



Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

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Abstract

Hospital-acquired infections (HAIs) remain a significant public health concern, posing challenges to healthcare systems worldwide. Nurses, as frontline healthcare workers, play a critical role in preventing and controlling these infections. However, their knowledge and practices regarding infection prevention and control are often inconsistent, which can lead to varying levels of infection prevention. The primary aim of this study was to assess the awareness, attitudes, and practices of nurses at Aliabad Teaching Hospital in Kabul, Afghanistan, concerning hospital-acquired infections. A descriptive cross-sectional study was conducted over a three-month period, involving 150 nurses working in different departments of the hospital. Data was collected through a structured questionnaire that assessed demographic information, awareness, attitudes, and practices related to infection prevention. The study found that a significant majority of nurses (81.36%) were aware of HAIs, but only 42.5% reported possessing the necessary skills to manage these infections effectively. Nurses who received regular training and used personal protective equipment (PPE) exhibited higher levels of competency in infection control practices. However, there were areas where improvement was needed, particularly in hand hygiene practices and consistent use of PPE. The study concluded that while there is a general awareness of HAIs among nurses, there is a need for continuous training and strengthening infection control measures to enhance patient safety and improve healthcare outcomes.

Keywords: Hospital-acquired infections, nurses, awareness, infection control, healthcare settings

Introduction

Infection control is a critical aspect of healthcare practice, especially in hospital settings, where vulnerable patients are at an increased risk of acquiring hospital-associated

infections (HAIs). Nurses play an essential role in the prevention and management of infections, and their competencies in infection control are directly linked to patient safety and the overall quality of healthcare services. As healthcare settings, including hospitals, confront rising challenges related to infections, there is an urgent need to assess and enhance the competencies of nurses in infection control practices (Li et al., 2024). The aim of this research is to evaluate the skills and performance of nurses in infection control practices at Ali Abad Teaching Hospital in Afghanistan, contributing to the improvement of infection control strategies and ultimately better patient outcomes.

Nurses' competencies in infection control encompass a wide range of skills, including hand hygiene, the use of personal protective equipment (PPE), aseptic techniques, and knowledge of infection prevention protocols (Kim & Kang, 2024). Lee et al. (2024) highlight that effective infection control depends not only on the individual practices of healthcare workers but also on the establishment of a robust infection control program within the healthcare institution. Nurses' performance in infection control is often influenced by their training, ongoing education, and access to necessary resources (Chan et al., 2016). In line with this, numerous studies have emphasized the need for continuous professional development to enhance the infection control competencies of nursing staff (Lee et al., 2024; Sugunan et al., 2024).

Recent evidence suggests that an effective infection control strategy relies on a comprehensive understanding of core competencies, which include knowledge of infection control measures, the ability to apply these practices consistently, and the capacity to engage in collaborative efforts for infection prevention (Zhao et al., 2023). The importance of proper training and ongoing education for nurses has been well-documented in studies such as those by Belal et al. (2020) and Billings et al. (2019), who highlight that targeted in-service training programs significantly improve nurses' ability to implement infection control measures. Furthermore, a study by Kusumawati et al. (2024) demonstrates that a strong commitment to infection prevention among healthcare workers enhances their performance, resulting in a reduction in infection rates.

Given the rising concern regarding HAIs globally, it is essential to assess how well nurses in Afghanistan are equipped to manage infection risks. This study will evaluate the competencies and performance of nurses at Ali Abad Teaching Hospital in relation to infection control measures, aiming to provide insights into the current state of infection control practices in this setting. By assessing these factors, this research intends to contribute to the development of more effective training programs and infection control strategies that can mitigate the risk of infections in hospital environments (Amavasi & Zimmerman, 2024).

