Knowledge and practice of nurses towards preventing Catheter-related Urinary Tract Infection and its associated factors at the governmental referral hospitals of West Oromia, Ethiopia, 2022. A facility-based cross-sectional study design

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Abstract

Introduction: Catheter-Associated Urinary Tract Infections have been highly associated with patient discomfort, increased hospitalization and healthcare costs, morbidity and mortality. Lack of knowledge and practice among nurses regarding basic infection control protocols could lead to hospital-acquired infections. Therefore, this study aimed to assess knowledge, practice and associated factors of Catheter-Associated Urinary Tract Infections prevention among nurses working at referral hospitals in the West Oromia region, Ethiopia, 2022.

Methods: A facility-based cross-sectional study was conducted among 423 nurses at five referral hospitals of the West Oromia region from May1-20, 2022. A simple random sampling technique was used to select nurses. A pre-tested and structured self-administered questionnaire was used to collect the data, and then coded and entered into EPI- Data version 4.6; cleaned and analyzed using Stata version 16.0. All variables with P-value < 0.25 in the binary logistic regression analyses were included in the multivariable regression analysis. The degree of the association was interpreted by using the adjusted odds ratio with 95% confidence intervals, and the significance level was declared at P-value < 0.05. The Hosmer–Lemeshow test was checked for the fitness of the model.

Results: Among 423 nurses, 411(97.2%) nurses participated. This study found that the knowledge and practice of nurses toward preventing Catheter-Associated Urinary Tract Infections was 57.9% with 95% CI (53.1, 62.6) and 54.5% with 95% CI (49.6, 59.3) respectively. Good knowledge was significantly associated with working experience [AOR = 2.8, 95% CI (1.5, 5)], training [AOR = 2.1, 95% CI (1.04, 4.2)] and had guideline [AOR = 2.6, 95% CI (1.3, 5.4)]. Good practice was significantly associated with the work experience [AOR = 2, 95%CI (1.05, 4.05)], guideline [AOR = 2.3, 95% CI (1.02, 5.2)], training [AOR = 2.3, 95% CI (1.06, 5.1)] and good knowledge [AOR = 8.7, 95% CI (5.1, 14.8)].

Conclusion: This study showed that more than half of nurses had good knowledge and good practice regarding preventing catheter-associated urinary tract infections, and were significantly associated with work experience, training and guideline.

Background

Catheter-Associated Urinary Tract Infections occur due to the insertion of the catheter into the urinary tract as a result of nurses not adhering to the bundles of infection prevention(1). Prolonged catheterization and break aseptic technique are risk factors for developing a Catheter-Associated Urinary Tract Infection(2). Catheter-Associated Urinary Tract Infections have increased the mortality rate, length of stay and susceptible patients to Catheter-Associated Urinary Tract Infections due to risk factors; women (sex), aged, diabetics (3)and neurological disease(4).

The incidence rate of Catheter-Associated Urinary Tract Infections in the USA (5) was 35.2, in China (6) 2.3, in Brazil (7) 4.8 and Ethiopia (8) 60.2 cases per 1000 catheter-days respectively. Catheter-Associated

Urinary Tract Infections have increased the mortality rate and length of hospital stay by 19.2 days and mortality by 11% (9).

In the United State of America, 100,000 people die annually (10) Catheter-Associated Urinary Tract Infections are the most common healthcare-associated infection and increase medical costs by $340 million up to $1.7 billion each year (11) and patients' discomfort and more than 13,000 hospital deaths per year according to Center for disease control and prevention report (12).

For the above problem, the appropriate nurses' knowledge and practice can prevent Catheter-Associated Urinary Tract Infections and complications (13).

It is expected for nurses to have appropriate knowledge and practice toward preventing Catheter-Associated Urinary Tract infections (14). Some studies recommended that training (educational intervention) is important to improve nurses' knowledge and practice regarding preventing Catheter-Associated Urinary Tract Infections to narrow the knowledge-practice gap (15, 16).

Nurses who had good knowledge and practice effectively following aseptic methods can prevent Catheter-Associated Urinary Tract Infections by 69% (7). A study conducted in the United States of America, 92% of Intensive Care Unit nurses implemented the guideline regarding preventing Catheter-Associated Urinary Tract Infections in practice, and 81% implied they implemented the guideline on 75% of their patients (17).

