Research Article

Knowledge, Attitude and Practice on Prevention of Nosocomial Infection among Nurses of Tertiary Care Hospital

Dilip K C[1], Gavisiddhayya B Salimath[2], Ashwini Narasannavar[3]

[1,3]Department of Public Health, Jawaharlal Nehru Medical College, KAHER, Belagavi, India.
[2]Department of Child Health Nursing, Institute of Nursing Sciences, KAHER, Belagavi, India.
DOI: https://doi.org/10.24321/2278.2044.202466

I N F O

Corresponding Author:
Gavisiddhayya B Salimath, Department of
Child Health Nursing, Institute of Nursing
Sciences, KAHER, Belagavi, India.
E-mail Id:
gavisalimath@gmail.com
Orcid Id:
https://orcid.org/0000-0002-2080-7659

A B S T R A C T

Introduction: Nosocomial infections, as defined by the World Health Organization (WHO), are "infections acquired by a patient in a hospital who was admitted for a reason other than that infection." A WHO survey reported that on average, 8.7% of hospital patients were affected by nosocomial infections. To prevent the transmission of infections, Standard precautions prevent infections spread through blood, fluids, non-intact skin, and mucous membranes.

Objectives: The objective of this study is to evaluate the Knowledge, Attitudes, and Practices (KAP) regarding the prevention of nosocomial infections among nurses at Tertiray care Hospital Belgavi, Karnataka.

Method: This cross-sectional study was conducted in Dr Prabhakar Kore Hospital & MRC, Belagavi from October 2022 to February 2023. Nurses were recruited for the study. Participants were excluded if consent was not given.

Results: A total of 144 nurses participated in the study. The majority of nurses (77, 53.5%) had a good level of knowledge, 58.3% displayed a positive attitude, and 75 (52.1%) demonstrated good practices for the prevention of nosocomial infections. The knowledge, attitude, and practice scores were significantly associated with the nurses' age, work experience, and educational level (p < 0.000). However, no significant association was found between knowledge, attitude, and practices with respect to religion and gender (p > 0.05).

Conclusion: Overall, the study concluded that the majority of nurses possess good knowledge, attitudes, and practices regarding the prevention of nosocomial infections. Trained healthcare professionals must consistently apply their knowledge to prevent nosocomial infections.

Keywords: Knowledge, Attitude and Practice Prevention, Nosocomial Infection, Nurses

Introduction

Nosocomial infections, as defined by the WHO, are "infections acquired by a patient in a hospital who was admitted for a reason other than that infection." This definition encompasses infections that develop while a patient is in the hospital or healthcare facility, as well as those that manifest after the patient has been discharged. It also includes infections contracted by healthcare workers due to their exposure in the healthcare setting.[1] It is acquired by the patient within the time frame of 48–72 hours after hospital admission, 3 days after hospital release, 30 days after surgery, and 1 year after the implant.[2] According to a WHO survey, an average of 8.7% of hospital patients in 55 different hospitals across 14 countries, representing the four WHO regions of Europe, the Eastern Mediterranean, South-East Asia, and the Western Pacific, were affected by nosocomial infections. At any given time, over 1.4 million people worldwide are affected by the complications of nosocomial infections. The Eastern Mediterranean and South East Asia regions had the highest prevalence rates, at 11.8% and 10.0%, respectively, compared to the European and Western Pacific regions, which had prevalence rates of 7.7% and 9.0%, respectively.[3] A set of infection control measures known as "standard precautions" is used to stop the spread of infections that can be transmitted by contact with blood, bodily fluids, non-intact skin (including rashes), and mucous membranes. It involves maintaining good hand hygiene, using personal protection equipment (PPE) correctly, using sterile techniques to reduce patient exposure to pathogens, and managing sharps, blood spills, linen, and garbage in order to safeguard the environment.[4]

