Knowledge and Practice of Nurses Regarding Urinary Catheter Care in Selected Hospitals of Asmara, Eritrea

Teame Kiflom Gaim[1, *], Salem Sium Mesfin[1], Frewengel Melake Weldeslassie[1], Firuz Tesfazieghi Fesiha[1], Semere Teklebrhan Tewelde[2], Aster Andom Beraki[2], Aklilu Gebrit Mebrahtu[2], Elsa Afewerki Kesete[2], Bietiel Woldemichel Goniche[2]

[1]Ministry of Health of Eritrea, Asmara, Eritrea

[2]Department of Nursing, Asmara College of Health Sciences, Asmara, Eritrea

Email address:
teamekiflom1@gmail.com (T. K. Gaim)
[*]Corresponding author

Abstract: Background: Urinary catheterization is one of the most common nursing procedures which has a high probability to predispose to CAUTI and other chronic urinary problems and tendency to cause incidences of morbidity and mortality if not practiced properly with adequate knowledge. A number of studies conducted in different countries of the world to assess knowledge and practice of nurses toward Urinary Catheter Care. Hence according to their statistics, catheterization proved to be the main cause of complications and mortality of patients admitted in hospitals. Objective: The aim of this study was to assess staff nurses' knowledge and practice regarding the care of patients with urinary catheter. Methods: A cross sectional descriptive analytical study was done from February to June 2021 in three purposely selected hospitals (ONRH, Halibet and Sembel Hospitals) of Asmara. All staff nurses in the selected wards of the hospitals, were included in this study (100 staff nurses). A self-administered questionnaire was used to assess the knowledge of staff nurses regarding urinary catheter care and observational checklist was used to assess practices of nurses in the care of patients with urinary catheter. Data was analyzed by computing frequencies percentages and descriptive and inferential statistics, Fisher's exact test at 95% confidence interval was used to compare scores using SPSS package version 22. Result: The study revealed that majority (68%) of the staff nurses had good level of knowledge and 32% had poor level of knowledge. And more than half (56%) of the staff nurses had good level of practice and the remaining 44% had poor level of practice. Overall 41% of the staff nurses had good level of knowledge and practice, and 17% had poor level of knowledge and practice. Conclusion: The level of knowledge and practice regarding urinary catheter care was found to be low in this study. Recommendation: an intensive training and supervision of staff nurses should be implemented and further studies should be carried out nationwide.

Keywords: Catheter Care, Staff Nurses, Urinary Tract Infection (UTI),
Catheter-Associated Urinary Tract Infections (CAUTI), Knowledge, Practice

1. Introduction

1.1. Background

Urinary catheterization is a procedure used to drain the bladder and collect urine, through a flexible tube called a catheter [1]. Urinary tract infection (UTI) is the most common bacterial infection in developing countries [2].

UTI comprises more than 40% of nosocomial infections in the United States every year and most of these infections are associated with urinary catheterization [3]. Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter. Between 15-25% of hospitalized patients receive urinary catheters during their hospital stay [4].

As per National Healthcare Safety Network (NHSN)

reports, catheter associated urinary tract infections (CAUTIs) are the most common health care acquired infections encountered in clinical practice. The single most important predisposing factor for CAUTI is the insertion of urinary catheter. One quarter of all hospitalized adults will have an indwelling catheter at some point during their stay and half of all catheterized patients test positive for bacteria in their urine within one week. A CAUTI can lead to further complications such as: fever, bloodstream infection, a longer hospital stay and a need for more expensive antibiotics for treatment [4].

Catheter use contribute to the higher incidence of bacteriuria among indwelling catheters in the various categories of women and that the incidence of catheter associated infection increases as the use of indwelling catheter is increased [5].

Further, the catheterized urinary tract acts as a reservoir for the dissemination of these drug resistant organisms to other patients. There are increased chances of catheter blockage, urinary tract stones and even increased risk of malignancy of the urinary tract following CAUTI. If it gets complicated by bacteremia, it increases the cost of care tremendously besides increasing the mortality in these hospitalized patients. Bacterial colonization (bacteremia) will occur within 2 weeks in half of catheterized patients, and in almost all patients within 4 to 5 weeks following insertion of catheter. Catheters impede the natural defenses of the urinary tract by obstructing per urethral ducts, by irritating the bladder mucosa, and by providing an artificial route of entry for the organisms to enter the bladder [6].

The morbidity and the mortality caused by the current urinary catheter devices and the costs to health services in managing the complications are surely no longer acceptable in the 21st century [7].

Nurses are the most influential team member when it comes to preventing CAUTI. They are the ones performing catheter care and performing assessments throughout a patients' stay [8]. The care of indwelling urinary catheter is a common procedure or practice for nurses who are working in the hospitals or community setting therefore it is the duty of the nurses to know about catheterization, its complications and the care of patients with catheterization [9]. Nurses are the primary managers of all the routine care and problem solving associated with patients who have indwelling urinary catheters [10].