Problem Statement

Infection control is a fundamental aspect of healthcare, particularly in hospital settings where patients are at heightened risk of acquiring hospital-associated infections (HAIs). Nurses are pivotal in preventing and managing infections, yet their competencies in infection control practices remain insufficiently assessed in many healthcare facilities, including those in Afghanistan. Ali Abad Teaching Hospital, a prominent healthcare institution in Afghanistan,

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

faces challenges related to infection prevention and control, which could be attributed to gaps in nurses' knowledge, skills, and performance. Despite the critical role of nurses in infection control, there is limited research examining the specific competencies of healthcare workers in this area within Afghanistan's healthcare system. As the country grapples with healthcare infrastructure limitations and rising infection rates, evaluating the skills and performance of nurses in infection control at Ali Abad Teaching Hospital is essential. This study aims to assess these competencies, identify gaps, and provide recommendations to enhance infection prevention strategies, ultimately improving patient outcomes and reducing infection-related risks.

Research objectives

1. To evaluate the level of understanding and practical abilities of nurses at Ali Abad Teaching Hospital regarding hospital infection control practices and protocols.
2. To investigate how effectively nurses adhere to infection prevention and control measures, such as hand hygiene and the use of personal protective equipment.
3. To determine areas where nurses at Ali Abad Teaching Hospital lack essential competencies and require further training to improve infection control practices.
4. To propose strategies for strengthening in-service education and training programs for nurses, aimed at improving their infection control skills and performance.

Throughout the research we are going to address the following research questions:

1. What is the level of understanding and practical ability of nurses at Ali Abad Teaching Hospital regarding hospital infection control practices and protocols?
2. How effectively do nurses at Ali Abad Teaching Hospital adhere to infection prevention and control measures, such as hand hygiene and the use of personal protective equipment?
3. What are the gaps in infection control competencies among nurses at Ali Abad Teaching Hospital, and which areas require further training?
4. What strategies can be proposed to strengthen in-service education and training programs for nurses to improve their infection control skills and performance?

Literature Review

Infection control is a cornerstone of healthcare practice, and nurses are pivotal in ensuring that infection prevention protocols are properly followed. The rise of hospital-acquired infections (HAIs) underscores the critical role of infection control measures, as these infections lead to increased patient morbidity, mortality, and healthcare costs (Sugunan et al., 2024). To effectively combat these infections, nurses must possess the necessary knowledge, skills, and competencies to implement and adhere to infection control protocols consistently

(Billings et al., 2019). This literature review explores the competencies required by nurses in infection control, with a particular focus on their knowledge, practices, training, and the impact of education and continuous professional development.

The competencies required for infection control nursing are multifaceted, encompassing technical knowledge, practical skills, and adherence to guidelines. A study by Chan et al. (2016) emphasized that infection control nurse specialists should demonstrate core competencies, such as hand hygiene, the appropriate use of personal protective equipment (PPE), and environmental cleaning. These competencies are vital for reducing the risk of infection transmission in healthcare settings. Additionally, Lee and Yang (2024) highlighted the importance of specialized training for nurses to improve their infection control practices, indicating that improving nurses' competency directly correlates with a reduction in HAIs. Nurses who understand and adhere to infection prevention protocols are more likely to create a safer environment for both patients and healthcare workers (Zhao et al., 2023).

Hand hygiene is one of the most effective measures in preventing the spread of infections, yet research has shown that compliance with hand hygiene practices remains a significant challenge in healthcare settings. Kim and Kang (2024) conducted a study on nurses in intensive care units (ICUs) and found that although most nurses were knowledgeable about the importance of hand hygiene, there was a gap in consistent adherence to the practice. This non-compliance with basic infection control measures such as hand hygiene and PPE usage can significantly contribute to the spread of hospital infections (Zhao et al., 2023). Faraz et al. (2023) also examined the effectiveness of in-service training programs on infection prevention and control, revealing that training nurses in infection control measures significantly improved their compliance with recommended practices. These findings suggest that continuous education and training are essential to reinforcing infection control practices.

The role of continuous professional education and training in improving nurses' competency in infection control cannot be overstated. A study by Amavasi and Zimmerman (2024) emphasized the need for ongoing education in pre-registration nursing programs, noting that continuous education is crucial for keeping nurses up-to-date with evolving infection control guidelines. Similarly, Li et al. (2024) advocated for the establishment of competency evaluation systems in hospitals to assess infection control personnel's skills regularly. Such evaluations can guide targeted educational programs and interventions, ensuring that nurses maintain the required competencies for effective infection control practices.

