

# The Relationship Between Nurses' Knowledge and the Prevention of Healthcare-Associated Infections (HAIs) Among Inpatients at Efarina Hospital Berastagi

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Healthcare Associated Infections (HAIs) are infections that patients get while undergoing treatment in a hospital or other health care facility. According to the World Health Organization (WHO) in 2022, it was reported that there were 8.9 million incidents of Healthcare Associated Infections (HAIs) in health care facilities and 1 in every 10 percent had died from nosocomial infections. This study aims to determine the relationship between nurses' knowledge and the prevention of Healthcare Associated Infections (HAIs) in the inpatient room of Hospital Efarina. The methodology of this study uses a quantitative research design with a Cross Sectional approach. Sampling used Saturated Sampling with a total of 124 respondents. The results of the study based on the Spearman p value test  $0.00 < 0.05$  showed that there was a significant relationship between the nurses' knowledge variable and the HAIs prevention variable. Nurses are expected to be able to improve their personal knowledge and maximize their performance, especially regarding the prevention of Healthcare Associated Infections (HAIs) by participating in training and monitoring nursing staff at the Hospital Efarina.

**Keywords:** Nurses' Knowledge; Healthcare-Associated Infections (HAIs); Infection Prevention; Inpatient Care; Hospital Efarina; Cross-Sectional Study

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## 1. Introduction

Healthcare-Associated Infections (HAIs) are infections acquired by patients while receiving treatment in hospitals or other healthcare facilities. According to the World Health Organization (WHO) in 2022, an estimated 8.9 million HAI cases occurred globally in healthcare service facilities, and 1 in every 10 affected patients died due to nosocomial infections (Istiqomah & Nurhayati, 2023). HAIs lead to various adverse impacts, including prolonged hospitalization, delays for incoming patients, reduced productivity, increased operational costs for healthcare institutions, and greater financial burdens on patients (Sumaryati, 2018). These infections significantly affect patients' overall health status, contributing to increased morbidity and mortality, extended length of stay, and higher healthcare expenditures (Sagala & Sitompul, 2019).

Efforts to prevent HAIs have primarily emphasized hand hygiene as the most effective standard precaution in infection prevention and control. Failure to maintain proper hand hygiene remains the leading cause of hospital-acquired infections and facilitates the transmission of multidrug-resistant microorganisms within healthcare settings (Apriany, 2020). Infection Prevention and Control (IPC) programs aim to prevent and minimize infection transmission among patients, healthcare workers, visitors, and the surrounding community (Chairani et al., 2022).

Knowledge plays a critical role in shaping healthcare workers' actions and behaviors. It is developed through sensory experiences—mainly hearing and sight—and represents an essential domain that influences decision-making and performance. The level of knowledge greatly determines the quality of infection

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prevention practices (Notoatmodjo, 2020). In Indonesia, the prevalence of HAIs is reported at 7.1%, affecting 10% of patients, 5% of healthcare workers, 30% of medical and non-medical equipment, and 10% of the healthcare environment (WHO, 2017). A report by the National Nosocomial Infections Surveillance (NNIS) and the Centers for Disease Control and Prevention (CDC) in 2022 indicated that 5 to 6 nosocomial infection cases occur per 100 hospital visits (Sihombing, 2020).

Previous studies also highlight the importance of nurses' knowledge in preventing HAIs. Sugeng et al. (2016) reported that among 48 respondents, 54.2% of nurses had good knowledge, 43.8% had adequate knowledge, and 2.1% had poor knowledge. Meanwhile, 75% demonstrated good nosocomial infection prevention practices. At Efarina Berastagi Hospital, the number of HAI cases increased from 4 cases in 2023 to 12 cases in 2024, indicating the need to strengthen preventive efforts through improved staff competence.

HAIs are influenced by multiple factors, including external sources such as healthcare personnel, equipment, the environment, food, other patients, and visitors; patient-related factors such as age, sex, underlying conditions, and treatment risks; nursing-related factors such as length of stay, service quality, and room occupancy; and microbial factors including pathogenicity and the duration of exposure (Sihombing, 2020).