Nurses should avoid unnecessary catheterization and early removal (18), closed system and adhering to guidelines are the strategic technique (19) and through Evidence Based Practice nurses can prevent Catheter-Associated Urinary Tract Infections and other Hospital Acquired Infections (20) recommended by the Centers for Disease Control and Agency for Healthcare Research and Quality respectively.

Despite the high incidence rate of Catheter-Associated Urinary Tract Infections in Ethiopia, data regarding knowledge and practice and associated factors of nurses towards preventing Catheter-Associated Urinary Tract Infections are little known in Ethiopia, particularly in the Oromia region. There is no study conducted about assessing the knowledge and practice and associated factors of nurses towards preventing Catheter-Associated Urinary Tract Infections among nurses staff in the study area.

Methods

This study aimed to assess the knowledge and practice of nurses towards preventing Catheter-related Urinary Tract Infection and its associated factors at governmental referral hospitals of West Oromia Region, Ethiopia.

Study Design

A facility-based cross-sectional study design was conducted from May1-20, 2022.

The study was conducted in five at the governmental referral hospitals of the West Oromia region namely Ambo University referral hospital (AURH), Wollega University Referral Hospital (WURH) and Nekemte Referral Hospital (NRH)), Jimma University Referral hospital (JURH) and Mettu Karl referral hospital (MKRH). These hospitals are serving about 2.5 million (21), 3 million (22), 11 million people (23) and 2.5 million people surroundings (24) respectively. AURH is located at 114 km, WURH and NRH 331km, JURH 354km and MKRH 600km respectively from Addis Ababa to the west, Western Oromia, Ethiopia. Currently, a total of 1203 nurses were working in the West Oromia region at WURH 170, AURH 230, NRH 191, JURH 500 and MKRH 112 health profession nurses are providing all necessary health services with other health professionals for all surrounding people and the study focus on Nurses.

Source And Study Population

Source population

All nurses who are working in the referral hospitals of the West Oromia region, Ethiopia.

Study Population

Nurses who are working in the referral hospitals of the West Oromia region during the study period

Inclusion Criteria

All nurses on duty on the day of data collection in specified wards or units were included.

Sample Size Determination

The sample size for the first objective was calculated by using single population proportion formula with the assumptions of 50% practice level, 95% confidence level (α), and a (d) 0.05 margin of error (25).

$$n = (Z\alpha/\ )\ (p)\,(1-p)/d^{2}.$$

Where: - n = estimated sample size, z = Confidence level (alpha), p = prevalence, d = margin of error.

$$\underline{n = (1.96)\,2 * 0.50\,(1-0.50)} = 384$$
$$(0.05)^{2}$$

By considering a nonresponse rate of 10%, the final sample size was 423

For the second objective, the sample size was calculated by using the double population proportion formula and calculated by Epi Info version 7 taking two significantly associated factors from the previous

study.

Sampling Technique And Procedure

First, the number and lists of all nurses working in each hospital of the West Oromia region were taken from the Human resource management. Then, the sample size was allocated proportionally to each of the five hospitals. To select the study participants, a computer-generated simple random sampling method was used from the list as the sampling frame

Dependent Variables

Knowledge and practice of nurses towards preventing CAUTIs.

Independent Variables

Socio-demographic related factors

such as age, gender, religion, marital status, level of education and monthly incomes/salary.

Work-related factors

work experience, ward/care unit.

Organizational-related factors

Training, Guidelines/protocol

Operational Definitions

Good knowledge nurses who scored above the mean value of 6.1 from knowledge questions were considered as having good knowledge, otherwise poor Knowledge (25).

Good practice; Nurses who scored above the mean value of 9.4 from practice questions were considered as having good practice, otherwise poor practice (25).

Data collection tool and Procedures

Data were collected by using a pre-tested self-administered questionnaire and a standard tool adapted from WHO (26) and CDC Guidelines (27), and a previous study from Rwanda (25). The questionnaire was first prepared in English and translated to Afaan Oromiffaa, and then back to English for the sake of consistency. The data were collected by five trained BSc nurses for duration of 20 days and supervised by three MSc professionals. The tool consisted of three sections: (i) nurses' demographic data and work-

related data (9 items); (ii) knowledge (10 items) and (iii) Practice (15 items) related to CAUTI prevention and Organizational related (5 items).