The prolonged use of indwelling catheter can lead to many complications, the most prevalent being urinary tract infection. Staff nurses were engaged in the development and implementation of the plan. Criteria-based Foley catheter guidelines, a decision-making algorithm, and a daily checklist were implemented that led to a significant reduction in Foley catheter device days and a decrease in CAUTI [11]. Indwelling catheter can be a source of urinary infections. Therefore, catheterization should be avoided when not required and when not needed, it should be terminated or removed as soon as possible. Aseptic catheter insertion and properly maintained closed drainage system are crucial to reducing the risk of bacteriuria. [12].

1.2. Problem Statement

Urinary catheterization is a widely-practiced procedure, which benefits the patient in various clinical situations, despite the complications which are inherent to its use. The role of the nurse and the health team in preventing the complications, principally UTI is essential [13]. One of the most important aspects of patient care in hospitals is developing and following protocols for specific cares and procedures. These protocols ensure that patients don't receive procedures they don't need, but they also help to prevent complications for a patient in the hospital, such as acquiring an infection [8].

A study conducted in a Tertiary Care Hospital in Pune, India found that out of 1380 catheterized patients, 34 developed CAUTI. The overall incidence was 4.59 per 1000 catheter days [14]. Although nurses insert and care for many Foley catheters, little is known about nurses' attitudes and knowledge regarding indications for catheter use or methods to prevent catheter related complications [15].

The use of gloves, hand washing, a high level of nursing knowledge and skill is required to achieve effective and safe management. Patients with indwelling urethral catheter should also be given urine drainage assistance whenever possible, which options include intermittent supra pubic and intra-urethral methods [12].

In our setting there is lack of urinary catheter care particularly after insertion of the catheter. No care and responsibility given until the patient complains any symptomatic issue and this attributes the patient to various complications of catheterization. Hence, to promote effective catheter care and to maintain high quality care in health delivery system nurses need to have adequate knowledge and skillful practices. Urinary catheter acquired infections, such as UTI and other complications may result due to poor practice in catheter care that may or may not correlate with the knowledge of the nurses. Thus it is crucial to conduct a study to assess knowledge and practice regarding urinary catheter care.

1.3. Objectives

1.3.1. General Objective

To assess the level of knowledge and practice of staff nurses regarding urinary catheter care.

1.3.2. Specific Objectives

1. To assess the level of knowledge of staff nurses regarding urinary catheter care.
2. To assess the level of practice of staff nurses regarding urinary catheter care.
3. To associate the level of knowledge and practice regarding urinary catheter care among the staff nurses.
4. To associate the level of knowledge and practice regarding urinary catheter care with their selected demographic variables.

2. Methodology

2.1. Study Design and Study Area

A cross sectional descriptive analytical study was conducted among 100 staff nurses in selected hospitals of Asmara, Eritrea. The study was conducted in ONRH (medical, surgical, ICU wards), Sembel Hospital (medical and surgical wards), and Halibet National Referral Hospital (medical and surgical wards) in Asmara, Eritrea.

2.2. Study Population

The participants of the study were staff nurses who attended catheter care in the three above mentioned hospitals, particularly at the selected wards.

2.3. Sampling Method and Sample Size

Wards that were mainly responsible for catheter care in the three hospitals were purposively selected. So purposive sampling method was used to select the study site. All staff nurses in the selected wards were included in this study (Total enumerative method was used). The sample size for the study was thus dependent on the number of staff nurses working in those selected wards which were 100 staff nurses.

2.4. Pilot Study

A Pilot study was conducted for the purpose of distinguishing the inadequacy, appropriateness and accuracy of the questionnaire in Hazhaz Hospital on 10 staff nurses, who regularly attend catheter insertion and catheter care. It was handled one week before the beginning of the research, and its sample size was calculated as one tenth of the sample size of the study population.

2.5. Reliability and Validity

The reliability of the questionnaire was checked using test retest method. Reliability test was carried out to check the degree of reliability and consistency of the factors included in the questionnaire using "Cronbach's alpha" procedure in SPSS. The result showed that the questionnaire used is highly reliable (Cronbach's $\alpha=0.77$); which is in the range considered to be good [0.65, 0.8] (Kline, 1999).

The questionnaire was reviewed by three professional experts and one statistician. It was thoroughly revised for its relevance and quality. The validity of the tool was established as it was adopted from previous studies done. The tool was modified and finalized according to the suggestion and recommendations of advisors and the research team.

2.6. Data Collection Tools and Techniques

1. Self-administered questionnaire was designed to collect demographic variable and assess the existing knowledge of nurses in relation to the key components of urinary catheter insertion and catheter care. We developed the questionnaire in reference to related original research articles and Current national guidelines for preventing CAUTI. The nurses in the selected wards filled the questionnaire and submitted in time.
2. Nurses' observational checklist was also designed to assess practices of nurses in the care for patients with urinary catheter. A checklist from the MOH was used to asses' practice of nurses during catheter care.