In order to prevent and control infections related to healthcare, healthcare workers (HCWs) such as nurses, doctors, and medical students must strictly follow standard precautions. It is essential for protecting not only the patients and environment but also the healthcare workers. Therefore, health professionals must follow some crucial precautions, such as hand hygiene, proper use of personal protective equipment (PPE) and proper handling of needle sticks and sharp objects, in order to prevent and protect patients from nosocomial infections, which are the main challenge and life threat to patients.[4] The Knowledge, Attitude, and Practice (KAP) survey is primarily concerned with acquiring information on baseline knowledge, attitudes, and practices based on certain topics. Data from the KAP survey aids institutions in developing programs, offering training and estimating resources to determine knowledge gaps, cultural practices and behaviours associated with a specific topic. This study also focuses on the KAP (Knowledge, Attitude, and Practices) regarding the prevention of nosocomial infections among nurses. The aim is to assess their knowledge, attitudes, and practices in order to identify any knowledge gaps and areas for improvement. If significant gaps or shortcomings in practices are found, the study advocates for continuous training and education on infection control to help reduce the prevalence of nosocomial infections.[5]

Method

Study Design and Participants

A descriptive cross-sectional study was conducted at Dr Prabhakar Kore Hospital & MRC, Belagavi, Karnataka, from October 2022 to February 2023 to evaluate the KAP (Knowledge, Attitude, and Practices) regarding the prevention of nosocomial infections among nurses. Data were collected using a pre-designed, validated semi-structured questionnaire. Participants who met the inclusion criteria and provided informed consent were enrolled in the study. The required sample size was calculated to be 144, as detailed below:

Z value = 1.96

p = 0.90

q = 1-0.90 = 0.10

d = Allowable error = 5%

We have,

$$n = \frac{Z^2 pq}{d^2} \quad n = \frac{Z^2 pq}{d^2}$$

$$n = \frac{1.96^2 0.90 * 0.10}{0.05^2}$$

$$n = \frac{4 * 0.09}{0.0025}$$

$$n = \frac{0.36}{0.0025}$$

n = 144

Ethical Consideration

Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of JNMC, KLE Academy of Higher Education and Research, Belagavi. Informed consent was obtained from all study participants.

Statistical Analysis

Each individual data was collected by using a survey tool after obtaining informed consent. Information was collected regarding sociodemographics, knowledge and attitudes on the prevention of nosocomial infection and also their practices. Each questionnaire had four parts: Knowledge, 2. Attitude, 3. Practices and 4. Sociodemographic profile. The knowledge parts included questions on nosocomial infection and infection control standard protocol. Assessment of

attitudes and practices towards prevention of nosocomial infection included questions on behaviour and changes in practices made on infection control standard protocol. Scoring was done for knowledge, attitude and practice questions. For each correct answer, 1 mark was assigned and the mean value was calculated. Participants who scored more than the mean value were considered to have good knowledge, attitude and practices while those who scored less than the mean value were considered to have poor knowledge, attitude and practices. The data were entered into MS Excel and analysed via Statistical Package for Social Sciences (IBM SPSS 20 version). Descriptive statistics were analysed using percentages and frequencies.

KAP scores were compared with demographic characteristics. The Chi-square test was employed to assess the association between demographic variables (independent variables) and KAP scores (outcome variable). Additionally, Pearson's correlation coefficient was used to determine the relationship between knowledge, attitude, and practice.

Results

Out of a total of 144 nurses, the mean age of nurses in the survey was 27.5 ± 6.7 years old. More than two-thirds (77%) were females 103 (71.3%) had completed a Diploma, 75.6% of nurses belonged to the Hindu religion, whereas Christians and Muslims were negligible in number. This study reported that more than two-thirds (70.10%) had less than 5 years of work experience, whereas 17.40%, 6.30% and 6.30% of nurses had 6–10 years, 11–15 years and > 15 years of work experience, respectively. More than half of the nurses had good levels of knowledge (53.5%), a positive attitude (58.3%) and practices (52.1%). The association between knowledge, attitude and practice with respect to age group, work experience and educational status are statistically significant but not with gender and religion variables.