The second section had ten questions; three were catheter indications (66%), three were maintenance and care(54%), one removal time (58%), two were risk factors (58%), and one was complication(79%) of respondents correctly answered knowledge towards preventing CAUTIs (Table 3). Each correct answer was scored one and each wrong answer was scored zero. The total score for correct answers from all of the items was computed and classified as good knowledge/poor based on study participants' responding above/below mean score of knowledge questions regarding preventing CAUTI(28).

Table 1
Socio-demographic characteristics of nurses working at the referral
hospitals of West Oromia region, Ethiopia, 2022 (N = 411)

Socio-demographic variables	Frequency(n)	Percentage (%)
Age 20−29	149	36.3
30−39	226	54.9
>40	36	8.8
Sex Male	226	54.9
Female	185	45.1
Marital status Single	108	26.3
Married	303	73.7
Religion Orthodox	131	32
Muslim	49	12
protestants	219	53
Others	12	3
Level of education Diploma	15	3.7
Bachelor degree	371	90.3
Masters	25	6.1
Monthly salary <5000 ETB	15	6.7
5000−7000 ETB	167	40.6
7001−9000 ETB	194	47.2
>9000 ETB	35	8.5
Keyword: ETB Ethiopian Birr Others: Wakefatas, Adventists		

Table 2

Work-related characteristics of nurses working at the referral hospitals of West Oromia Region, Ethiopia, 2022(N = 411).

Work-related variables	Frequency (n)	Percentage (%)
Work experience < 5 years	112	27.3
5–10 years	232	56.5
>10 years	67	16.3
Attend training on preventing CAUTI Yes	231	56.2
No	180	43.8
Presence of prevention CAUTI guidelines Yes	265	64.5
No	146	35.5
Following prevention of CAUTI guidelines Yes	245	92.5
No	20	7.5
Working unit Surgical Ward	77	18.7
Medical Ward	80	19.5
EOPD	57	13.9
Orthopedic Ward	69	16.8
Gyn/Obs Ward	50	12.2
Pediatrics Ward	42	10.2
Others	36	8.8
Keywords; Others *Intensive Care Unit* *Recovery ward*. CAUTIs Catheter-Associated Urinary Tract Infections. EOPD Emergency Outpatient Department.		

Table 3
Knowledge status of the nurses towards preventing CAUTIs at referral hospitals of west Oromia region, Ethiopia, 2022(N = 411).

Questions	Yes		No	
	Freq.	%.	Freq	%
Can we take urine for culture when the patient can void voluntarily	291	70.80	120	29.20
Catheterization is indicated patients expected to receive a great number of infusions or diuretics during surgery	214	52.07	197	47.93
Using an aseptic technique with sterile equipment	304	73.97	107	26.03
Remove the catheter as soon as possible postoperatively, preferably within 24 hour	237	57.66	174	42.34
If a catheter is obstructed, Change the catheter immediately	235	57.18	176	42.82
Changing the urinary catheters or drainage bags only at routine and fixed intervals	233	56.69	178	43.31
Prolonged time of catheterization is a risk factor for CAUTIs	233	56.69	178	43.31
Elderly patients of more than 65 years and women at high risk for mortality and developing CAUTIs	247	60.10	164	39.90
We can do all during catheter insertion except none	198	48.18	213	51.82
Hypertension is not a complication of CAUTIs	325	79.08	86	20.92

The third section had fifteen questions about practice towards preventing CAUTIs; five before catheter insertion (66%) two during catheter insertion (60%) and eight after catheter insertion (62%) were correctly answered (Table 4).

Table 4

Practice status of the nurses towards preventing CAUTIs at referral hospitals of west Oromia region, Ethiopia, 2022(N = 411).