2.7. Data Analysis

After data collection, each questionnaire was checked for completeness and code was given before data entry. Data was entered and validation was done in software named SPSS version 22 where frequencies and statistical analysis were run. Hypothesis was tested using Fisher's test method. Different frequency tables were used to describe the study variables.

Descriptive and analytical statistics were used to interpret the data. Frequency distributions and graphs were used to provide an overall and coherent presentation and description of data. Chi square measures were applied to examine the variables of interest.

Measuring Variables
Knowledge

For every correct option in knowledge a score of one is assigned and every wrong option was scored zero. Interpretation of scores was based on the number of issues with correct knowledge, staff nurses were classified into two levels of knowledge "Poor" and "Good". Staff nurses were considered to have poor level of knowledge if they responded below the average of the number (8) and were considered to have good level of knowledge if they responded correctly above the average.

Practice

The performance score of individual respondent was based on the observations to their actual practices to 35 performance related skills that they are expected to implement during Urinary Catheter insertion. The scores of the individual respondent on practice of the skills were evaluated on a five-level scale coded as "1" if the skill was implemented very poorly, "2" if implemented poorly, "3" if implemented fairly, "4" if implemented good, and "5" if implemented very good. Interpretation of scores was based on the percentage performance scores, respondents were classified into two groups: those who perform "poor" and those who perform "good". Respondents whose percentage performance score was below the average (59.4%) were considered to have "poor" performance level and those whose percentage score were above the average were considered to have good level of performance.

2.8. Variables

Dependent variables: level of practice, level of knowledge
Independent variables: demographic variables (age, sex, educational qualification, professional Years of experience, place of study).

2.9. Ethical Consideration

A formal letter was written from school of Nursing, ACHS,

and then taken to the ONRH, Halibet National Referral Hospital and Sembel Hospital medical officers. According to the research protocol set by the National Board for Higher Education of Eritrea, the proposal was approved at the Asmara College of Health Sciences Scientific and research ethical committee. Each study participant was well enlightened concerning the goal, process and predicted benefit of the research. Before the interview commenced, Verbal and written consent was obtained from the study participants and confidentiality was assured by excluding their names and their right to refuse or with draw at any point from the study was respected. Data was only available to researchers, and was stored safely otherwise.

3. Result

3.1. Results of Demographic Characteristics

Table 1. *Demographic characteristic of the staff nurses.*

Background characteristics		%
Age	<25	31.0
	25-29	42.0
	30 and Above	27.0
Sex	Male	31.0
	Female	69.0
	Total	100.0
Educational Qualification	Health Assistance	31.0
	Diploma	61.0
	Degree	8.0
Place of study	ACHS	66.0
	Mendefera Nursing school	10.0
	Asmara Associate Nurse	14.0
	Barentu Nursing school	4.0
	Ghinda Nursing school	6.0
Average number of catheter insertion per day	1.00	37.0
	2.00	42.0
	3.00	19.0
	4.00	1.0
	5.00	1.0
Professional years of experience	Less than 5 years	61
	Five and above	39
	Total	100.0

A total of 100 nurses who fulfilled the inclusion criteria were participated in the study. Table 1 shows that majority of the staff nurses were between the age range of 25-29 years, and that accounts 42%, and the remaining 31%, 27% were below 25 and above 30 years respectively. In terms of their sex distribution 69% of the staff nurses were female. According to educational qualification most of the nurses (61%) were having diploma, 31% having certificate and 8% having degree. Majority of the staff nurses (66%) studied in ACHS, and the remaining 10% Mendefera, 14% Asmara associate nursing school, 4% Barentu, and 6% Ghinda Nursing School. Most of the staff nurses (42%) inserted an average of 2 catheters per day. Most of the staff nurses (61%) were having below 5 years of professional experience.
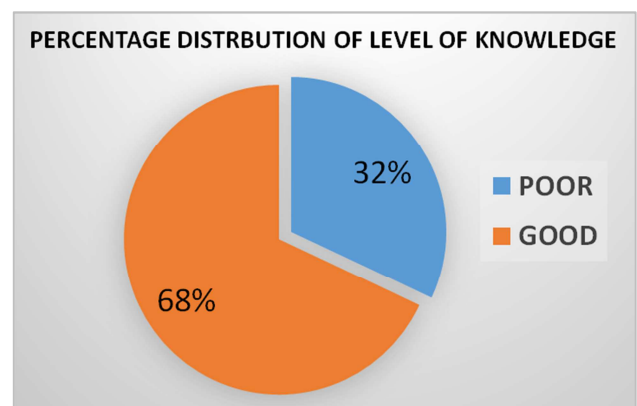
3.2. Result of Knowledge

Figure 1. *Percentage distribution of level of knowledge.*

This Figure illustrates majority of the staff nurses had good level of knowledge.

