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# Assessment Of Knowledge And Attitude Towards Healthcare Associated Infection Among Staff Nurses In Selected Settings

**Mrs. Malathi Booshanraj[1], Mrs. Aleena Meety Lal. A[2], Mrs. Bindhu[3], Mrs. R. Yuvashree[4], Ms. Varsha. N[5], Ms. Varshini. S[6], Mr. Vishwa[7], Mr. Yogendar.M[8]**

[1]Nursing Tutor, Department of Medical Surgical Nursing, Panimalar College of Nursing, Varadharajapuram, Poonamallee, Chennai – 600 123, Tamil Nadu, INDIA. malathipcon@gmail.com.
[2]Nursing Tutor, Department of Mental Health Nursing, Panimalar College of Nursing, Varadharajapuram, Poonamallee, Chennai – 600 123, Tamil Nadu, INDIA. aleenameetylal@gmail.com
[3]Assistant Professor, Department of Obstetrics and Gynaecology Nursing, Panimalar College of Nursing, Varadharajapuram, Poonamallee, Chennai – 600123, Tamil Nadu, INDIA. rbindhu0412@gmail.com
[4]Nursing Tutor, Department of Obstetrics and Gynaecology Nursing, Panimalar College of Nursing, Varadharajapuram, Poonamallee, Chennai – 600 123, Tamil Nadu, INDIA. ryuvashree15@gmail.com.
[5,6,7,8] BSc Nursing IV Year, Panimalar College of Nursing, Varadharajapuram, Poonamallee, Chennai – 600 123, Tamil Nadu, INDIA. ks5716975@gmail.com

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**Abstract:**

***Background of the study:*** Healthcare-associated infections (HAIs) are a significant concern in healthcare settings. This study aims to assess staff nurses' knowledge and attitude towards HAIs in selected settings. Understanding their awareness and perceptions is essential for identifying gaps in infection control practices and improving strategies to enhance patient safety and care outcomes. ***Methods:*** This study uses a quantitative, non-experimental descriptive design with a sample of 107 staff nurses from Panimalar Medical College Hospital, selected through purposive sampling. Data is collected through demographic details, a structured knowledge questionnaire on HAIs, and a Likert scale to assess attitudes. Descriptive and correlation analysis will be used. ***Results:*** The study reveals the correlation between the knowledge and attitude towards HAIs among the staff nurses. The Correlation coefficient value r = 0.1783 indicates a positive moderately correlation between knowledge and attitude at p = 0.0661* indicating high statistical significance. ***Conclusion:*** The study scores significant deficiencies in nurses' knowledge of healthcare-associated infections (HAIs), which directly impacts their infection control practices. The correlation between knowledge and attitude underscores the need for structured training programs on infection prevention to bridge these gaps. To address these challenges effectively, implementing a **HAI Bundle Checklist** could enhance compliance with evidence-based infection prevention practices.

## Introduction:

Health is a comprehensive state of physical, emotional, and social well-being, fostering overall wellness through healthy goals, habits, and supportive environments. Infections remain a significant global threat, impacting people across all demographics. Healthcare-associated infections (HAIs), or nosocomial infections, occur in medical settings and can be caused by bacteria, viruses, fungi, or parasites. Common HAIs include central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), surgical site infections (SSI), and ventilator-associated pneumonia (VAP). WHO estimates 7.1 million HAIs annually, with a significant burden due to antibiotic-resistant bacteria. Despite advances, HAIs challenge healthcare systems by raising costs and affecting patient outcomes. Nurses

are central to infection control, implementing protocols such as hand hygiene and the use of personal protective equipment. However, studies reveal knowledge gaps among nurses in low- and middle-income settings, highlighting the need for improved training. A descriptive study at PMCH&RI will assess nurses' knowledge and attitudes toward HAIs, aiming to enhance infection prevention, patient safety, and healthcare quality, ultimately supporting professional development and better patient care.