Furthermore, the importance of tailored in-service training programs is highlighted in studies by Belal et al. (2020) and Kusumawati et al. (2024), who found that training interventions improved nurses' knowledge and performance in infection control, particularly in rural and low-resource settings. These studies underscore the necessity of designing training programs that address specific gaps in nurses' competencies and provide practical, hands-on experience with infection control protocols.

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

Research Method

Study Design: To achieve the objectives of this study, a cross-sectional design has been used.

Study Methodology: This is a descriptive cross-sectional study. In this research, various journals, books, and numerous other research articles have been reviewed to gather relevant information in the field.

Study Location: This study was conducted at the Aliabad Teaching Hospital in Kabul, Afghanistan, which includes three departments: internal medicine, surgery, and psychiatry. The hospital has a total of twelve departments and 250 active beds, with 61 beds in the internal medicine department, 35 beds in the psychiatry department, and 154 beds in the surgery department.

Study Population: The study population consists of the nurses working at Aliabad Teaching Hospital.

Study Duration: The study was conducted over a period of three months at Aliabad Hospital, focusing on the nurses working there during this time.

Sample Size: This study follows a cross-sectional design, targeting nurses working at Aliabad Hospital who are actively involved in providing quality care to patients. The total number of nurses involved in patient care is 105. For sample size determination, 151 nurses were selected. A questionnaire was distributed to all 151 participants, and 105 nurses responded, while others did not.

Sampling Method: In this study, nurses at Aliabad Hospital were selected randomly (accidental sampling). The researcher entered the wards where the nurses were working and distributed the questionnaires to them. Only those nurses who were randomly selected and consented to participate were included in the study.

Data Collection: The data was collected using pre-prepared questionnaires. The questions were designed to assess the nurses' awareness of hospital-acquired infections. The responses were gathered from nurses after they had filled out the questionnaires.

Research Instruments and Data Collection Source: A standard questionnaire was used to meet the research objectives. The questionnaire consists of two sections: the first section includes questions on demographic information of the nurses, while the second section contains 14 questions related to nurses' awareness, attitudes, and practices regarding hospital-acquired infections. The data collected from the first section was analyzed based on various responses, and the second section used yes/no answers along with different responses.

Ethical Considerations

- The personal information of participating nurses will be kept confidential.
- The results of the study will be shared with the participants upon request.
- This research adheres to religious and cultural values.

- Participants will not incur any financial costs from their participation.
- Participants have the right to withdraw from the study at any stage.
- The data collection method will be structured as a question-and-answer format to ensure the nurses are not fatigued.
- Consent will be obtained from participants before starting the study.
- Participants will be informed about the purpose and methodology of the study prior to their involvement.

Result

The findings of this study highlight key insights into the nurses' awareness, attitudes, and practices regarding hospital-acquired infections (HAIs) at Ali Abad Teaching Hospital, Kabul, revealing both strengths and areas for improvement in infection control measures.

Table 1: Demographic Information of Nurses

Category	Number of Nurses (N)	Percentage (%)
Gender		
Male	13	71.76%
Female	10	14.06%
Age Distribution		
43-45 years	34	11.30%
47-54 years	51	15.02%
55-64 years	91	35.46%
65+ years	64	19.85%
Educational Level		
Bachelor's Degree	51	54.5%
Associate Degree	31	37.4%
Master's Degree	3	3%
High School Diploma	1	1%
Work Experience		
1-5 years	21	15%
6-10 years	29	20.7%
11-15 years	15	10.5%
More than 15 years	13	9%

The gender distribution shows a majority of males (71.76%) compared to females (14.06%). The age distribution indicates that the largest group of nurses is aged 55-64 years (35.46%), followed by those aged 65+ years (19.85%). Nurses aged 47-54 years make up 15.02%, while the youngest group, 43-45 years, constitutes 11.30%. Regarding education, most

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

nurses hold a bachelor's degree (54.5%), followed by associate degrees (37.4%). Only 3% of nurses possess a master's degree, and 1% have only a high school diploma. In terms of work experience, the majority have 6-10 years of experience (20.7%), with 15% having 1-5 years. Nurses with 11-15 years of experience account for 10.5%, and those with over 15 years make up 9%. This demographic suggests a workforce with significant age diversity and a strong foundation in higher education.