3.3. Results of Practice

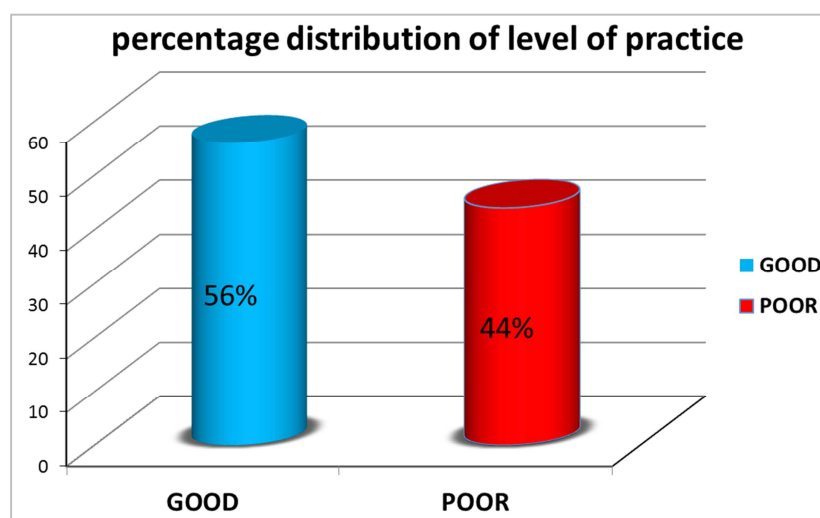This figure proved more than half of the staff nurses had good level of practice.

Figure 2. *Percentage distribution of level of practice.*

Table 2. Level of knowledge with demographic characteristics of the staff nurses.

Demographic Characteristics		Level of knowledge				P VALUE
		Poor		Good		
		Frequency	%	Frequency	%	
AGE	<25	11	35.5	20	64.5	0.390
	25- and above	21	30.4	48	69.6	
Sex	Male	10	32.3	21	67.7	0.573
	Female	22	31.9	47	68.1	
Educational Qualification	Health Assistance	13	41.9	18	58.1	0.117
	Diploma/Degree	19	27.5	50	72.5	
Professional Years of Experience	below 5 years	19	31.1	42	68.9	0.494
	5 and above	13	33.3	26	66.7	
Place of Study	ACHS	19	28.8	47	71.2	0.231
	Other places	13	38.2	21	61.8	
Average number of Catheter insertion per day	1	10	27.0	27	73.0	0.278
	2 and Above	22	34.9	41	65.1	

3.4. Association of Level of Knowledge with Demographic Variables

Table 2 shows the association of the staff nurses' knowledge with their demographic characteristics. Hence 64.5% of the nurses with the age distribution below 25 years owned good level of knowledge, and 69.6% of the nurses with the age range 25 and above possessed good level of knowledge. The level of knowledge in females was found to be higher compared to males. Diploma/ Degree nurses owns higher level of knowledge than those Health Assistant nurses. When we compare in terms of years of experience, newly graduated staff nurses (below 5 years of experience) owned slightly higher level of knowledge than those who had 5 and above years of experience. According to the place where the staff nurses studied, 71.2% of the staff nurses who studied at ACHS have good level of knowledge, likewise 61.8% of the staff nurses who studied at places like Mendefera, Ghinda, Barentu and Asmara associate nursing held good level of knowledge. The association between average number of catheter insertion and level of knowledge showed that, staff nurses who inserted average 1 catheter per day owned more level of knowledge than those who inserted more than 2 catheters per day (p=0.278). However there is no statistically significant difference between levels of knowledge with their demographic characteristics.

Table 3. Level of Practice with Demographic Characteristics of the staff nurses.

Demographic Characteristics		Level of Practice				P VALUE
		Poor		Good		
		Frequency	%	Frequency	%	
AGE	<25	16	51.6	15	48.4	0.209
	25- and above	28	40.6	41	59.4	
Sex	Male	12	38.7	19	61.3	0.311
	Female	32	46.4	37	53.6	
Educational Qualification	Health Assistance	14	45.2	17	54.8	0.523
	Diploma/Degree	30	43.5	39	56.5	
Professional Years of Experience	below 5 years	29	47.5	32	52.5	0.424
	5 and above	15	38.5	24	61.5	
Place of Study	ACHS	30	45.5	36	54.5	0.247
	Other place	14	41.2	20	58.8	
Average number of Catheter insertion per day	1	17	45.9	20	54.1	0.463
	2 and Above	27	42.9	36	57.1	