Table 1. Knowledge of Nurses on Prevention of Nosocomial Infection

S. No.	Variable	Response	Frequency	Percentage
1	Nosocomial infection is an infection whose development is favoured by a hospital environment.	True*	118	81.90
		False	26	18.10
2	Nosocomial infections include ventilator-associated pneumonia (VAP), tuberculosis, urinary tract infection, and gastroenteritis.	True*	137	95.10
		False	7	4.10
3	Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), *Staphylococcus aureus* and *Pseudomonas aeruginosa* are the organisms commonly encountered in nosocomial infections.	True*	117	81.20
		False	27	18.10
4	Gloves should always be worn as contact precautions.	True*	131	91.00
		False	13	9.00
5	Standard precautions should include the use of protective equipment and frequent hand washing.	True*	127	88.20
		False	17	11.80
6	Diagnosis influences my decision in choosing to choose PPE.	True*	123	85.40
		False	21	14.60
7	The probability of HIV infection following a needlestick injury from an HIV-positive patient is 10% to 20% per injury.	True	89	61.80
		False*	55	38.20
8	Washing hands before and after handling patients helps to prevent infection.	True*	138	95.80
		False	6	4.20
9	Wearing an N95 mask is important when dealing with airborne infections.	True*	129	89.60
		False	15	10.40
10	Wearing surgical masks when doing surgical procedures is vital to prevent infection.	True*	130	90.30
		False	14	9.70
11	Stethoscopes should be cleaned with an antiseptic (e.g., 70 % alcohol) after examining each patient.	True*	122	84.70
		False	22	15.30
12	Daily used items like pens, mobile phones, aprons, and uniforms acts as carrier for nosocomial infection.	True*	122	84.70
		False	22	15.30

* Correct Answers

Table 1 shows that the nurse's knowledge regarding the prevention of nosocomial infection was assessed using 12 questions that encompassed their knowledge about nosocomial infection and its prevention from spread between patients and healthcare workers. Out of the total nurses, 138 (95.80%) participants agreed that the statement regarding cleaning hands before and after contact with patients helps to prevent infections which indicated that they had correct knowledge. Similarly, 38.20% of nurses mentioned that the statement regarding needlestick injury and transmission of HIV from HIV patients has a 10–20% chance per injury is false which indicates that they had correct knowledge. Similarly, 137 (95.10%) nurses answered correctly on the statement that nosocomial infections included gastroenteritis, tuberculosis, UTIs, and ventilator-associated pneumonia (VAP). One hundred and thirty-one

(91%) nurses had correctly answered the statement that gloves should always be worn as contact precautions.

Table 2 shows the nurses' attitudes regarding the prevention of nosocomial infection. Out of 144 nurses, more than 90% of nurses had a good attitude towards the statement "Treatment of PLHIV should be in an isolation ward and universal precautions to be followed while handling patients infected with Hepatitis B virus, Hepatitis C virus and HIV". More than 3/4th of nurses had a good attitude towards hand hygiene, proper use of PPE, sterilising the infective materials and linen as well as the role of healthcare workers in the prevention of nosocomial infection. As compared to other statements, only 61.8% of nurses had a better attitude regarding the statement "Clinical history and drug history are essential for diagnosing MDR pathogens".

Table 2.Nurses' Attitude regarding Prevention of Nosocomial Infection

S. No.	Variables	Agree n (%)	Neutral n (%)	Disagree n (%)
1	The patient's outcome will be fatalistic due to nosocomial.	110 (76.4)	17 (11.8)	17 (11.8)
2	Nosocomial infection can be prevented through effective hand hygiene.	109 (75.7)	19 (13.2)	16 (11.1)
3	The reason for nosocomial infection is inadequate hand hygiene and improper removal of PPE.	127 (88.2)	9 (6.3)	8 (5.6)
4	Special precautions should be taken for Hepatitis B virus (HBV), Hepatitis C virus (HCV), and HIV-positive patients.	131 (91)	7 (4.9)	6 (4.2)
5	Patients living with HIV antigen must be treated in an isolation ward.	133 (92.4)	5 (3.5)	6 (4.2)
6	Vaccination for healthcare workers is a must.	102 (70.8)	21 (14.6)	21 (14.6)
7	PPE is not needed when a healthcare worker is vaccinated.	1 (0.7)	9 (6.3)	134 (93.1)
8	Medical history and antibiotic usage history are important for MDR microorganisms.	89 (61.8)	24 (16.7)	31 (21.5)
9	Used needles should not be recapped.	121 (84.0)	8 (5.6)	15 (10.4)
10	Do you think that performing hand hygiene is less likely to transmit infections to patients?	112 (77.8)	13 (9.0)	19 (13.2)
11	A valuable part of the healthcare worker's role is to prevent nosocomial infection.	123 (85.4)	10 (6.9)	11 (7.6)
12	If no washing machine is available for linen soiled with infective material, the linen can be boiled.	128 (88.9)	4 (2.8)	12 (8.3)