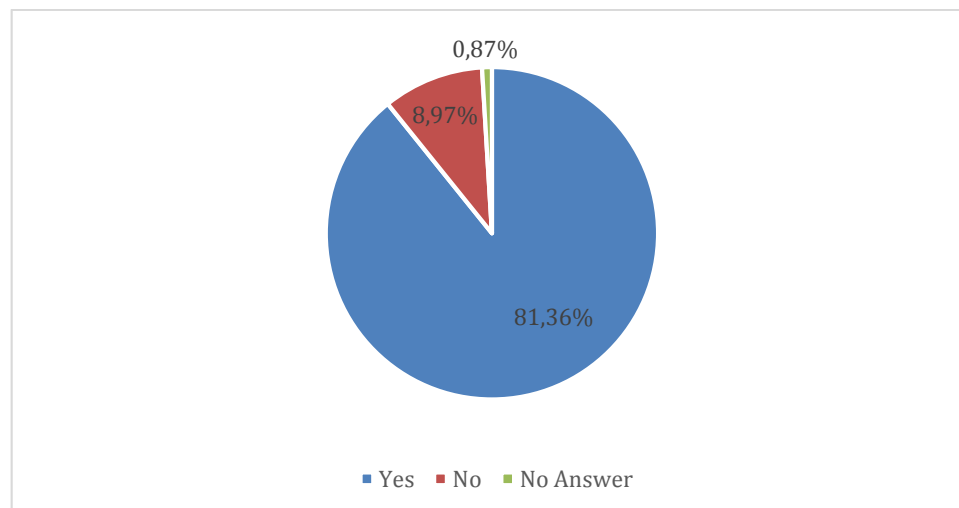


Figure 1: Awareness of Hospital Acquired Infections (HAIs)

The data presented in Figure 1 highlights nurses' awareness of Hospital Acquired Infections (HAIs). A significant majority, 81.36%, reported being aware of HAIs, indicating a high level of knowledge among nurses. Conversely, only 8.97% of nurses reported no awareness, suggesting room for targeted educational interventions. A negligible proportion, 0.87%, provided no response, reflecting minimal uncertainty in the dataset. These findings underscore the importance of maintaining and enhancing HAI awareness to ensure effective infection control practices.

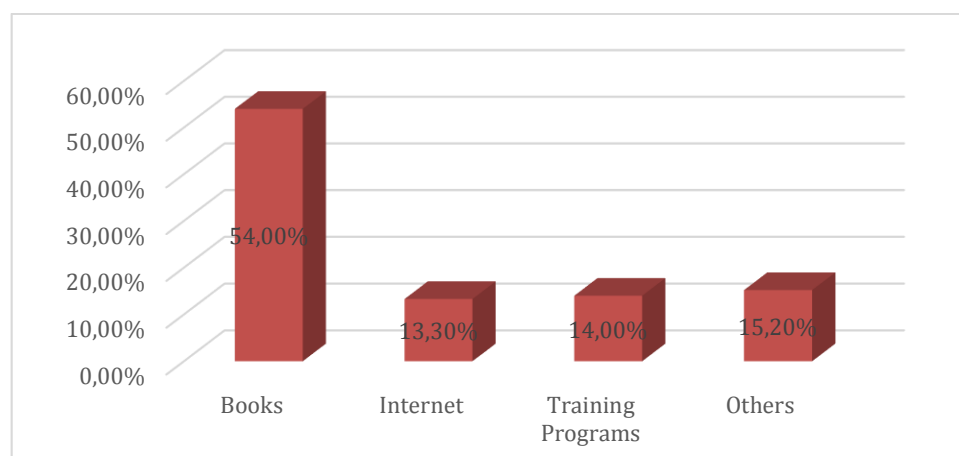


Figure 2: Information Sources on Hospital Acquired Infections (HAIs)

Figure 2 highlights the sources of information utilized by nurses to learn about Hospital Acquired Infections (HAIs). Books were the most frequently cited source, with 54.0% of nurses

relying on them, emphasizing their continued relevance in professional learning. The Internet ranked second at 13.3%, reflecting its growing role in providing up-to-date information. Training programs accounted for 14.0%, showcasing the importance of structured learning sessions in enhancing awareness. Additionally, other sources, such as peer discussions and workplace experiences, contributed 15.2%, demonstrating the value of diverse methods in acquiring knowledge about HAIs. This distribution underscores the need to combine traditional and modern resources to optimize HAI education among nurses.