3.5. Association of Level of Practice with Demographic Characteristics
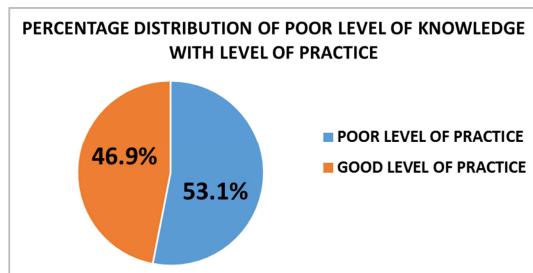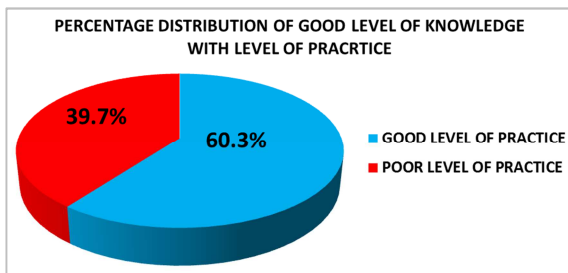
Considering to their age, more than half of the staff nurses with the age of below 25 years performed poor, on the contrary more than half of the nurses with the age of 25 & above years performed good level of practice. The level of practice of males found to be higher than Females. Based on educational qualification nurses who have diploma/degree qualifications practiced slightly higher than health assistant. In terms of years of experience, nurses with 5 & above years of experience performed moderately better than nurses with below 5 years of professional. According to the place where the staff nurses studied, the level of practice of the staff nurses who studied in ACHS is comparatively lower than those studied in other places. The association between average number of catheter insertion per day and the level of practice showed that staff nurses who inserted average more than 2 catheter per day had performed better than the nurses who only insert 1 catheter per day. Therefore Since the p value is greater than 0.05, hence there is no significant association between level of practice and demographic characteristics.

Table 4. Association of level of knowledge with level practice.

Level Knowledge	Level of Practice				P Value
	Poor		Good		
	Count	Percentage	Count	Percentage	
Poor	17	53.1	15	46.9	**0.148**
Good	27	39.7	41	60.3	

3.6. Association of Level of Knowledge with Level of Practice

Figure 3. Percentage distribution of poor level of knowledge with level of practice.

Figure 4. Percentage distribution of good level of knowledge with level of practice.

Both table 4 and figures 3-4 illustrate the association of level of knowledge with level of practices of the nurses regarding urinary catheter care. Hence from nurses who have poor level knowledge more than half (53.1%) of them performed poor, and 46.9% of them performed Good. On the other hand, out-of the nurses who have Good level of knowledge 60.3% of the nurses performed Good, whereas 39.7% of them performed Poor. Using Fisher's exact test method the hypothesis was tested and the P-value was 0.148 at 95% confidence interval which is greater than 0.05, thus we can conclude in this study, significantly there was no association between level of knowledge with level of practice.

4. Discussion

4.1. Discussion About Demographic Characteristics of the Staff Nurses

In this study majority (69%) of the participants were 25 years and above, and the remaining (31%) were less than 25 years old. Whereas on a similar study which was conducted in India at selected hospitals of Nellore, majority of the participants 16 (53.3%) were ranged between 20-21 years

and the remaining 14 (46.7%) were above 21 years [4]. Another related study in selected teaching hospital Sri Lanka showed that most of the participants (60.7%) were less or equal to 30 years of age out of the total 122 participants [16].

In this study majority of the respondents (69%) were female out of the total 100 sample size. This finding agree with the study conducted at Nellore University who found 60% of the respondents were female out of the 30 sample size [4]. On the other hand the studies conducted at selected teaching hospital Sri Lanka and at Ain Shams University in Egypt were only having female respondents (122 and 40 respectively) [16, 18]. In contrast to this, a study conducted in a private hospital in Iloilo city, Philippines reported more than half (56.7%) of the respondents were males [20, 21].

According to Educational qualification, majority of the nurses (61%) were having diploma in nursing and the remaining 31% and 8% were having health assistant and bachelor degree levels of qualification in nursing respectively. Our study is consistent with the study conducted in selected teaching hospital Sri Lanka which announced 82.8% of the study population were having diploma at their highest educational qualification [16]. In spite of that the study conducted in Nellore university revealed that 14 (46.7%) of the respondents were having degree in nursing [4]. Our result also showed disagreement with other results reported by Opina and Oducado (2014) who found that more than three-fourths (76.7%) of the respondents had bachelor's degree [20, 21].

In this study most of the study participants (61%) were having less than 5 years of experience. This can be similar with the demographic characteristics of studies directed at public hospitals at Amran city, Yemen and selected teaching hospital Sri Lanka in which majority of the participants 81.7% with 1-5 years of experience and (55.7%) with three months to 5 years of work experience, respectively [16, 20]. Another related study was conducted in India (Nellore) which revealed 16 (53.3%) were having less than one year of experience and the remaining participants were having a range of 1-3 years of experience [4].

In this study majority of the nurses report that they insert 1 up to 2 catheter per day in the last 3 month. Comparably on a study engaged in Braidee Adams and Katreena Merrill College of nursing 80% of the respondents reported that they were inserting 0-1 catheter per day in the last month [8].

4.2. Discussion About Level of Knowledge with Demographic Characteristics Regarding Catheter Care Among Staff Nurses

In this study older respondents (25 years and above) have

slightly higher level of knowledge than those aged below 25 years (69.6% and 64.5%, respectively). There is no notable variation in the level of knowledge between male and female respondents. The proportion of nurses with good level of knowledge is higher among those with degree or diploma level of education (72.5%) compared to those who are health assistances (58.1%) (With P-value 0.117). This could be as a result of the differences of the levels and advancement of the lectures of the courses and trainings given at university. Level of knowledge by place of study revealed that respondents studied at Asmara College of Health Science have higher level of knowledge than those who studied in other learning institutions (71.2% and 61.8%, respectively).