A preliminary survey conducted at Efarina Berastagi Hospital revealed variations in nurses' knowledge regarding HAIs: of 10 respondents, 4 had good knowledge, 3 had moderate knowledge, and 3 had poor knowledge. Observations of preventive practices showed that 3 nurses demonstrated good infection prevention, 2 moderate, and 5 poor.

Considering the importance of nurse knowledge in preventing HAIs and the preliminary findings indicating gaps in both knowledge and practice, this study aims to examine the relationship between nurses' knowledge and the prevention of Healthcare-Associated Infections (HAIs) in the inpatient wards of Efarina Berastagi Hospital in 2025..

## 2. Methods

### Conceptual Framework

The conceptual framework of this study consists of one independent variable and one dependent variable. The independent variable is nurses' knowledge, while the dependent variable is the nurses' actions in preventing Healthcare-Associated Infections (HAIs).

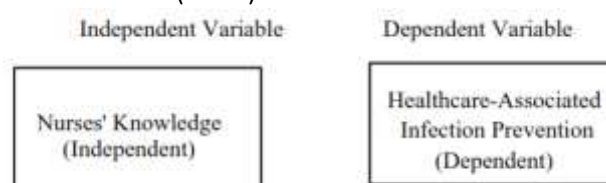


Figure 1. Conceptual Framework

### Research Variables

This study includes an independent variable and a dependent variable, described as follows:

#### Independent Variable

The independent variable in this study is Nurses' Knowledge regarding Healthcare-Associated Infections (HAIs).

## Dependent Variable

The dependent variable in this study is Nurses' Actions in Preventing Healthcare-Associated Infections (HAIs).

## Research Design and Type

This research uses a quantitative approach with a cross-sectional design, in which data on the independent variable (nurses' knowledge) and the dependent variable (HAI prevention actions) are collected simultaneously at one point in time. The study was conducted in the inpatient wards of Efarina Berastagi Hospital to determine the relationship between the two variables.

## Population and Sample

### Population

The population refers to a generalization consisting of objects or subjects having certain characteristics that are determined by the researcher for study and from which conclusions can be drawn (Sugiono, 2018). The population in this study includes all nurses working in the inpatient wards of Efarina Berastagi Hospital, totaling 124 nurses.

### Sample

A sample is a portion of the population that possesses similar characteristics. The advantage of sampling is that it allows the research to be more efficient while still adequately representing the population under study (Sugiono, 2018). This study employed a total sampling technique, in which the entire population meeting the criteria is selected as the sample. Therefore, the number of samples in this study is the same as the total population, namely 124 nurses from the inpatient wards of Efarina Berastagi Hospital.

## Research Location and Time

This study was conducted at Efarina Berastagi Hospital from July to August 2025, located at Jl. Jamin Ginting No. 1, Desa Raya Berastagi, Karo Regency..

## 3. Results and Discussion

### Overview

This research was conducted in July 2025 at Efarina Berastagi Hospital. The study focused on examining the relationship between nurses' knowledge and the prevention of Healthcare-Associated Infections (HAIs) in the inpatient wards. Data collection involved distributing questionnaires to nurses who met the inclusion criteria. The collected data were processed and analyzed using univariate and bivariate analysis methods to describe respondent characteristics and to determine the relationship between variables.

### Univariate Analysis

Respondent Characteristics by Age, Gender, Education, and Work Experience

**Table 1.** Characteristics of Respondents by Age, Gender, Education, and Work Experience (n = 124)

Characteristics	Category	Frequency (n)	Percentage (%)
Age	21–25 years	28	22.6
	26–30 years	39	31.5
	31–35 years	32	25.8
	> 35 years	25	20.2
Gender	Male	33	26.6

Characteristics	Category	Frequency (n)	Percentage (%)
	Female	91	73.4
Education	Diploma III in Nursing	81	65.3
	Bachelor of Nursing	30	24.2
	Professional Nurse (Ners)	13	10.5
Work Experience	< 3 years	29	23.4
	3–5 years	46	37.1
	6–10 years	33	26.6
	> 10 years	16	12.9

Source: Data processed in July 2025.