Table 3.Practice of Nurses on Prevention of Nosocomial Infection

S. No.	Variable	Response	Frequency	Percentage
1	Do you wear a gown or apron when handling contaminated materials or infected or colonised patients?	True*	97	67.40
		False	47	32.60
2	Do you wash your hands before handling new patients?	True*	127	88.20
		False	17	11.80

3	Do you change your gloves before starting to handle a new patient?	True*	121	84.00
		False	23	16.00
4	Do you wear a mask while handling TB-suspected patients?	True*	120	86.10
		False	24	13.90
5	Do you discard infectious materials and left-over samples according to the guidelines?	True*	118	81.90
		False	26	18.10
6	Do you practice cleaning white coats or nursing uniforms regularly after hospital duty?	True*	120	83.30
		False	24	16.70
7	Do you practice using pre-sterilised instruments?	True*	104	72.20
		False	40	27.80
8	Do you wear dedicated shoes in aseptic units and in operating rooms which is easy to clean?	True*	118	81.90
		False	26	18.10

* Correct Answers

Table 4.KAP Level of Nurses

N = 144

Characteristics	No. of Questions	Score Range	Score	Level (%)	
			(Mean ± SD)	Poor n (%)	Good n (%)
Knowledge	12	4, 12	10.2 ± 1.9	67 (46.5)	77 (53.5)
Attitude	12	5,12	9.8 ± 2.05	60 (41.7)	84 (58.3)
Practice	8	4, 8	6.47 ± 1.55	69 (47.9)	75 (52.1)

Table 5.Correlation between KAP Score on Prevention of Nosocomial Infection among Nurses

Characteristics	Correlation Coefficient	p Value
Knowledge and attitude	0.68	0.000*
Knowledge and practice	0.58	0.000*
Attitude and practice	0.59	0.000*

* Statistically significant

Table 3 shows that most nurses had a positive practice. More than two-thirds of nurses practised safety precautions like maintaining hand hygiene (88.20%), proper use of N95 masks while handling TB-suspected patients (86.10%), changing gloves while handling each patient (84.0%), discarding infectious materials as per guidelines (81.90%) as well as cleaning white coat and uniform on regular basis (83.30%) for preventing the spread of nosocomial infection among patients as well as nurses. Only 72.20% of nurses practised using pre-sterilised instruments.

Table 4 shows the mean score of knowledge, attitude and practice level of the nurses.

- **Knowledge Level:** The mean score of knowledge was 10.2 ± 1.9. 53.5% of nurses had a score above the mean. Hence, they had a good knowledge level. Similarly, 46.5% had a poor level as the score was less than the mean.
- **Attitude Level:** The mean score of attitudes was 9.8 ± 2.05. 58.3% of nurses had a score above the mean. Hence, they had a good attitude level. Similarly, 41.7% had a poor level as the score was less than mean.
- **Practice Level:** The mean score of practice was 6.47 ± 1.55. 52.1% of nurses had a score above the mean. Hence, they had a good practice level. Similarly, 47.9% had a poor level as the score was less than the mean.

Table 5 shows an association between outcomes as knowledge with attitude, knowledge with practice, and attitude with practice. A positive linear correlation between knowledge and attitude ($r = 0.68$, $p < 0.000$), knowledge and practice ($r = 0.58$, $p < 0.000$) and attitude and practice ($r = 0.59$, $p < 0.00$) was observed.

Table 6.Association between Knowledge Level and Sociodemographic Characteristics

Variables		Knowledge Level		Total	χ2 (p Value)
		Poor Knowledge	Good Knowledge		
Age group (years)	20–29	62	45	107	22.178 (0.000) *
	30–39	4	27	31	
	40–49	1	3	4	
	≥ 50	0	2	2	
Gender	Male	16	17	33	0.66 (0.84)
	Female	51	60	111	
Religion	Hindu	54	55	109	2.190 (0.534)
	Muslim	6	8	14	
	Christians	6	13	19	
	Others	1	1	2	
Work experience (years)	0–5	63	38	101	34.545 (0.000) *
	6–10	3	22	25	
	11–15	0	9	9	
	≥ 15	1	8	9	
Working area	High-risk area	9	25	34	7.422 (0.024) *
	Postoperative ward	18	14	32	
	General wards	40	38	78	
Educational status	Diploma	64	39	103	35.492 (0.000) *
	Bachelor degree	3	35	38	
	Master's degree	0	3	3	