In this study there is no significant association between demographic variables and level of knowledge. this is much consistent with the study done by Prassana and Radihika (2015) which revealed there is no association between the level of knowledge of staff nurses regarding urinary catheter care with some selected demographic characteristics like age, gender, professional experience [4, 23].

This study disagreed with Rashmi and Dhakal (2021), who revealed that all socio-demographic variables were statistically significant with the level of knowledge about CAUTI prevention [20, 22]. Besides of this a study conducted at public hospitals at Amran city, Yemen concluded there is significant association between knowledge level regarding preventive of CAUTI, and demographic characteristics of nurses regarding sex at (P-value=0.042), but no statistically significant association between overall knowledge and other demographic characteristics of nurses regarding age, marital status, educational level, years of experience and training courses because (P-value ≥ 0.05) [20]. However the study conducted in India Nellore proved that there is significant association between the level of knowledge of staff nurses regarding catheter care with their selected socio demographic variables like Educational qualification, Source of information and Attended CNE Program [4]. Additionally a study conducted at King Abdulaziz university hospital concluded there was a significant relation between nurses' knowledge and age [17].

4.3. Discussion about Level of Practice with Demographic Characteristics Regarding Catheter Care Among Staff Nurses

In this study accordingly, 56% [95%C.I: 45.8%, 65.7%] of the respondents were found to have good level of performance. Percentage with good level of performance is moderately higher among respondents aged 25 years and above compared to the young (below 25 years) respondents (59.4% and 48.4%, respectively). Majority (62%) of the respondents who worked in the profession for more than 5 years have good level of performance which is higher compared to the professionals with below 5 years' experience. The reason of finding higher level of good performance at the respondents with older age and with more years of experience might be due to cumulative skills and experiences

gained over time. This is much consistent with Madeo and Roodhouse, (2009) clarified that nurses who are qualified for at least 4 years, would be expected to have at least a basic understanding of best practice for the management of an indwelling urinary catheter [18, 19].

There is no notable variation in level of practice by educational qualification, this might be due to the same area of clinical exposure. Hence we conclude in this study there is no significant association between demographic variables and level of practice. Similarly the study conducted on knowledge, attitude and practice (KAP), in selected hospitals in Rwanda concluded there is no impact of socio demographic characteristics (age, sex, level of education and years of experience) on nurses' KAP towards catheter indication and CAUTI prevention as the p values for all the results are above 0.05 [23].

4.4. Discussion About Level of Knowledge with Level of Practice Regarding Catheter Care Among Staff Nurse

Based on the result scored correct from the knowledge questionnaire, staff nurses were classified into two levels of knowledge "Poor" and "Good". Respondents were considered to have poor level of knowledge if they responded correctly below the average of the number of questions (8) and were considered to have good level of knowledge if they replied correctly greater or equal to the average (8). Accordingly, nearly seven in ten (68%) [95%C.I: 58.2%, 76.4%] of the surveyed staff nurses have good level of knowledge on Urinary Catheter related concepts. Our finding has similarity with the finding of Narayan college of nursing in 2015 related to Level of knowledge regarding catheter care among staff nurses, which proved majority of the staff nurses 14 (46.7%) had adequate knowledge, 10 (33.3%) had moderately adequate knowledge and only 6 (20%) had inadequate knowledge [4].

The current result is contrary with both findings of the researches conducted at King Abdulaziz university hospital which revealed more than half of the nurses (62.77%) had a low level of knowledge and 83.94% of the nurses had a poor level of practices [17], and at selected teaching hospital Sri Lanka in which majority of the participant (82%) had an unsatisfactory level of knowledge regarding indwelling urinary catheter care (IUC). However more than three quarters (78.7%) of the participants performed satisfactory level of practices regarding IUC care [16]. Moreover our study also disagree with the finding of the research done at major hospitals at Amran city, Yemen which declared more than two-third (72%) of the nurses were had fair knowledge and only 18.3% had good level of knowledge toward prevention of CAUTI [20].

Based on the percentage performance scores, respondents were classified into two groups: those who perform "poor" and those who perform "good". Respondents whose percentage performance score was below the average (59.4%) were considered to have "poor" performance level and those whose percentage score were above the average were considered to have good level of performance.

Level of knowledge of the respondents was shown to enhance the level of performance. 60.3% of the staff nurses with good level of knowledge performs good compared to 46.9% of those with poor level of knowledge.

In this study there is no significant association between level of knowledge and practice. Similarly the research conducted at King Abdulaziz university hospital concluded there was no significant relation between nurses' knowledge and practice toward CAUTI prevention [17]. In contrast to the above conclusions a study conducted in Ain Shams University in Egypt reveals that there was a highly significant difference between nurses' knowledge and practice. This is due to implementing one month interactive workshop that the majority of nurses (80.0%) had satisfactory level of knowledge and 92.5% of the nurses had satisfactory level of practice post workshop [18].