Questions	Yes		No	
	Freq.	%	Freq.	%
Did you aware of the use of catheter alternatives such as male urethral or male external condoms	165	40.2	246	59.8
Before and after the insertion, did you wash your hands	185	45.1	226	54.9
Did you utilize sterile tools such as sterile gloves, drapes, sponges, and solution	388	94.4	23	5.6
Did you use an antiseptic solution to clean the urethra before inserting the catheter	326	79.3	85	20.7
Did you insert the catheter using an aseptic technique	288	70.1	123	29.9
Did you use a single used lubricant bottle	181	44.1	230	55.9
After insertion, did you correctly secure the indwelling catheter	311	75.7	100	24.3
Did you avoid kinking the catheter and collection tube	194	47.2	217	52.8
Did you consistently maintain the collecting bag below the bladder	219	53.3	192	46.7
Did you use a distinct, clean urine collection jug for each patient and frequently empty the collecting bag	291	70.8	120	29.2
Have you consistently maintained the closed system	256	62.3	155	37.7
Did you keep the urine bag away from the ground	261	63.5	150	36.5
Did you keep the collecting container's drainage spigot (end of urine bag) away from contact	267	64.9	144	35.1
When removing the catheter, did you use any protection	282	68.6	129	31.4
Did you note the date the catheter was removed	258	62.8	153	37.2

Every correct answer was given one point and the wrong answer was given zero. The total score for correct answers from all of the items was computed and classified as good practice and poor practice based on study participants who respond above/below the mean score of practice questions towards preventing CAUTI.

Data Quality Assurance

One day of training was given to five BSc data collectors and three supervisors on the objectives of the study. A pre-test was conducted on nurses working at Adama referral Hospital using 5% (22) of the study population sample size before the actual data collection started. The pretest result was 0.77and 0.80 for the knowledge and practice questionnaire. Based on the results of the pre-test, minor clarification was

made (practice-related). Data collectors and the supervisors checked the completeness of each questionnaire before submission. Then data were entered using Epi. Data, by the principal investigator and the internal consistency, checked using Cranach's α value was .75.

Data Processing and Analysis

Data were checked manually for completeness and consistency of responses. Then it was entered into Epi. Data version 4.6, and exported into Stata version 16.0 software for further cleaning and analysis. Results were presented in the form of tables, figures and charts descriptively. The Chi-square assumption test was checked for categorical variables. All variables p-value < 0.25 in the bi-variable binary logistic regression model was entered into a multi-variable binary logistic regression analysis and those variables with a p-value less than 0.05 with a 95% confidence interval were considered as significantly associated with outcome variables. Model fitness was checked by the Hosmer-Lemeshow goodness of fit test (0.5080). Use the Adjusted Odds Ratio to determine the strength of association between the dependent and independent variables.

Results

Socio-demographic characteristics of respondents towards preventing CAUTIs

From a total of 423 participants, 411 nurses have participated in this study with a response rate of 97.2%. More details were illustrated in Table 1

Work-related characteristics of respondents towards preventing CAUTIs

Out of 411 nurse participants, 232 (56.4%) nurses had work experience of 5–10 years as illustrated below Table 2.

Knowledge status of the nurse respondents towards preventing CAUTIs

The following Table 3 shows the frequency and the percentage of respondents based on their correct scores to different knowledge questions.

More than half of 238 (58%) with 95% CI (53.1, 62.6) nurses had good knowledge regarding preventing CAUTIs with a mean score of 6.1 (SD ± .1) (Fig. 1).

Practice status of the nurse respondents towards preventing CAUTIs

The following table (Table 4) shows the frequency and the percentage of respondents based on their correct scores to different practice questions.

More than half of 224 (55%) with 95% CI (49.6, 59.3) nurses had a good practice regarding preventing CAUTIs with a mean score of 9.4 (SD ± .2) (Fig. 2).

Factors Associated with the Knowledge of Nurses towards preventing CAUTIs

In both bi-variable and multi-variable analysis, work experience, training and presence of guidelines were significant associations at the p-value < 0.05 with nurses' knowledge regarding preventing CAUTIs. Nurses who had 5–10 years of work experience were 2.8 times more likely to have good knowledge regarding preventing CAUTIs compared to nurses with < 5 years of work experience [AOR = 2.8, 95% CI (1.5, 5)]. Nurses who had > 10 years of work experience were 6.8 times more likely to have good knowledge regarding preventing CAUTIs compared to nurses with < 5 years of work experience [AOR = 6.8, 95% CI (2.7, 17.8)]. Nurses who took training were 2.1 times more likely to have good knowledge regarding preventing CAUTIs than those who had not taken [AOR = 2.1, 95% CI (1.04–4.2)]. Nurses who had guidelines were 2.6 times more likely to have good knowledge regarding preventing CAUTIs than nurses who had not [AOR = 2.6; 95%CI (1.3, 5.4)] more illustrated in (Table 5).