*Statistically significant

Table 7.Association between Attitude Level and Sociodemographic Characteristics

Variables		Attitude Level		Total	χ2 (p Value)
		Poor Attitude	Positive Attitude		
Age group (years)	20–29	56	51	107	21.343 (0.000) *
	30–39	2	29	31	
	40–49	1	3	4	
	≥ 50	1	1	2	
Gender	Male	14	19	33	0.10 (1.00)
	Female	46	65	111	
Religion	Hindu	49	60	109	2.588 (0.460)
	Muslim	5	9	14	
	Christians	5	14	19	
	Others	1	1	2	

Work experience (years)	0–5	55	46	101	25.140 (0.000) *
	6–10	2	23	25	
	11–15	0	9	9	
	≥ 15	3	6	9	
Working area	High-risk area	7	27	34	8.198 (0.01) *
	Postoperative ward	16	16	32	
	General wards	37	41	78	
Educational status	Diploma	56	47	103	24.141 (0.000) *
	Bachelor degree	4	34	38	
	Master's degree	0	3	3	

*Statistically significant

Table 6 shows the association of knowledge with sociodemographic variables of nurses regarding the prevention of nosocomial infection. In the age group of 20–29 years, the majority had poor knowledge, whereas 30–39, 40–49 and ≥ 50 years of aged participants had good knowledge. This indicates that higher the age, higher is the knowledge score. So, knowledge is significantly associated with age. The knowledge is associated with years of work experience. Hence more the work experience, more is the knowledge. Those participants who worked in high-risk areas (ICU, NICU etc.) and post-operative wards have more knowledge as compared to general wards area postings. This is statically associated with knowledge level. Similarly, knowledge level is significantly associated with educational status. It shows that if educational status increases the knowledge level also increases. The association between knowledge level with gender and religion are not statistically significant.

Table 7 shows the association of attitude level with sociodemographic variables of nurses regarding prevention of nosocomial infection. In the age group of 20–29 years, the majority had a poor attitude, whereas participants in the age groups of 30–39, 40–49 and ≥ 50 years had a positive attitude. This indicates that the attitude score increases with age. So, the attitude is significantly associated with age. The attitude increases with an increase in years of work experience too. Those participants who worked in high-risk areas (ICU, NICU etc.) and post-operative wards have a more positive attitude as compared to general wards area postings. This is statically associated with attitude level. Similarly, attitude level is significantly associated with educational status. It shows that if educational status increases the attitude level also increases. The association between attitude level with gender and religion are not statistically significant.

Table 8 shows the association of practice with sociodemographic variables of nurses regarding the prevention of nosocomial infection. In the age group of 20–29 years, the majority had poor practices whereas 30–39, 40–49 and ≥ 50 years of aged participants had good practices. So, the practice is significantly associated with age. The practice is also associated with years of work experience. Hence, more the work experience, more is the practice. Similarly, practice level is significantly associated with educational status. It shows that if educational status increases, the practice level also increases.

The association between practice level with gender, specification of working area and religion is not statistically significant.

Table 8. Association between Practice Level and Sociodemographic Characteristics

Variables		Practice Level		Total	χ2 (p Value)
		Poor Practice	Good Practice		
Age group (years)	20–29	58	49	107	6.971 (0.045) *
	30–39	9	22	31	
	40–49	1	3	4	
	≥ 50	1	1	2	
Gender	Male	18	15	33	0.754 (0.431)
	Female	51	60	111	

Religion	Hindu	54	55	109	2.628 (0.453)
	Muslim	8	6	14	
	Christians	6	13	19	
	Others	1	1	2	
Work experience (years)	0–5	57	44	101	11.091 (0.01) *
	6–10	6	19	25	
	11–15	2	7	9	
	≥ 15	4	5	9	
Working area	High-risk area	11	23	34	5.119 (0.077)
	Postoperative ward	19	13	32	
	General wards	39	39	78	
Educational status	Diploma	61	42	103	18.779 (0.000) *
	Bachelor degree	7	31	38	
	Master's degree	1	2	3	