In this study we found a gap in the level of knowledge such as in the correct positioning of patients for inserting catheter, appropriate size of urinary catheter, the appropriate time to empty urinary bag, in complications of catheterization, indications and contraindications for catheterization, leakage of catheter.

Along with that there was also weakness in the level of performance such as in describing the objectives of catheterization, assessing client status, placing kidney basin on the foot of the bed, in cleaning perineum area during catheter insertion. After catheter insertion there was poor performance in the care of catheterized patients, this includes lack of proper assessment and care of perineum area, in assessing for episodes of bowel incontinence or client discomfort, explaining procedure to client, assessing urethral meatus and surrounding tissue, cleansing the length of catheter, in repositioning the client and disposing contaminated supplies. Findings of this study is consistent with the study conducted in Pune, India in 2015, there was gap in the level of preventive practices which includes the necessity of catheterization, discontinuation of catheterization if not indicated, maintenance of close drainage system, maintenance of aseptic technique while insertion of catheter, care of the catheter, maintenance of urine bag below the waist level and strict adherence to five moments of hand hygiene. Based on their finding they concluded that the preventive practices regarding urinary catheter must be strictly monitored by the infection control nurse in the daily rounds. The hand hygiene compliances were noted by using WHO form of an individual [14].

5. Conclusion

More than two-thirds of the research participants in this study have good level of knowledge and more than half of them accomplished good level of practice regarding urinary catheterization. And this indicating that the level of knowledge and practice in this research was ascertained to be low. Level of knowledge of the staff nurses was shown to enhance level of practice. This study revealed that staff nurses with good level of knowledge practice good compared

to those with poor level of knowledge. Despite the general expectation that the demographic variables to affect the knowledge and practice of the staff nurses, this study concludes there was no significance among the demographic characteristics with level of knowledge and practice.

6. Recommendation

The indication of this much gaps in knowledge and practice of catheter care proved that nurses who take care of catheters should be given detailed and comprehensive periodic in-service training and supervision concerning all catheter care practices and potential complications of urinary catheterization. Preventive practices regarding urinary catheter must be strictly monitored by the infection control nurse in the daily rounds, and Special care after insertion of catheter need to be emphasized. Quality performance measures concerning urinary catheter should be checked regularly. Similar study to be conducted in nationwide.

7. Limitation of the Study

There was no previous study conducted on the same topic in our country. Hence we were not able to get prior literature review and theoretical foundations of the same research topic from the same area of study as a base reference for our study and this resulted to incapability to identify literature gaps and to compare research design, result & conclusion and to report the need for further development in the area of the study. However we overcame the limitation by finding similar studies conducted at neighborhood regions like Ethiopia, Sudan and other areas of study.

Abbreviations

ACHS: Asmara College of Health Sciences; ONRH: Orotta National Referral Hospital; WHO: World Health Organization; UTI: Urinary Tract Infection; NHSN: National Healthcare Safety network; CAUTI: Catheter Associated Urinary Tract Infection; ICU: intensive care unit; HICC: Hospital Infection Control Committee; CNE: Continuous Nursing Education; SPSS: Statistical Package for the Social Sciences.

Funding

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

All authors participated in all phases of the study including topic selection, design, data collection, data analysis,

interpretation and presentation. Teame, Salem & Frewengel contribute to write this manuscript. All authors have read and approved the final manuscript.

Availability of Data and Materials

The complete data set supporting the conclusions of this article is available from the corresponding author and can be accessed up on reasonable request.

Consent for Publication

This manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the final manuscript and agreed for its publication.

Acknowledgements

References

[1] Abdalla Entesar Mohamed ABD Alrhman. (2016). Nurses knowledge and practice regarding nursing care of patients with urinary catheterization in Gezira hospital for renal diseases and surgery, Gezira state, Sudan. DSpace Repository. URI: http://repo.uofg.edu.sd/handle/123456789/840

[2] Tessema B. et al. (2007). Predominant isolates of urinary tract pathogens and their antimicrobial susceptibility patterns in Gondar University teaching hospital, northwest Ethiopia. Ethiopian Med journal, 45 (1), 61-67. Available from: https://europepmc.org/article/med/17642159

[3] J Sedor 1, S G Mulholland. (1999). Hospital-acquired urinary tract infections associated with the indwelling catheter. Urol Clin North Am. 26 (4): 821–8. DOI: 10.1016/s0094-0143(05)70222-6.

[4] K Prasanna, Radihika M. (2015). Knowledge regarding Catheter care among staff nurses. Int J Appl Res. 1 (18), 182-186.

[5] Lindsay E Nicolle. (2014). Catheter associated urinary tract infections. Antimicrobial resistant & infection control. 3 (23). Doi: 10.1186/2047-2994-3-23.