Table 5
Bi-variable and Multi-variable analysis on Factors Associated with the Knowledge of Nurses towards preventing CAUTIs among nurses at referral hospital of West Oromia region, Ethiopia, 2022(N = 411).

Variables	Knowledge (n = 411)		COR (CI = 95%)	AOR (CI = 95%)	P-value
	Good	Poor			
Age 20–29(ref)	85	64	1	1	
30–39	130	96	1(0.6–1.5)	0.6(0.4–1.2)	0.200
>40	23	13	1.3(2.8)	0.5(0.1–1.5)	0.251
Sex male (ref)	132	94	1	1	
Female	106	79	0.9(0.6–14)	0.8(0.5–1.3)	0.572
Marital status Single(ref)	66	42	1	1	
Married	172	131	0.8(0.5–1.3)	0.6(0.3–1.2)	0.224
Education Level Diploma(ref)	8	7	1	1	
Bachelor degree	213	158	1.1(0.4–3.3)	2.2(0.6–7.9)	0.200
Masters	17	8	1.8(0.4–6.9)	1.9(0.4–8.8)	0.412
Monthly salary < 5000 ETB(ref)	7	8	1		
5000–7000 ETB	89	78	1.3(0.4–3.7)	1.7(0.5–5.8)	0.365
7001–9000 ETB	120	74	1.8(0.6–5.3)	1.8(0.5–6.4)	0.324
>9000 ETB	22	13	1.9(0.5–6.5)	1.5(0.3–7.4)	0.591
Working unit SW (ref)	46	31	1		
Medical Ward	56	24	1.5(0.8-3)	1.7(0.8–3.7)	0.139
Emergency Out Pt Dep	24	33	0.4(0.2–0.9)	0.5(0.2–1.3)	0.205
Orthopedic Ward	40	29	0.9(0.4–1.70)	1.1(0.5–2.4)	0.764
Gyn/Obs Ward	24	26	0.6(0.3–1.2)	0.5(0.2–1.1)	0.124
Pediatrics Ward	26	16	1(0.5–2.3)	1.2(0.5–2.9)	0.658
Others	22	14	1(0.5–2.3)	0.8(0.3–2.1)	0.753
Work experience < 5 years(ref)	40	72	1		
5–10 years	149	83	3.2(2-5.17)	2.8(1.5-5)	0.000**
>10 years	49	18	4.8(2.5–9.5)	6.9(2.7–17.8)	0.000**

Variables	Knowledge (n = 411)		COR (CI = 95%)	AOR (CI = 95%)	P-value
Attend training Yes	171	60	4.8(3.1−7.3)	2.1(1.04−4.2)	0.038*
No (ref)	67	113	1		
Presence guidelines Yes	188	50	4.6(3-7.2)	2.6(1.3−5.4)	0.007**
No(ref)	77	96	1		

Factors Associated with the practice of respondents towards preventing CAUTIs

In bi-variable analysis, marital status, work experience, the presence of guidelines, good knowledge and training towards preventing of CAUTIs were significant association at the p-value < 0.05 with good practice of nurses towards preventing CAUTIs whereas, in multi-variable analysis, work experience, the presence of guidelines, good knowledge and training towards preventing CAUTIs were a significant association with good practice of nurses' towards preventing CAUTIs. Nurses who had 5–10 years of work experience were 2 times more likely to have good practice regarding preventing CAUTIs compared to nurses with < 5 years of work experience [AOR = 2, 95% CI (1.05, 4)]. Nurses having attended the training were 2.3 times more likely to have good practice toward preventing CAUTIs than those having no training, [AOR = 2.3, 95% CI (1.06, 5.1)]. Nurses who had guidelines/protocols in their health facilities were 2.3 more likely to have good practice regarding preventing CAUTIs than nurses having no guidelines, [2.3, 95% CI (1.02, 5.2). Nurses having good knowledge were 8.7 times more likely to have good practice regarding preventing CAUTIs than nurses having poor knowledge [AOR = 8.7, 95% CI (5.1, 14.8)] (Table 6).

Table 6
Bi-variable and Multi-variable analysis on Factors Associated with the practice of Nurses towards preventing CAUTI among nurses at referral hospital of West Oromia region, Ethiopia, 2022(N = 411).