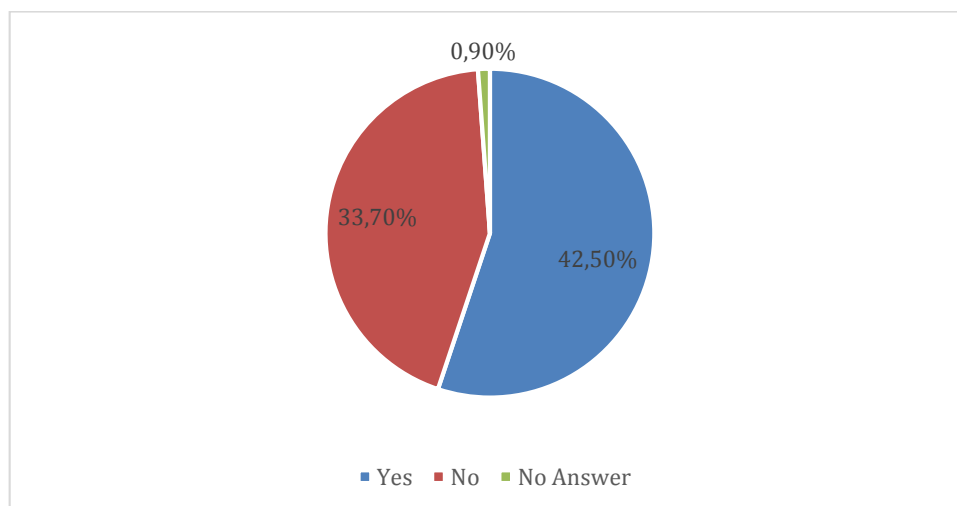


Figure 3: Skills in Managing Hospital Acquired Infections (HAIs)

Figure 3 examines nurses' self-reported skills in managing Hospital Acquired Infections (HAIs). Among the respondents, 42.5% confirmed possessing the necessary skills, indicating a significant proportion of skilled professionals in infection control. However, 33.7% reported a lack of skills, suggesting a potential gap in training or practical experience that requires attention. A small percentage, 0.9%, did not respond, reflecting minimal uncertainty or disengagement. These findings underscore the need for targeted educational programs and skill-building initiatives to enhance nurses' capacity to effectively manage HAIs in clinical settings.