*Statistically significant

Discussion

This study results revealed that out of 144 nurses, 107 (74.3%) nurses were between 20 and 29 years of age, followed by 22.5% of nurses between 30 and 39 years old. Similarly, 2.8% belonged to the age group of 40 to 49 years and 1.4% were more than or equal to 50 years. The mean age of participants in this study was 27.5 ± 6.7 years. Out of the total nurses, more than two-thirds of the nurses (77%) were females followed by males and accounted for 23%. Studies showed similar results conducted at Tehran University of Medical Sciences, Iran (mean age = 29 ± 4.7)[6], Southwest China (mean age = 31.30 ± 6.47)[7] and Northeast Ethiopia (mean age = 29.87 ± 6.76).[8]

In this study, the majority of nurses (71.53%) held a diploma, while 38 (26.39%) had a bachelor's degree, and 3 (2.08%) had a master's degree. These findings are similar to those reported in studies conducted in Yemen (Diploma = 60%, Bachelor's degree = 40%) and in University Clinical Centre of Kosovo (Diploma = 70.7%, Bachelor's degree = 22.4%).[9]

This study found a statistically significant association between knowledge and attitude (r = 0.68, p < 0.000), knowledge and practice (r = 0.58, p < 0.000), and attitude and practice (r = 0.59, p < 0.000). These findings are consistent with studies conducted in Iran at Shiraz University of Medical Sciences and in North Central Nigeria, where the associations between knowledge and attitude (p = 0.004, p

< 0.001), knowledge and practice (p < 0.001), and attitude and practice (p < 0.001) were also statistically significant.[10]

The association between gender and knowledge (p = 0.84), attitude (p = 0.71) and practices (p = 0.16) were not statistically significant in this study which is similar to the study findings conducted at the Iran and Northern Red-Sea Hospitals, Eritrea (p > 0.05) where the associations between gender and knowledge, attitude and practices were not statistically significant.[11]

This study reported that 53.5% of nurses had a good level of knowledge and 52.1% had a good level of practice for the prevention of nosocomial infections. The knowledge level in this study is similar to findings from a study conducted among nurses at Bir Hospital, Kathmandu (57.8%) and in Iran (69.5%). However, the practice level was slightly higher than that reported in Bir Hospital, Kathmandu (48.2%).[12]

This study reported a statistically significant association between knowledge level and age (p = 0.000), work experience (p = 0.000), educational status (p = 0.000), and the specification of the working area (p = 0.024). The association between knowledge and educational level in our study is similar to the results from studies conducted in Northwest Ethiopia (p < 0.005) and Palestinian hospitals (p = 0.012), where both studies also found a statistically significant association between knowledge and educational level.[13]

This study reported that there was a statistically significant association between attitude level with age (p = 0.000) and educational level (p = 0.000). Studies have shown similar findings, especially a study conducted in Saudi has shown an association with age (p = 0.000).[13] Similarly, the association between attitude level with work experience was also statistically significant (p = 0.000) in this study which is similar to the results of a study conducted in Northwest Ethiopia and the University Clinical Center of Kosovo where the association between attitude level and work experience was found to be statistically significant (p < 0.005, p = 0.001).[14]

This study found that the association between practice level and age group (p = 0.04), education level (p = 0.000), and work experience (p = 0.001) were statistically significant. These findings are similar to studies conducted at Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, and King Faisal Hospital, Rwanda, where the association between practice and age group (p < 0.05), education level (p < 0.005, p = 0.001), and work experience (p < 0.005, p = 0.001) were also statistically significant.[15]

Conclusion

Overall, this study concluded that the majority of nurses have good knowledge, attitudes and practices regarding the prevention of nosocomial infection. As they are already trained health professionals, they should implement all their positive knowledge in the prevention of nosocomial infection.