**Ethical approval:**

Ethical approval for this study was granted by the Institutional Human Ethics Committee of Panimalar Medical College Hospital & research Institute PMCHRI/IHEC/MS/2023/102. Before the commencement of the study, all participants were thoroughly briefed about the research objectives, procedures, and potential risks involved. Written consent was obtained from each participant before their participation.

**Objectives:**

1. To assess the level of knowledge and attitude toward healthcare associated infection among Staff nurses
2. To correlate the knowledge and attitude of healthcare associated infection among Staff nurses

**Null hypothesis:**

**H0 –** There is a significant correlation of the knowledge on healthcare associated Infection with attitude among nurses.

**Materials and methods:**

The quantitative research approach and Non-Experimental descriptive design was chosen for this study. By using Solvin's formula sample size were calculated 107 staff nurses who were working in Panimalar Medical College Hospital and Research Institute selected by using non probability purposive sampling technique who fulfil the criteria selection of sample. The study includes three parts: demographic variables, a structured knowledge questionnaire, and a rating scale to assess attitudes on healthcare-associated infections (HAIs).

1. **Part A** collects demographic information, including age, gender, educational level, years of nursing experience, institution name, and area of specialization.
2. **Part B** is a structured knowledge questionnaire on HAIs, covering ventilator-associated pneumonia (VAP), catheter-associated urinary tract infections (CAUTI), central line-associated bloodstream infections (CLABSI), and surgical site infections (SSI). Each correct answer earns 1 point, with a maximum score of 20. Scores are interpreted as follows: below 8 (poor), 8–14 (fair), and above 15 (good).
3. **Part C** consists of a 5-point Likert scale with 10 items to assess attitudes toward HAIs in VAP, CAUTI, CLABSI, and SSI areas. Responses range from "never" (1) to "always" (5), with a maximum score of 50.

Analysis was done by Frequency and percentage will analyze demographics, while mean and standard deviation describe knowledge and attitudes. Correlation assesses the relationship between nurses' knowledge and attitudes.

**Results & Discussion:**

The present study was aimed to assess the knowledge and attitude towards healthcare associated infections among staff nurses in PMCHRI. The data collected were organized, tabulated and analyzed according to the objectives. The findings based on the descriptive statistical analysis are presented under the following sections.

***Table 1:*** **Frequency and Percentage Distribution of Demographic Variables**

**N=107**

| **Demographic variables** | | **n** | **%** |
|---|---|---|---|
| Age in years | 18 -25 | 85 | 79.5 |
| | 26-30 | 20 | 18.6 |
| | >30 | 2 | 1.9 |
| Gender | Male | 12 | 11.2 |
| | Female | 95 | 88.8 |
| Educational status | B.Sc., (Nursing) | 64 | 59.8 |
| | Post (B.Sc., Nursing) | 9 | 8.4 |
| | ANM/ GNM | 25 | 23.4 |
| | DGNM | 9 | 8.4 |

| | | | |
|---|---|---|---|
| Year of experience | 0-6months | 22 | 20.6 |
| | 6months-1year | 16 | 15 |
| | 1-2years | 17 | 15.9 |
| | 2-3years | 27 | 25.2 |
| | Above 3 years | 25 | 23.3 |
| Still working in PMCH&RI | Yes | 105 | 98.1 |
| | No | 2 | 1.9 |
| Specialization/ area of working | Medical ward | 52 | 48.15 |
| | Surgical ward | 18 | 15.26 |
| | Care units | 30 | 29.1 |
| | Operation theater | 2 | 2.14 |
| | OPDs | 5 | 5.35 |
| Designation | Trainee nurses | 7 | 6.5 |
| | Staff nurses | 86 | 80.4 |
| | Assistant nurses | 13 | 12.2 |
| | Incharge | 1 | 0.9 |
| Have you attended any infection control training programme previously | Yes | 91 | 85 |
| | No | 16 | 15 |

***Table 1*** depicts a percentage distribution of demographic variables of staff nurse in which most of them, 79.5% were in age group of 18 -25, 88.8% were females, 59.8% of nurses had completed B.Sc. (Nursing), 25.2% of nurses had 2-3 years of experience, 98.1% of staff were working in PMCHRI, 48.15% of staff were working in medical ward, 80.4% of nurses were in staff nurse designation and 85% of nurses have attended infection control training programme previously.

***Table. 2:*** **Assessment of knowledge towards surgical site infection among nurses**
**N=107**

| **Questionnaire** | | **N** | **%** |
|---|---|---|---|
| What is the gold standard for diagnosing an SSI? | Checking the patient's temperature | 11 | 10.3 |
| | Assessing the wound status daily | 27 | 25.2 |
| | Collecting a sample from the wound for growth | 43 | 40.2 |
| | Observing and performing I & D in the ward | 26 | 24.3 |
| In which layer of tissue are superficial surgical site infections typically localized? | Subcutaneous tissue | 16 | 15 |
| | Muscles and fascia | 29 | 27.1 |
| | Deep incision tissues | 35 | 32.7 |
| | None of the above | 27 | 25.2 |
| Which class of microorganisms is most commonly associated with SSI, particularly in clean surgical procedures? | Viruses | 6 | 5.6 |
| | Fungi | 21 | 19.6 |
| | Gram negative bacteria | 31 | 29 |
| | Gram positive bacteria | 49 | 45.8 |

***Table 2*** depicts the assessment of knowledge towards surgical site infection among nurses in which 40.2% of nurses given correct answer for the gold standard diagnosis for SSI, 15 % of staff given correct answer for location SSI, and 45.8% of nurses answered correctly for question related to most commonly associated microorganisms with SSI.

***Table 3:*** **Assessment of knowledge towards Ventilator Associated Pneumonia among nurses**
**N=107**

| **Questionnaire** | | **N** | **%** |
|---|---|---|---|
| In the following which is the common symptom of VAP in incubated patients | Oral thrush | 18 | 16.8 |
| | Increased urine output | 28 | 26.2 |
| | Worsening cough and fever | 32 | 29.9 |

| | | | |
|---|---|---|---|
| | Improved appetite | 29 | 27.1 |
| What is the recommended method for preventing VAP in ventilated patients | Frequent ventilator circuit changes | 9 | 8.4 |
| | Hand hygiene practices | 44 | 41.1 |
| | Elevating the head of the bed | 20 | 18.7 |
| | Frequent oral care | 34 | 31.8 |
| What is the most common pathogen associated with VAP | Tuberculosis | 13 | 12.1 |
| | Methicillin resistant staphylococcus aureus | 31 | 29 |
| | Pseudomonas aeruginosa | 34 | 31.8 |
| | Influenza virus | 29 | 27.1 |

***Table 3*** shows Assessment of knowledge towards Ventilator Associated Pneumonia among nurses in which 29.9% of nurses answered correctly for common symptom of VAP in incubated patients,18.7% of nurses answered correctly for recommended method for preventing VAP in ventilated patients, 31.8% of nurses answered correctly for the most common pathogen associated with VAP

***Table 4:*** **Assessment of knowledge towards Central Line Associated Blood Stream Infection among nurses N=107**

| **Questionnaire** | | **N** | **%** |
|---|---|---|---|
| What is the recommended maximum duration for using a central venous catheter, if it is still medically necessary? | 24 hours | 12 | 11.2 |
| | 7 hours | 34 | 31.8 |
| | 30 days | 41 | 38.3 |
| | 90 days | 20 | 18.7 |
| Which type of central venous catheter insertion site is associated with the lowest risk of CLABSIs | Jugular vein | 18 | 16.8 |
| | Femoral vein | 27 | 25.2 |
| | Subclavian vein | 48 | 44.9 |
| | Radial artery | 14 | 13.1 |
| Which of the following is NOT a sign or symptom of CLABSIs? | Fever | 18 | 16.8 |
| | Swelling and redness at the insertion site | 29 | 27.1 |
| | Rapid breathing | 31 | 29 |
| | Increased urine output | 29 | 27.1 |

***Table 4*** depicts the assessment of knowledge towards central line associated blood stream infection among nurses in which 38.3% of nurses answered correctly for recommended maximum duration for using a central venous catheter, 44.9% of nurses answered correctly for the type of central venous catheter insertion site is associated with the lowest risk of CLABSIs and 27.1% of nurses answered correctly for sign or symptom of CLABSIs.

***Table 5:*** **Assessment of knowledge towards Catheter Associated Urinary Tract Infection among nurses N=107**

| **Questionnaire** | | **N** | **%** |
|---|---|---|---|
| CAUTIs often result from the colonization of which part of the urinary system? | Kidneys | 11 | 10.3 |
| | Bladder | 42 | 39.3 |
| | Urethra | 32 | 29.8 |
| | Ureters | 22 | 20.6 |
| Catheter-associated urinary tract infection is always symptomatic and easy to diagnose | True | 57 | 53.3 |
| | False | 50 | 46.7 |
| What is one potential complication of CAUTIs that can be serious, especially in elderly patients? | Renal stones | 18 | 16.8 |
| | Bone fractures | 26 | 24.3 |
| | Delirium | 19 | 17.8 |
| | Pyelonephritis | 44 | 41.1 |
| Which type of catheter is associated with a lower risk of CAUTIs compared to indwelling urethral catheters? | Suprapubic catheter | 21 | 19.6 |
| | Ureteral stent | 26 | 24.3 |
| | Nephrostomy tube | 28 | 26.2 |

| | | | |
|---|---|---|---|
| | Urethral catheter | 32 | 29.9 |

***Table 5*** depicts the assessment of knowledge towards Catheter Associated Urinary Tract Infection among nurses in which 39.3% of nurses answered correctly for the question related to part of the urinary system, 41.1% of nurses answered correctly for one potential complication of CAUTIs that can be serious and 19.6% of nurses answered correctly for lower risk of CAUTIs compared to indwelling urethral catheters.

***Table 6:*** **Assessment of knowledge towards scenario-based questions on HAIs among nurses**
**N=107**

| **Questionnaire** | | **N** | **%** |
|---|---|---|---|
| A patient is admitted to a hospital for a routine medical procedure. To prevent healthcare-associated infections (HAIs), which of the following practices is most important for healthcare providers to follow? | Using personal protective equipment only during major surgeries | 17 | 15.9 |
| | Cleaning hands with soap and water when visibly soiled, otherwise using hand sanitizer. | 50 | 46.7 |
| | Reusing disposable gloves if they appear undamaged after use | 22 | 20.6 |
| | Keeping patient rooms free of any ventilation to reduce the risk of airborne infections. | 18 | 16.8 |
| A patient is admitted to a hospital for a surgical procedure. During the postoperative period, the patient develops symptoms of an infection. Which of the following factors is most likely to contribute to the development of a healthcare-associated infection (HAI) in this scenario? | The patient's pre-existing medical conditions | 10 | 9.3 |
| | Proper sterilization of surgical instruments | 42 | 39.3 |
| | Adequate hand hygiene by healthcare staff | 35 | 32.7 |
| | Timely administration of prescribed antibiotics | 20 | 18.7 |
| A patient undergoes abdominal surgery in a reputable hospital. During the postoperative period, signs of redness and warmth appear around the incision site. The patient also experiences an increase in body temperature. Considering these symptoms, what could be a potential concern, and what preventive measures could have been implemented to minimize this risk? | Concern: Expected postoperative changes; Preventive Measure: Regularly changing wound dressings. | 34 | 31.7 |
| | Concern: Surgical site infection (SSI); Preventive Measure: Proper preoperative skin preparation and aseptic techniques. | 43 | 40.2 |
| | Concern: Allergic reaction to anesthesia; Preventive Measure: Administering antibiotics after surgery. | 16 | 15 |
| | Concern: Normal healing process; Preventive Measure: Delaying wound inspection until the follow-up Appointment. | 14 | 13.1 |
| A patient is admitted to the intensive care unit (ICU) and placed on mechanical ventilation following a serious respiratory condition. After a few days, the healthcare team notices increased secretions, fever, and a decline in the patient's | HAI: Catheter-associated urinary tract infection (CAUTI); Preventive Measure: Encouraging oral hydration. | 28 | 26.2 |

| | | | |
|---|---|---|---|
| respiratory function. What healthcare-associated infection (HAI) might be suspected in this scenario, and what measure could help prevent its occurrence? | Ventilator-associated pneumonia (VAP); Preventive Measure: Regularly changing the ventilator tubing. | 50 | 46.7 |
| | HAI: Surgical site infection (SSI); Preventive Measure: Administering prophylactic antibiotics postoperatively. | 20 | 18.7 |
| | HAI: Bloodstream infection; Preventive Measure: Limiting the use of indwelling catheters. | 9 | 8.4 |
| A patient in the intensive care unit (ICU) requires intravenous (IV) therapy through a central venous catheter (CVC). The healthcare team is focused on preventing complications. What is a key consideration to minimize the risk of catheter-related bloodstream infections (CRBSI) in this situation? | Changing the IV tubing every 24 hours. | 13 | 12.1 |
| | Administering antibiotics without indication. | 37 | 34.6 |
| | Routinely flushing the catheter with saline | 32 | 29.9 |
| | Using aseptic applications and maintenance practices | 25 | 23.4 |
| A patient admitted to the hospital for a medical condition requires a urinary catheter. The healthcare team is attentive to preventing catheter-associated urinary tract infections (CAUTIs). What is a key practice they should follow to minimize the risk of CAUTIs for this patient? | Changing the catheter every 72 hours | 19 | 17.8 |
| | Administering prophylactic antibiotics routinely | 36 | 33.6 |
| | Using a closed urinary drainage system | 36 | 33.6 |
| | Encouraging limited fluid intake for the patient | 16 | 15 |
| The access port of central line should be scrubbed with 70 % alcohol swab prior to each use. | True | 34 | 31.8 |
| | False | 37 | 34.6 |
| | None of the above | 36 | 33.6 |

***Table 6:*** depicts the assessment of knowledge towards scenario-based questions on HAIs among nurses in which 46.7 % of nurses answered correctly for prevention of healthcare associated infection, 40.2% of nurse given correct answer for question related to surgical site infection and 46.7% of nurses selected correct statement for question related to VAP. 33.6% have given correct answer for question related CAUTI.

**OVERALL PERCENTAGE OF LEVEL OF KNOWLEDGE**
**n =107**

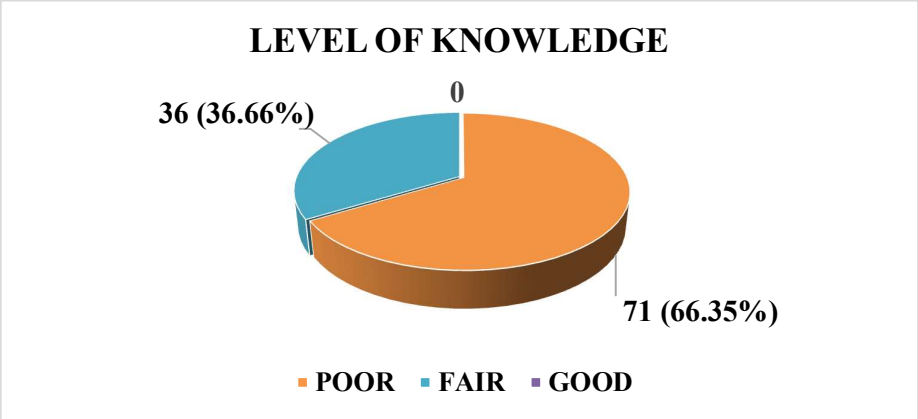



***Fig 1:*** **Percentage of Level of Knowledge Towards Healthcare Associate Infection among staff nurses in Panimalar Medical College Hospital & research Institute**

***Table 7:*** **Assessment of attitude towards HAIs among nurses**

**n=107**

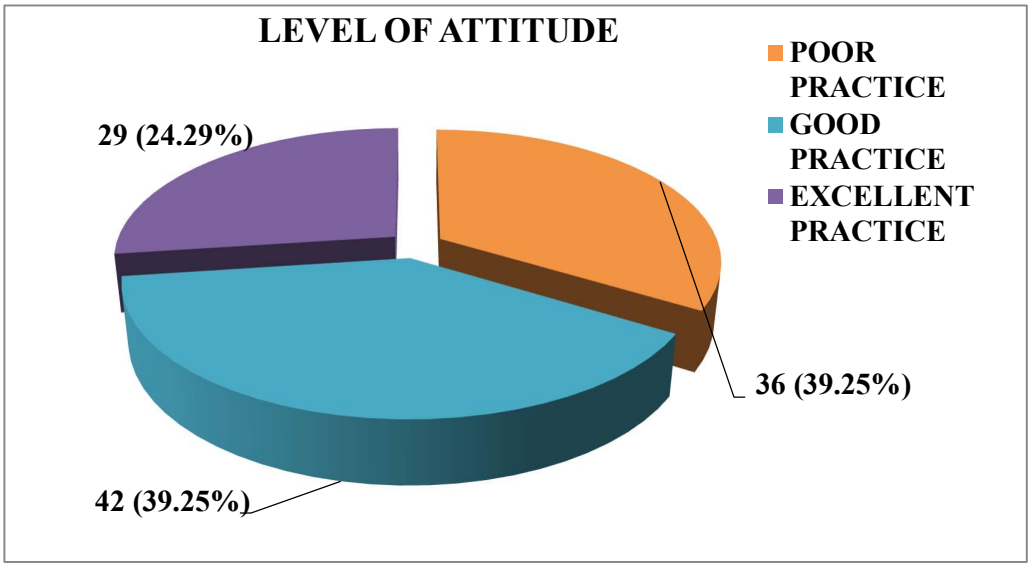
| **Questionnaire** | | **n** | **%** |
|---|---|---|---|
| I will provide bolus feeds, to the patient on ventilation | **Never** | **18** | **16.8** |
| | Seldom | 11 | 10.3 |
| | Occasionally | 30 | 28.1 |
| | Very often | 13 | 12.1 |
| | Always | 35 | 32.7 |
| I will provide oral care to patient with chlorhexidine solution every 6th hourly. | Never | 11 | 10.3 |
| | Seldom | 13 | 12.1 |
| | Occasionally | 23 | 21.5 |
| | Very often | 25 | 23.4 |
| | **Always** | **35** | **32.7** |
| I will follow Sterile technique while insertion of central line. | Never | 11 | 10.3 |
| | Seldom | 10 | 9.3 |
| | Occasionally | 25 | 23.4 |
| | Very often | 23 | 21.5 |
| | Always | 38 | 35.5 |
| The gauze pad should he changed every 48 hours, even if it is solid in between, I will change after 48 hours. | Never | 11 | 10.3 |
| | Seldom | 11 | 10.3 |
| | Occasionally | 29 | 27.1 |
| | Very often | 33 | 30.8 |
| | Always | 23 | 21.5 |
| I will assess the line site for sings (rash, redness, etc) before administrating any medication. | Never | 9 | 8.4 |
| | Seldom | 9 | 8.4 |
| | Occasionally | 25 | 23.4 |
| | Very often | 28 | 26.2 |
| | Always | 36 | 33.6 |
| I will use 1 gauze pad in multiple strokes to clean catheter tube. | Never | 17 | 15.9 |
| | Seldom | 12 | 11.2 |
| | Occasionally | 27 | 25.2 |
| | Very often | 15 | 14.1 |
| | Always | 36 | 33.6 |

| | | | |
|---|---|---|---|
| Catheter tube should be used and changed once in every 5 days. | Never | 7 | 6.5 |
| | Seldom | 9 | 8.4 |
| | Occasionally | 32 | 29.9 |
| | Very often | 31 | 29 |
| | Always | 28 | 26.2 |
| I will clamp catheter before removing it. | Never | 9 | 8.4 |
| | Seldom | 19 | 17.8 |
| | Occasionally | 18 | 16.8 |
| | Very often | 22 | 20.6 |
| | Always | 39 | 36.4 |
| Aseptic technique is used to clean catheter tube. | Never | 14 | 13.1 |
| | Seldom | 16 | 15 |
| | Occasionally | 21 | 19.6 |
| | Very often | 21 | 19.6 |
| | Always | 35 | 32.7 |
| I will perform hand wash before doing procedure\before handling the patient. | Never | 5 | 4.7 |
| | Seldom | 10 | 9.3 |
| | Occasionally | 36 | 33.6 |
| | Very often | 16 | 15 |
| | Always | 40 | 37.4 |

***Table 7*** depicts assessment of attitude towards HAIs among nurses in which 32.7 % nurses will provide oral care to patient with chlorhexidine solution every 6th hourly, 35.5% nurses were following Sterile technique while insertion of central line, 36.4% will clamp catheter before removing it, 37.4% nurses will perform hand wash before doing procedure\before handling the patient.

**OVERALL PERCENTAGE OF LEVEL OF ATTITUDE**

***Fig 2:***




**Percentage of level of Attitude towards Healthcare Associated Infection among staff nurses in PMCH&RI.**

**Table 8: Correlation of knowledge with attitude towards HAIs among staff nurses.**

**n=107**

| **Correlation** | **Karl Pearson Correlation coefficient** | **Interpretation** |
|---|---|---|
| Knowledge score Vs attitude score | r = 0.1783<br>p = 0.0661* | Moderately positive correlation |

***Table 8:*** reveals the correlation between the knowledge and attitude towards HAIs among the staff nurses. The Correlation coefficient value r = 0.1783 indicates a positive moderately correlation between knowledge and attitude at p = 0.0661*indicating high statistical significance.

This study evaluated nurses' knowledge and attitudes toward healthcare-associated infections (HAIs) at PMCHRI, revealing valuable insights. While a portion of the staff (36%) demonstrated fair knowledge, there is an opportunity for improvement, with 71% showing gaps, particularly in areas like prevention and pathogens linked to infections such as VAP, SSI, CLABSI, and CAUTI. The attitude results were promising, with 39.25% exhibiting good practices and 24.29% demonstrating excellent practices in infection prevention. The moderate positive correlation (r = 0.1783, p = 0.0661*) between knowledge and attitude emphasizes the potential impact of enhancing training and education. These findings suggest that targeted interventions could significantly strengthen infection control practices, improving overall patient safety and healthcare quality.

**Conclusion:**

This study assessed nurses' knowledge and attitudes toward healthcare-associated infections (HAIs) at PMCHRI, offering key insights into infection control practices. While 36% of nurses demonstrated fair knowledge, 71% exhibited notable gaps, particularly in understanding prevention strategies and pathogens associated with HAIs such as VAP, SSI, CLABSI, and CAUTI. Attitudes toward infection prevention were encouraging, with 39.25% displaying good practices and 24.29% demonstrating excellent practices. A moderate positive correlation (r = 0.1783, p = 0.0661*) between knowledge and attitude highlights the potential of education to improve infection control outcomes. By focusing on education and targeted interventions, nurses can be better equipped to adhere to infection prevention measures effectively. Implementing a **HAI Bundle Checklist** could further strengthen compliance with evidence-based practices. Key components include proper hand hygiene, use of personal protective equipment, and protocols specific to preventing CLABSI, CAUTI, VAP, and SSI. Emphasizing these measures through training and consistent application can significantly improve patient safety and healthcare quality. These findings underscore the critical role of education and standardized protocols in combating HAIs and fostering a culture of infection prevention.

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