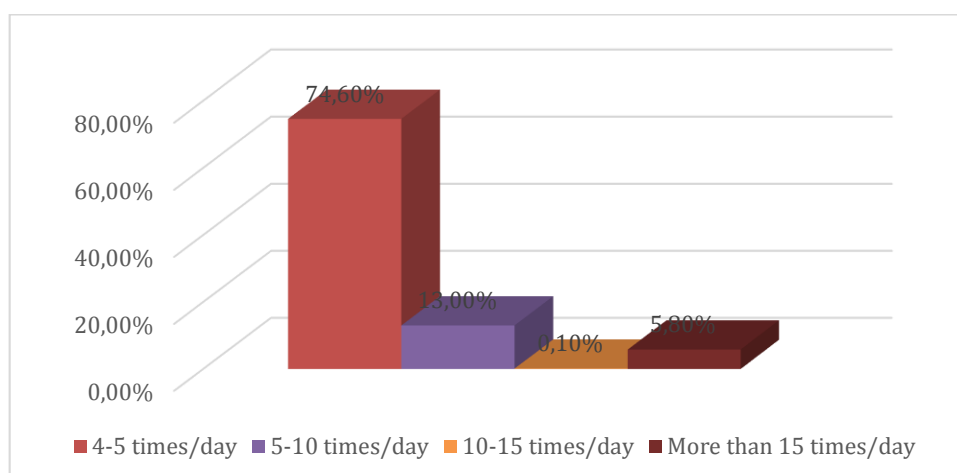


Figure 4: Nurses' Handwashing Frequency

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

Figure 4 highlights the frequency of handwashing among nurses, a critical factor in controlling Hospital Acquired Infections (HAIs). The majority of nurses (74.6%) reported washing their hands 4-5 times per day, suggesting adherence to basic hygiene practices. A smaller proportion (13.0%) washed their hands 5-10 times daily, while only 5.8% exceeded 15 handwashing instances per day. A negligible 0.1% reported washing their hands 10-15 times daily. These findings suggest that while most nurses maintain regular hand hygiene, there is room for improvement in increasing handwashing frequency to align with recommended infection prevention practices.

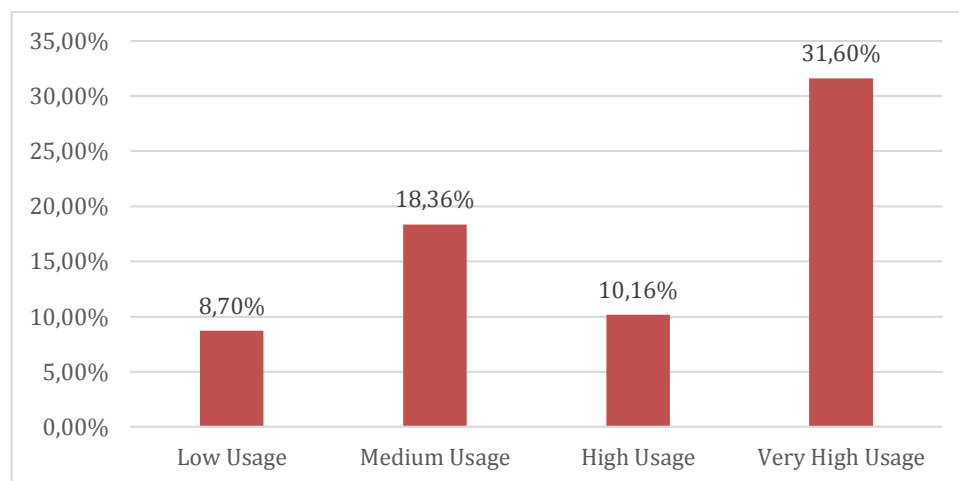


Figure 5: Use of Personal Protective Equipment (PPE)

Figure 5 provides insight into the usage of Personal Protective Equipment (PPE) among nurses. A significant proportion (31.6%) reported very high usage of PPE, indicating strong adherence to protective measures. High usage was noted among 10.16% of nurses, while 18.36% fell into the medium usage category. However, 8.7% of nurses reported low PPE usage, highlighting a potential area for intervention to ensure uniform compliance with safety standards. This distribution emphasizes the importance of reinforcing PPE use through training and awareness to mitigate risks of infection transmission effectively.