[6] Manisha Jain et al. (2015). Knowledge and attitude of Doctors and Nurses regarding indication for catheterization and prevention of catheter-associated urinary tract infection in a tertiary care hospital. Indian J Crit Care Med. 19 (2), 76-81. Doi: 10.4103/0972-5229.151014.

[7] Roger C L Feneley, Calvin M Kunin, David J Stickler. (2011). an indwelling urinary catheter for the 21st century. BJU International. 109 (12), 1746-9. DOI: 10.1111/j.1464-410X.2011.10753.x.

[8] Braidee Adams and Katreena Merrill, College of Nursing. (2016). Nurses Knowledge and Attitudes of Urinary Catheter care. Journal of Undergraduate Research. Available from http://jur.byu.edu/?p=19930

[9] The Royal Children's hospital Melbourne- Clinical guidelines nursing. Indwelling urinary catheter-insertion and ongoing care. Available at https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Indwelling_urinary_catheter_insertion_and_ongoing_care/

[10] Andrew Fleming et al. (2000). Registered nurse management of urinary catheters in a rehabilitation and long term care hospital. International Journal of Nursing practice. 6 (5), 237-246. Doi: 10.1046/j.1440-172x.2000.00216.x.

[11] Laura Reilly et al. (2006). Reducing Foley catheter device days in an intensive care unit: using the evidence to change practice. AACN Adv Crit Care. 17 (3), 272-83. DOI: 10.4037/15597768-2006-3006.

[12] Chukwuocha, U. M., Dozie, U. W, Nwawume, I. C. (2019). Bacteriuria in patients with indwelling urethral catheter in owerri municipality, Nigeria. African Journal of microbiology research. 5 (9), 990-995. Doi: 10.5897/AJMR10.674.

[13] Flávia Falci ErcoleI; Tamara Gonçalves Rezende MacieiraII et al. (2013). Integrative Review: evidences on the practice of intermittent/indwelling urinary catheterization. Rev Latino-Am. Enfermagem. 21 (1). Doi: 10.1590/S0104-11692013000100023.

[14] Kazi MM, et al. (2015). CAUTI and Antibiotic sensitivity pattern from confirmed cases of CAUTI in a tertiary care hospital: A prospective study. Clinical Microbiology, 4: 2. Doi: 10.4172/2327-5073.1000193.

[15] Drekonja MD, Kuskowski MA, Johnson JR. Am J. (2010). Internet survey of Foley catheter practices and Knowledge among Minnesota nurses. American journal of Infection control, 38 (1), 31-37. Doi: 10.1016/j.ajic.2009.05.005.

[16] Priyantha Rohan, Thamara Amarasekara. (2019). Knowledge and Practices among female nurses on insertion and care of Indwelling Urinary catheter to female patients in a selected teaching hospital in Sri Lanka. OUSL Journal. 14 (01), 103-120. DOI: 10.4038/ouslj.v14i1.7461.

[17] Algarni S. S. et al. (2019). Nurses' knowledge and practices toward prevention of catheter-associated urinary tract infection at king Abdulaziz University hospital. Journal of Health, Medicine and Nursing. 4 (1), 50-73. Retrieved from https://www.iprjb.org/journals/index.php/JHMN/article/view/825

[18] Hanan Sobeih, Manal Hussein Nasr. (2015). indwelling urinary catheter management: Effect of an interactive workshop on nurses' practice and perception. New York science Journal. 8 (5), 117-126. (ISSN: 1554-0200) Available at http://www.sciencepub.net/newyork. 18.

[19] Madeo M, Roodhouse A. J. (2009). Reducing the risks associated with urinary catheter standards. Nurs Stand. 23 (29), 47-55 Available at: http://www.ncbi.nlm.nih.gov/pubmed/19385401.

[20] Abdulnasser A. Haza'a*, Abdulfatah Al-Jaradi, Morzoq Ali Odhah. (2021). Knowledge of Nurses toward prevention for Catheter-Associated Urinary Tract Infection in public Hospitals at Amran city, Yemen. Open Journal of Nursing. 11 (11). DOI: 10.4236/ojn.2021.1111076.

[21] Opina, M. L. F., Oducado, R. M. F. (2014). Infection control in the use of urethral catheters: Knowledge and Practices of Nurses in a private hospital in Iloilo City. Asia pacific Journal of Education, Arts and Sciences. 1 (5), 93-100. Available at: https://www.researchgate.net/publication/271585612_Infection_Control_in_the_Use_of_Urethral_Catheters_Knowledge_and_Practices_of_Nurses_in_a_Private_Hospital_in_Iloilo_City

[22] Rashmi, K. C, Dhakal, B. (2021). Knowledge, Attitude and Practice on prevention of Catheter-Associated UTI among Nurses of a Tertiary Care Hospital. Journal of College of Medical Sciences-Nepal. 17 (1), 61-68. DOI: https://doi.org/10.3126/jcmsn.v17i1.28543

[23] Mukakamanzi, Jacqueline. (2017). Digital. University of Rwanda, digital repository home. URL: http://hdl.handle.net/123456789/324