Acknowledgements

References

1. Nag K, Datta A, Karmakar N, Chakraborty T. Knowledge, attitude and practice about hospital acquired infection among health care personnel in a tertiary care hospital of Tripura. Int J Res Med Sci [Internet]. 2018 Oct [cited 2024 Apr 12];6(10):3303-8. Available from: https://www.msjonline.org/index.php/ijrms/article/view/5317 [Google Scholar]

2. Jeyasheelan VP, Devasuga SS, Myneni S, Ravikumar D, Kumar MR, Sivagananam P, Kunasekaran V, Balu P, Chelladurai UM, Sargunan Y, Kamineni SR, Veeraraghavan VP, Mohan SK. Knowledge and perception on prevention of Hospital Acquired Infections (HAI) among health care professionals in tertiary care teaching hospital. J Pure Appl Microbiol. 2020;14(2):1527-36. [Google Scholar]

3. Sarani H, Balouchi A, Masinaeinezhad N, Ebrahimitabs E. Knowledge, attitude and practice of nurses about standard precautions for hospital-acquired infection in teaching hospitals affiliated to Zabol University of Medical Sciences (2014). Glob J Health Sci. 2015;8(3):193-8. [PubMed] [Google Scholar]

4. Yakob E, Lamaro T, Henok A. Knowledge, attitude and practice towards infection control measures among Mizan-Aman General Hospital workers, South West Ethiopia. J Community Med Health Educ. 2015;5(5):370. [Google Scholar]

5. Tenna A, Stenehjem EA, Margoles L, Kacha E, Blumberg HM, Kempker RR. Infection control knowledge, attitudes, and practices among healthcare workers in Addis Ababa, Ethiopia. Infect Control Hosp Epidemiol. 2013;34(12):1289-96. [PubMed] [Google Scholar]

6. Ghadamgahi F, Zighaimat F, Ebadi A, Houshmand A. Knowledge, attitude and self-efficacy of nursing staffs in hospital infections control. Iran J Mil Med. 2011;13(3):167-72. [Google Scholar]

7. Feng W, Sae-Sia W, Kitrungrote L. Knowledge, attitude, and practice of surgical site infection prevention among operating room nurses in southwest China. Belitung Nurs J. 2022;8(2):124-31. [PubMed] [Google Scholar)

8. Gezie H, Leta E, Admasu F, Gedamu S, Dires A, Goshiye D. Health care workers knowledge, attitude and practice towards hospital acquired infection prevention at Dessie Referral Hospital, Northeast Ethiopia. Clin J Nurs Care Pract. 2019;3:59-63. [Google Scholar]

9. Alrubaiee G, Baharom A, Shahar H, Daud SM, Basaleem HO. Knowledge and practices of nurses regarding nosocomial infection control measures in private hospitals in Sana'a City, Yemen. Saf Health. 2017;3:16. [Google Scholar]

10. Kolade OA, Abubakar S, Adejumoke SR, Funmilayo HV, Tijani A. Knowledge, attitude and practice of surgical site infection prevention among post-operative nurses in a tertiary health institution in north-central Nigeria. Int J Nurs Midwifery. 2017 Jun;9(6):65-9. [Google Scholar]

11. Ghadamgahi F, Zighaimat F, Ebadi A, Houshmand A. Knowledge, attitude and self-efficacy of nursing staffs in hospital infections control. Iran J Mil Med. 2011;13(3):167-72. [Google Scholar]

12. Shrestha GD, Thapa B. Knowledge and practice on infection prevention among nurses of Bir Hospital,

Kathmandu. J Nepal Health Res Counc [Internet]. 2018 [2024 Apr 21];16(3):330-5. Available from: https://pubmed.ncbi.nlm.nih.gov/30455495/ [PubMed] [Google Scholar]

13. Bayleyegn B, Mehari A, Damtie D, Negash M. Knowledge, attitude and practice on hospital-acquired infection prevention and associated factors among healthcare workers at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. Infect Drug Resist [Internet]. 2021 [cited 2024 Apr 15];14:259-66. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7850400/ [PubMed] [Google Scholar]

14. Gruda A, Sopjani I. The knowledge, attitudes and practices of nurses toward management of hospital-acquired infections in the University Clinical Center of Kosovo. Mater Sociomed. 2017 Jun;29(2):84-7. [PubMed] [Google Scholar]

15. Nepomuscéne NJ, Ernest S, Beatha M. Knowledge, attitudes and practices regarding nosocomial infections prevention among nurses at King Faisal Hospital, Rwanda. Glob Sci J. 2021;9(9):2203-17.