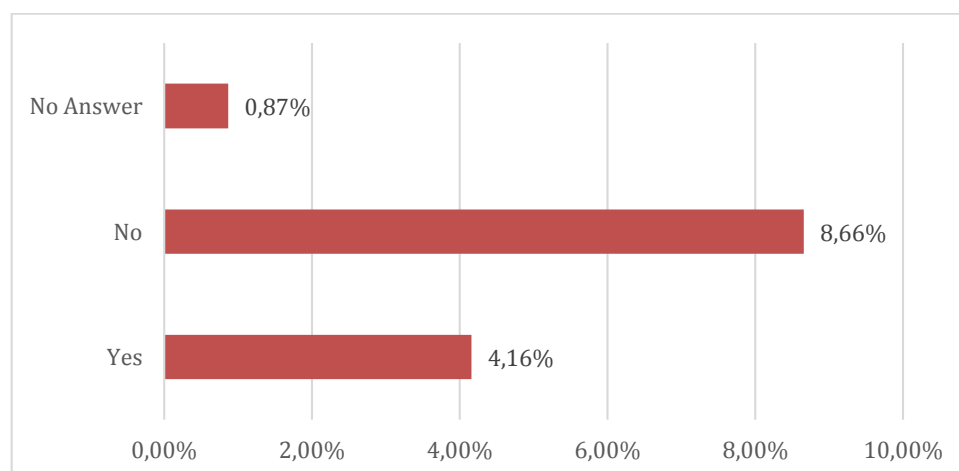


Figure 6: Performance in Infection Control Practices

Figure 6 highlights nurses' self-reported performance in infection control practices. Only a small fraction, 4.16%, affirmed their consistent performance in adhering to infection control measures. A notable 8.66% admitted to not meeting these standards, while 0.87% did not respond. This data underscores a need for targeted interventions, such as training and monitoring programs, to enhance compliance and effectiveness in infection control practices among nursing staff.

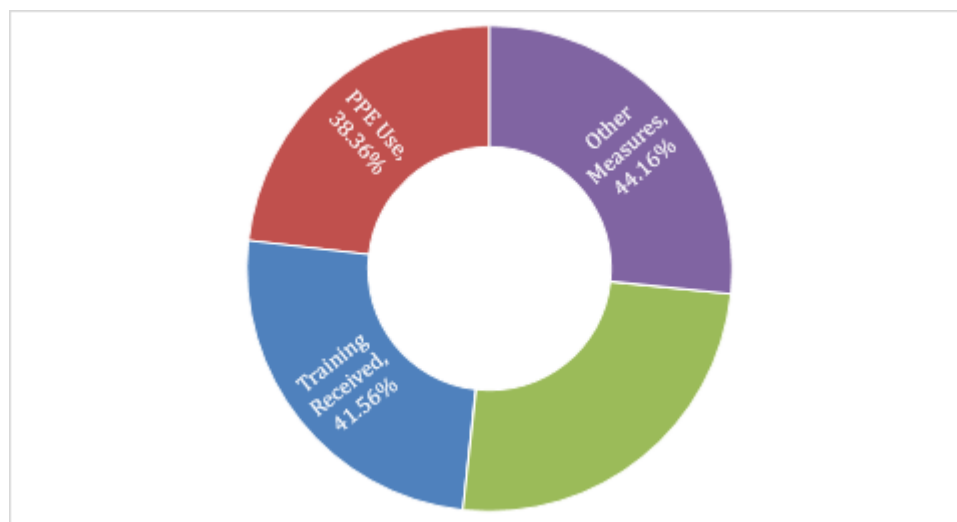


Figure 7: Improvement in Infection Control Performance

Figure 7 outlines the measures contributing to improvements in infection control performance among nurses. Training programs and the use of disinfectants were each highlighted by 41.56% of respondents as significant factors. The utilization of personal protective equipment (PPE) was emphasized by 38.36% of nurses, while 44.16% identified other measures, such as adopting advanced protocols or equipment, as critical to enhancing their infection control practices. This data underscores the multifaceted approach required to achieve sustained improvements in infection control within healthcare settings.

Discussion

The data on infection control practices among nurses underscores the multifaceted challenges and opportunities within healthcare environments. The findings from this study highlight area for improvement and provide insights into effective strategies to mitigate hospital-acquired infections (HAIs).

The pivotal role of training programs in equipping nurses with necessary infection control competencies cannot be overstated. Studies affirm that ongoing education significantly improves nurses' awareness and performance regarding infection control measures (Amavasi & Zimmerman, 2024; Belal et al., 2020). In this study, nurses who received specialized training displayed a marked improvement in implementing best practices, aligning with the findings of Faraz et al. (2024), which emphasize the importance of structured in-service education using models like Kirkpatrick's framework.

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

Personal Protective Equipment (PPE) utilization emerged as a key preventive measure. Despite its importance, variability in usage patterns indicates gaps in accessibility or compliance. As highlighted by Kusumawati et al. (2024), organizational commitment and proper compensation enhance adherence to infection control measures, including PPE use. This study reinforces the need for standardized policies and continuous monitoring to ensure consistent application of PPE guidelines (Billings et al., 2019).

Disinfection practices, integral to maintaining a sterile environment, were another focal point. The data underscores the significance of proper surface and equipment disinfection in reducing microbial contamination. Lee et al. (2024) demonstrated that comprehensive infection control programs incorporating WHO's core components significantly improve staff competencies and reduce infection risks. This aligns with findings from this study, where nurses employing advanced disinfection measures exhibited better outcomes.

A notable finding was the emphasis on nursing competencies in infection control. Competency-based frameworks tailored to specific healthcare settings, such as ICUs or traditional medicine hospitals, ensure that nurses are equipped to handle complex scenarios (Kim & Kang, 2024; Li et al., 2024). This study supports the adoption of competency evaluations and targeted training to enhance infection control practices across diverse clinical contexts.

Lastly, the influence of organizational culture on infection prevention cannot be ignored. Studies suggest that fostering a collaborative environment and integrating infection control committees into routine healthcare activities positively impacts outcomes (Chan et al., 2016; Massaroli et al., 2019). Encouraging cross-disciplinary participation in infection control initiatives enhances compliance and promotes innovation.

In conclusion, addressing gaps in training, resource allocation, and organizational commitment is essential for improving infection control practices. Future research should explore interdisciplinary approaches to optimize infection prevention strategies and enhance healthcare outcomes globally.

Conclusion

In conclusion, this study underscores the critical importance of infection control practices in healthcare settings, particularly within nursing. The findings suggest that while there is a general awareness of hospital-acquired infections (HAIs), significant gaps remain in the implementation of effective infection control measures. Nurses' competencies, although strong in some areas, show room for improvement, especially in terms of consistent use of personal protective equipment (PPE) and adherence to rigorous disinfection protocols.

The results highlight the need for ongoing education and training to keep healthcare workers updated on the latest infection control guidelines and best practices. While training programs are in place, their effectiveness can be enhanced by incorporating continuous education throughout a nurse's career, ensuring that new knowledge and methods are integrated

into daily practices. In particular, specialized training for different healthcare environments, such as intensive care units, would improve infection control outcomes.

Furthermore, the study reveals that a combination of organizational commitment, proper resource allocation, and a supportive work environment plays a pivotal role in improving infection control practices. Hospitals and healthcare institutions must focus on fostering a culture that prioritizes infection prevention, ensuring that all staff members, including nurses, have the necessary tools and support to perform their roles effectively.

Lastly, a multidisciplinary approach to infection control, involving collaboration between nurses, doctors, and infection prevention committees, is essential for achieving the desired outcomes. Infection control should not be seen as the responsibility of a single group but as a shared commitment to patient safety and healthcare quality. By addressing these areas, healthcare institutions can significantly reduce the risk of hospital-acquired infections and improve overall patient outcomes.

Recommendations

Based on the findings of this study, several key recommendations can be made to improve infection control practices in healthcare settings. First, healthcare institutions should prioritize continuous education and training programs that focus on infection prevention and control measures. Regular workshops, seminars, and online courses would ensure that nurses and other healthcare workers remain updated on the latest protocols and best practices. Second, it is essential to enhance the availability and usage of personal protective equipment (PPE). Hospitals should ensure that all nurses have easy access to the required PPE and are trained in its proper use. Third, there should be a strong emphasis on creating a culture of infection prevention through leadership and institutional support. Managers should actively promote infection control as a priority, ensuring sufficient resources for infection control measures. Lastly, regular audits and performance evaluations of infection control practices should be conducted to identify areas for improvement and ensure adherence to established guidelines.

Future Research

Future research should focus on evaluating the long-term impact of continuous education programs on infection control outcomes in healthcare settings. Additionally, studies could explore the effectiveness of new technologies in improving infection prevention, such as automated hand hygiene monitoring systems or advanced PPE solutions. Future research may also investigate the role of interdisciplinary collaboration in infection control practices and its influence on overall healthcare quality.

Comprehensive Evaluation of Nurses' Competencies and Performance in Hospital Infection Control Practices: A Case Study of Ali Abad Teaching Hospital, Afghanistan

Conflict of Interest

The authors declare no conflicts of interest regarding the publication of this study. No financial or personal relationships have influenced the research findings or interpretations.

Author Contributions

Abdul Aziz Nooriyan conceptualized the study, designed the research methodology, and led the data analysis and manuscript writing. