	18(19.6)	47(51.1)		
No	12(26.7)	12(26.7)	21(46.6)		
Availability of appropriate cuff size				O.778	0.678
Yes	14(33.3)	8(19.0)	20(47.6)		
No	25(26.3)	22(23.2)	48(50.5)		

The significant level at 0.05

F. Relationship between Knowledge and Skill regarding BP measurement technique

As shown in table 4, there is no significant relationship between knowledge score and skills score of respondents regarding BP measurement technique (r=0.095; p=0.271).

TABLE 4
Relationship between Knowledge Score and Skills Score

Variables	Spearman's Rho (R)	*p*-value
Knowledge vs Practice	-0.095	0.271

The significant level at 0.05

IV. DISCUSSION

The study finding revealed that 22.6% of the respondents had an excellent level of knowledge (≥75% of total score), and 48% of the respondents had a poor level of knowledge (<50% of total score) regarding BP measurement technique. This finding is in contrast to the findings of Dokoohki et al. [4], where only 6% of respondents had scored >75 of the total score, and 40% of respondents had scored <50% of the total score regarding BP measurement technique. The increase in an excellent level of knowledge in this study may be because most of the respondents had the habit of self-directed learning and availability of the protocol regarding BP measurement techniques in the hospital.

Concerning the level of skills, this study findings revealed that 28.50% of the respondents had an excellent level of skills (≥75% of total score), whereas the previous findings by Dokoohki et al. [4] revealed that only 16.4% of respondents had scored >75 of the total score. In this study, 21.90% of the respondents had got a good level of skills (50% -<75% of total score), and 49.6% of the respondent had got a poor level of skills (>50% of total score) regarding BP measurement technique, but this finding is a contrast to the findings of Dokoohki et al. [4] where 78% of respondent had scored in between of 50% to 74.99% of the total score and 5.6% of respondents had scored <50% of total score regarding BP measurement technique. The increase in the percentage of poor level of skills in this study may be due to difference in education level were, majority of the respondent were PCL nursing in comparison to Bachelor level in nursing, and another reason may be lack of participation in in-service education.

About association of level of knowledge with selective variables, this study finding showed that level of knowledge regarding BP measurement technique is not statistically significant with respondents age (p=0.293), which is supported by a previous study conducted by Toit [14] and Mujtaba et al., [8], where the level of knowledge regarding BP measurement technique and age of respondents is not statistically significant (p= 0.73 and p= >0.05) respectively. The study shows a statistically significant association between the level of knowledge regarding BP measurement technique and respondents' level of qualification is statistically significant (p=0.005). In contrast, Toit [14] reported that the association between respondents' level of knowledge regarding BP measurement technique and professional qualification is not significant (p=0.50). Whereas, this finding is supported by Mujtaba et al. [8], which reported that the association of the level of respondents' knowledge regarding BP measurement technique with qualification is statistically significant (p=0.001). Results also revealed that there is no statistical significance with respondents' level of knowledge regarding BP measurement technique with respondents' total professional experience (p= 0.764) and respondents' participation in in-service education (p= 0.377), and these findings are supported by the previous study Toit[14], which revealed that association of level of knowledge regarding BP measurement technique with respondents' total professional experience (p=0.12) and participation in in-service education (p= 0.89) was not statistically significant. The study also

showed that there is no statistical significance of respondents' level of knowledge regarding BP measurement technique with the habit of self-directed learning (p= 0.070), availability of hospital protocol (p= 0.600), and availability of appropriate cuff size (p= 469).

Most of the respondents had a lack of knowledge on areas such as; measurement of systolic BP by palpatory method, Korotkoff sounds, waiting time between two consecutive BP readings on same individual and selection of arm at the first visit and from second assessment unless contraindication, influencing factor of BP, width and length of the bladder. Similarly, a previous study by Toit [14] also revealed that most of the respondents lack knowledge on areas such as knowledge about documenting the site of measurement, auscultatory gap, Korotkoff sounds, deflation rate, waiting time between two consecutive BP measurements in the same individual, the reason for identifying systolic BP by palpation.

Concerning association of level of skills and selective variables, this study's findings reported that level of skills regarding BP measurement technique is statistically significant with the respondents' participation in in-service education (p=0.013). This finding is in contrast to the finding of Toit[14], which showed that the skills regarding BP measurement are not statistically significant with respondent in-service education/training (p= 0.89).

The study revealed that most of the respondents had a lack of skills in areas such as; performing hand hygiene before and after the procedure, ensuring influencing factor of BP during measurement, communication, maintaining privacy, maintaining the position of the patient and patient's arm, selection of the appropriate cuff size, palpating brachial artery before applying cuff and stethoscope, palpatory estimation, inflating the pressure 30 mmHg above the point at which the systolic pressure was palpated and documenting the site of measurement.

These study findings revealed that there is no significant relationship between knowledge score and skills score regarding BP measurement technique (r= -0.090, p=0.271), which is supported by Toit[14] where, r =0.062, p =0.50.

V. CONCLUSION

The study showed that only less than one-fourth of the respondents have an excellent level of knowledge, and very few respondents have an excellent level of skills. Most of the respondents have a lack of knowledge on areas such as; palpatory method, Korotkoff sounds, waiting time between two consecutive BP readings on same individual and selection of arm at the first visit and from second assessment unless contraindication, influencing factor of BP, width and length of the bladder.

Similarly, most of the respondents have limited skills in areas such as; performing hand hygiene before and after the procedure, ensuring influencing factor of BP during measurement, communication, maintaining privacy, maintaining the position of the patient and patient's arm, selection of the appropriate cuff size, palpating brachial artery before applying cuff and stethoscope, palpatory estimation, inflating the pressure 30 mmHg above the point at which the systolic pressure was palpated and documenting the site of measurement.

This study shows a statistically significant association between level of knowledge and professional qualification. Similarly, this study shows a statistically significant association between level of skills and respondents' participant in in-service education. This study shows that there is no statistically significant relationship between knowledge score and skills score regarding BP measurement technique.

Therefore, the health institution must work in improving the knowledge and skills regarding blood pressure measurement among nurses. A skill-based training program can be conducted on a regular basis along with continuous monitoring, evaluation, and constructive feedback in the clinical setting by the seniors.

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