Based on the analysis results in Table 4.1, the majority of respondents were aged 26-30 years (62 respondents) and 50% (50%). The majority of respondents were female (98 respondents) and 79% (62.1%) with a Diploma 3 education. The majority of respondents had 1-2 years of service (64 respondents) and 51.6% with 1-2 years of service.

## Research Results

### Univariate Analysis

#### Nurse Knowledge Variables

**Table 2.** Distribution of Nurses' Knowledge Levels (n = 124)

Knowledge Level	Frequency (n)	Percentage (%)
Good	67	54.0
Fair	45	36.3
Poor	12	9.7

Source: Data processed in July 2025.

Based on Table 2, the results show that the majority of respondents have a good level of knowledge, totaling 67 respondents (54.0%). Meanwhile, 45 respondents (36.3%) have a fair level of knowledge, and 12 respondents (9.7%) have a poor level of knowledge.

#### Variable of HAI Prevention Measures

**Table 3.** Distribution of HAI Prevention Measures (n = 124)

Prevention Category	Frequency (n)	Percentage (%)
Good	72	58.1
Fair	40	32.3
Poor	12	9.7

Source: Data processed in July 2025.

Based on Table 3. the results show that most respondents demonstrate good HAI prevention practices, totaling 72 respondents (58.1%). Meanwhile, 40 respondents (32.3%) fall into the fair category, and 12 respondents (9.7%) perform poor HAI prevention measures.

### Bivariate Analysis

**Table 4.** Relationship between Nurses' Knowledge and Prevention of Healthcare-Associated Infections (HAIs) (n = 124)

Knowledge Level	Good Prevention n (%)	Fair Prevention n (%)	Poor Prevention n (%)	Total	p-value
Good	52 (41.9%)	12 (9.7%)	3 (2.4%)	67	

Knowledge Level	Good Prevention n (%)	Fair Prevention n (%)	Poor Prevention n (%)	Total	p-value
Fair	18 (14.5%)	19 (15.3%)	8 (6.5%)	45	0.001
Poor	2 (1.6%)	9 (7.3%)	1 (0.8%)	12	
Total	72	40	12	124	

Source: Data processed in July 2025.

Based on the bivariate analysis in Table 4.4, it is evident that the respondents with *good knowledge* predominantly perform *good HAI prevention measures*, with 52 respondents (41.9%). Meanwhile, nurses with *fair knowledge* show a lower proportion of good prevention actions, with 18 respondents (14.5%). In contrast, those with *poor knowledge* exhibit the lowest level of prevention actions, with only 2 respondents (1.6%).

The statistical test results show a p-value < 0.05, indicating a significant relationship between nurses' knowledge and HAI prevention measures. This means that better knowledge is associated with better infection prevention practices.

These findings align with previous research stating that adequate knowledge plays a crucial role in enabling nurses to implement effective infection control measures. Knowledge equips nurses with the understanding required to perform hand hygiene correctly, use personal protective equipment (PPE) appropriately, and adhere to standard precautions in the clinical setting. Thus, it can be concluded that nurses with higher knowledge are more likely to carry out effective HAI prevention measures compared to those with lower knowledge levels.

## Discussion

### Introduction

This discussion chapter elaborates on the research findings related to respondents' characteristics (age, gender, education, and work experience), descriptions of the study variables (nurses' knowledge and Healthcare-Associated Infection (HAI) prevention practices), and the analysis of the relationship between the two variables using the Spearman correlation test as presented in the previous chapter.