Variables	Practice (n = 411)		COR (CI = 95%)	AOR (CI = 95%)	P-value
	Good	Poor			
Age 20–29	82	67	1	1	
30–39	122	104	0.9(0.6–14)	0.8(0.4–1.6)	0.718
>40	20	16	1(0.4–2.1)	0.8(0.2–2.7)	0.759
Sex Male(ref)	126	100	1	1	
Female	98	87	0.8(0.6–1.3)	0.8(0.5–1.4)	0.634
Marital status; Single(ref)	68	40	1	1	
Married	156	147	0.6(0.3–0.9)	0.5(0.2–1.1)	0.102
Educational level; Diploma	8	7	1	1	
BSc degree	200	171	1(0.3–2.8)	0.8(0.2–3.3)	0.861
Masters	16	9	1.5(0.4–5.7)	0.8(0.1–4.4)	0.856
Monthly salary;<5000 ETB	8	7	1	1	
5000–7000 ETB	86	81	0.9(0.3–2.6)	1.2(0.2–5.5)	0.741
7001–9000 ETB	111	83	1.1(0.4–3.3)	1.1(0.2–5.3)	0.839
>9000 ETB	19	16	1(0.3-4)	1(0.1–6.7)	0.937
Working unit; Surgical Ward	43	34	1	1	
Medical Ward	47	33	1.1(0.5–2.1)	0.8(0.3-2)	0.744
Emergency Out Pt Dep	27	30	0.7(0.3–1.4)	1.2(0.4–3.2)	0.639
Orthopedic Ward	35	34	0.8(0.4–1.5)	1(0.4–2.4)	0.976
Gyn/Obs Ward	26	24	0.8(0.4–1.7)	0.9(0.3–2.5)	0.951
Pediatrics Ward	25	17	1.1(0.5–2.4)	1.3(0.5–3.7)	0.517
Others	21	15	1.1(0.4–2.4)	1(0.3–2.9)	0.981
Experience; <5 years(ref)	38	74	1	1	
5–10 years	145	87	3.2(2-5.2)	2(1.05–4.05)	0.035*
>10 years	41	26	3(1.6–5.7)	1.9(0.7–5.3)	0.192

Keywords p-value **=<0.01, *<0.05, Hosmer-Lemeshow = 0.5196

Variables	Practice (n = 411)		COR (CI = 95%)	AOR (CI = 95%)	P-value
Attend training; Yes	171	53	6.8(4.4−10.5)	2.3(1.06−5.1)	0.035*
No (ref)	60	127	1	1	
Presence guidelines; Yes	186	38	6.6(4.2−10.5)	2.3(1.02−5.2)	0.044*
No(ref)	79	108	1	1	
Knowledge: Good	186	38	12.7(7.9−20.4)	8.7(5.1−14.8)	0.000**
Poor(ref)	52	135	1	1	
Keywords p-value **=<0.01, *<0.05, Hosmer-Lemeshow = 0.5196					

Discussion

The finding of this study showed that 57.9% with 95% CI (53.1, 62.6) of nurses had good knowledge regarding preventing CAUTIs. This result is in line with the study conducted in India (56.7%) (29). The possible reason could be the use of a similar study unit (nurses) and study design.

The result of this study is lower than the study conducted in Georgia (86.9%) (30), Sri Lanka (63.9%) (31), America(66%) (32) and Rwanda (64.5%) (28) in Malaysia(69%) (33). The possible reason for this difference could be due to differences in study units (sample size), socio-economic level and study settings.

However, the result of this study is higher than the study conducted in Nepal 16.3% (34), Yemen(18.3%) (35), India(16.7%) (36), in Saudi Arabia(37.2%) (37) and India (46.7%) (38). The possible rationale could be due to differences in a study setting, educational status and sample size.

More than half of the study participants 224 (54.5%) with 95% CI (49.6, 59.3) had good practices regarding preventing CAUTIs.

The finding of this study is in line with the study conducted in northern Ethiopia (50%) (25).

The possible reason could be the similarity between the study unit, study setting (referral hospital) and tool assessment methods.

This result is less than the result of the studies conducted in Sri Lanka (79.5%) (31), Rwanda (79.9%) (28) and India(86.5%) (29) and (another study) India(95.8%) (39). The possible rationale could be based on differences in socio-economic status, level of health sector development, study setting, educational status and study design.

However, this study's finding is higher than the study conducted in New York (40%) (40) and Pakistan(49%) (41). The reason for this difference could be the difference in the study setting and sample

size

The work-related experience is significantly associated with good knowledge. Nurses who had 5 to 10 years of work experience were 2.8 times more likely to have good knowledge regarding preventing CAUTIs than nurses who had < 5 years of work experience. Nurses who had > 10 years of work experience were 6.9 times more likely to have good knowledge regarding preventing CAUTIs than nurses who had < 5 years of work experience.

The results of this agreed with the study conducted in northern Ethiopia (25). The possible reason might be the fact that with increasing years of experience, healthcare providers are exposed to repetitively and become more experienced by working with senior staff they can gain knowledge towards preventing CAUTIs.

The training is significantly associated with good knowledge. Nurses who had trained were 2.1 times more likely to have good knowledge regarding preventing CAUTIs than nurses who had not received training. This finding is consistent with the studies conducted in India (29), Turkey (42) Mangalore (43) and Egypt (44). The possible explanation could be that training can increase knowledge regarding preventing CAUTIs (primary catheter care and an appropriate protocol for monitoring the number and duration of catheterizations may reduce the incidence of CAUTI) (43).

The presence of guidelines in their health facilities is significantly associated with good knowledge. Nurses who had guidelines were 2.6 times more likely to have good knowledge regarding preventing CAUTIs than nurses who did not. This finding is consistent with a study conducted in Pakistan (45). This may be justified by the fact that the presence of guidelines will enhance the knowledge of nurses regarding CAUTI prevention (33).

The work-related experience is significantly associated with good practice. Nurses who had 5 to 10 years of work experience were 2 times more likely to have good practice in preventing CAUTIs than nurses < 5 years of work experience. This finding agreed with the studies conducted in Northern Ethiopia (25), India (46) and Pakistan (45).

The possible reason might be the fact that with increasing years of experience, healthcare providers are exposed to repetitively and become more experienced by working with senior staff.

The training is significantly associated with good practice. Nurses who had undergone training were 2.3 times more likely to have good practices towards preventing CAUTIs than nurses who had not trained. This finding agreed with the study conducted in Georgia (30). The possible reason might be due to gaining knowledge on specific objectives plus demonstration can support practice development (41).

The presence of guidelines in their health facilities was significantly associated with good practice. Nurses who had guidelines were 2.3 times more likely to have good practices towards preventing CAUTIs than nurses who did not. The result findings are consistent with the studies conducted in Yemen (35) and India (39). The possible reason might be the availability of guidelines for preventing CAUTI is likely to

improve nurses' knowledge and ensure continuity of care (37). It is a manual how the protocol is carried out.

Good knowledge is significantly associated with good practice. Nurses who had good knowledge were 8.7 times more likely to have good practice regarding preventing CAUTIs than nurses who had poor knowledge. This finding agreed with the studies conducted in the USA (47), Iran (46)and Saudi Arabia (37). The possible reason might be knowledge applying it in clinical practice is real and currently, there is an increasing amount of scientific knowledge and the time needed to implement the new knowledge at the bedside is too long (17, 48).

Limitations

This study was susceptible to social desirable since it was self-reported.

Due to the time constraint, observational data collection method was not done.

Conclusion

The overall result showed more than half of nurses working at the West Oromia region referral hospital had good knowledge and good practice regarding preventing CAUTIs.

In this study, knowledge was found to have effects/impact on preventing CAUTI. This study also showed that work experience, the presence of guidelines and training had an impact on the level of knowledge and practice.

Abbreviations

AOR
Adjusted Odd Ratio
AURH
Ambo University Referral Hospital
CAUTI
Catheterization Associated Urinary Tract Infection
CI
Confidence Interval
JURH
Jimma University Referral Hospital
MKRH
Mettu Karl Referral Hospital
NHSN
National Healthcare Safety Network

NRH
Nekemte Referral Hospital
OR
Odds Ratio
USA
United States of America
UTIs
Urinary Tract Infections
WHO
World Health Organization

Declarations

Ethical approval and consent to participate

The study was conducted in accordance with the principles of the Helsinki Declaration. Ethical clearance was granted from the ethical clearance committee of the school of nursing on behalf of the IRB of the University of Gondar (IRB#242/2014). Following approval, a written official letter of cooperation was submitted to each hospital administration office before the beginning of data collection. Informed written and signed consent was taken from the study participants and confidentiality of the information was ensured throughout the process of data collection. Nurses were informed and information provided by them was kept confidentially that their names were not mentioned.

Consent to publication

Not applicable.

Availability of data and materials

Data will be available upon request from the corresponding author.

Competing interest

The authors declared that there is no competing interest.

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Authors' contributions

A.Z. conceived, designed the study, acquired data, analyzed, and interpreted the findings. T.GM and N.A. revised and provided critical intellectual feedback. W.M. and A.D. drafted the manuscript.

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Figures

Knowledge status

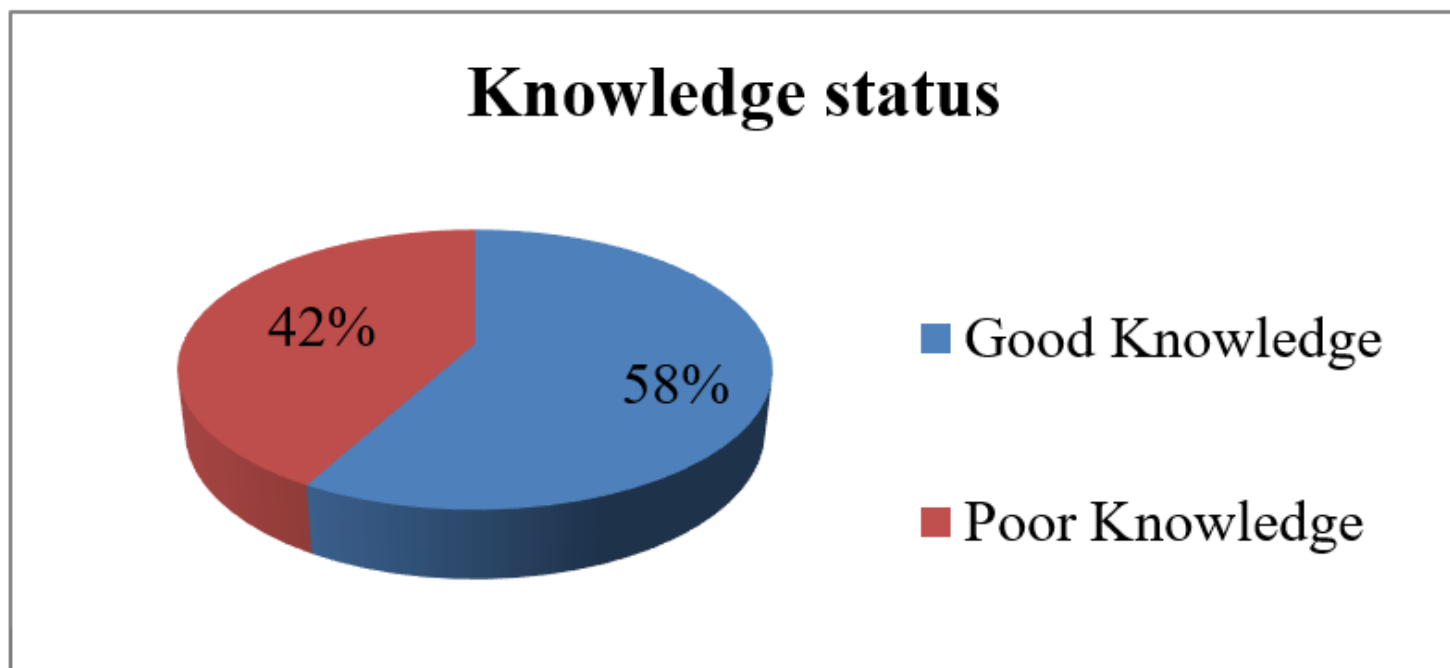- 42% — Poor Knowledge
- 58% — Good Knowledge

Figure 1

Knowledge status of the nurses towards preventing CAUTIs at referral hospitals of west Oromia region, Ethiopia, 2022(N=411)

Practice status

Good practice
Poor practice

Figure 2

Practice status of the nurses towards preventing CAUTIs at referral hospitals of west Oromia region, Ethiopia, 2022(N=411)