### Interpretation and Discussion of Findings

#### Age

The results show that the largest proportion of respondents were aged 26–30 years, totaling 50% of the sample. Nursing is a profession that requires complex decision-making and continuous interaction with patients who have varying characteristics and health needs. According to Nursalam (2016), as individuals grow older, their cognitive abilities and maturity level generally improve, allowing nurses to make better clinical judgments.

Younger nurses often enter the profession with high enthusiasm but may have limited realistic expectations compared with older nurses who possess more work experience and emotional stability (Istiqomah & Nurhayati, 2023). Experienced and older nurses tend to demonstrate stronger coping mechanisms when facing emotional stressors and exhibit patience and empathy toward patients undergoing critical conditions (Sartika et al., 2023).

Additionally, nurses aged 20–35 years are more likely to comply with established standards and demonstrate higher levels of knowledge retention (Ardina et al., 2021). However, findings from the study site revealed that some younger nurses still performed HAI prevention practices inadequately, indicating a need for continuous guidance and supervision.

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In contrast, older nurses at Efarina Berastagi Hospital—particularly those working in inpatient units—demonstrated better mastery of HAI-related Standard Operating Procedures (SOPs). Their experience enables them to anticipate infection risks more effectively and serve as role models for younger nurses.

### **Gender**

Most respondents in this study were female, comprising 79% of the total. Evidence indicates that both male and female nurses may experience stress and workload demands differently, influencing their infection prevention behavior (Pangestika, 2022). Sihombing (2020) notes that the high incidence of HAIs is partly attributed to female nurses performing patient care procedures without always adhering strictly to infection prevention standards due to high direct-contact workloads.

Female nurses tend to be more compliant with institutional standards and more meticulous in self-care, which contributes to better infection prevention practices (Ardina et al., 2021). However, the study also found that some female nurses still demonstrated low levels of accuracy in HAI prevention procedures.

Male nurses, on the other hand, were generally found to perform tasks in accordance with SOPs but sometimes lacked the same level of emotional engagement or thoroughness seen in their female counterparts. Nonetheless, male nurses tended to perform nursing documentation more precisely and systematically.

### **Education**

The majority of respondents (62.1%) held a Diploma III in Nursing (D3). Educational level is closely related to an individual's cognitive ability and skills in performing clinical duties. Nurses with higher education generally demonstrate better documentation quality and a stronger understanding of clinical protocols (Notoatmodjo, 2020; Saragih et al., 2021).

According to Alberta Esti Noviantari et al. (2023), education serves as a foundation influencing both knowledge and behavior. Individuals with lower educational levels tend to demonstrate lower awareness and understanding of infection control measures.

Education is a lifelong process that plays a central role in shaping human knowledge and skill development. Higher educational attainment often corresponds to greater responsibility and higher expectations within nursing roles. At Efarina Berastagi Hospital, most inpatient nurses had Diploma-level education, meaning that continuous professional development is crucial to strengthening their competence in HAI prevention.

### **Work Experience**

The findings indicate that 51.6% of respondents had 1–2 years of work experience, suggesting a workforce dominated by relatively young nurses. Work experience is directly related to professional expertise, where longer experience typically equates to greater mastery of clinical procedures and situational judgment (Fatimah et al., 2024).

Experienced nurses are better able to manage complex patient conditions and prevent the occurrence of HAIs due to their familiarity with routine protocols and potential risk factors (Sophia Hasanah et al., 2024). Conversely, nurses with limited experience may still be developing core competencies, making them more vulnerable to procedural errors and lapses in infection control.

While experienced nurses at Efarina Berastagi Hospital demonstrated better infection prevention practices, high workloads and fatigue sometimes led to reduced performance, potentially contributing to patient HAI risk. This aligns with evidence that prolonged physical and emotional strain may affect compliance with infection control standards.

Work experience also influences how extensively nurses understand clinical issues. Those with longer tenure may have deeper insights into HAI prevention measures, while newer nurses may still be adjusting to clinical responsibilities.

The scientific equation is written in the center (centered) and the equation number is written on the right parallel to the equation as in the following example.

### **Nurses' Knowledge**

The analysis revealed that 98.4% of respondents had good knowledge of HAI prevention. These findings are consistent with Fatimah et al. (2024), who reported that most nurses in their study demonstrated high knowledge levels regarding infection prevention. Knowledge is shaped by the information received through formal and informal learning as well as previous clinical experience (Mokodongan et al., 2021). Training, seminars, workshops, and continuing education play a critical role in enhancing nurses' skills and knowledge (Sophia Hasanah et al., 2024).

Notoatmodjo emphasizes that knowledge is a fundamental determinant of behavior. Actions grounded in knowledge tend to be more effective and consistent. Conversely, inadequate understanding leads to poor infection prevention behavior, longer hospitalization, and increased healthcare costs. Improving nurses' knowledge is therefore essential to minimizing HAI risks. Hospitals and Infection Prevention and Control (IPC) teams must promote continuous learning to cultivate a strong safety culture and enhance patient outcomes.

### **HAI Prevention Practices**

The study found that 95.2% of respondents demonstrated good HAI prevention practices. This aligns with the findings of Hamonangan (2018), where 83% of respondents performed appropriate HAI prevention measures. Similarly, Julwansah Saragih & Perangin-Angin (2021) reported that most nurses appropriately applied infection prevention principles.

Survey results indicated that nurses consistently practiced standard precautions, including hand hygiene before and after patient contact, proper glove use, and adherence to PPE guidelines. These actions significantly reduce the spread of nosocomial infections.

HAIs may result from patient-related factors (age, comorbidities), nursing-related factors (length of stay, adherence to SOPs), and microbiological factors (pathogenicity, exposure duration). Therefore, preventive practices by healthcare workers, especially nurses, are critical in reducing HAI incidence and improving patient safety.

### **Relationship Between Nurses' Knowledge and HAI Prevention Practices**

Spearman correlation analysis revealed a significant relationship between nurses' knowledge and HAI prevention practices ( $p$ -value < 0.001). This finding indicates that higher knowledge is associated with better HAI prevention performance. The correlation coefficient ( $r = 0.568$ ) falls within a moderate positive correlation range, meaning that improved knowledge contributes meaningfully to improved prevention behaviors. This result is consistent with studies by:

1. Sartika et al. (2023) – found a significant relationship between knowledge and infection prevention.
2. Saragih & Perangin-Angin (2021) – reported a significant association between HAI knowledge and sterile procedures.
3. Chairani et al. (2022) – confirmed knowledge correlated with handwashing compliance.
4. Hamonangan (2018) – found a link between knowledge and nosocomial infection prevention.

Knowledge influences actions by shaping awareness and guiding decision-making. When nurses understand the consequences of inadequate infection control, they are more likely to perform preventive measures effectively. However, environmental, organizational, and personal motivational factors may also influence compliance.

### Study Limitations

The use of Google Forms for data collection resulted in delayed responses from participants, slowing the data-gathering process. Limited research time may have affected the comprehensiveness and accuracy of the data obtained.

### Implications

The findings provide important insights for the nursing profession, particularly regarding the significance of HAI prevention. This study may serve as a reference for future research, while also informing policy and training programs aimed at improving nurse competency and strengthening patient safety culture in healthcare settings.

## 4. Conclusion

Based on the results of this study, it can be concluded that most nurses in the inpatient wards of Efarina Berastagi Hospital demonstrated a good level of knowledge (98.4%) and good practices in preventing Healthcare-Associated Infections (HAIs) (95.2%). The findings also revealed a significant relationship between nurses' knowledge and HAI prevention measures ( $p$ -value = 0.000), with a moderate correlation strength ( $r = 0.568$ ). The positive correlation coefficient indicates that higher levels of knowledge are associated with better HAI prevention practices, whereas lower levels of knowledge correspond to poorer prevention efforts.

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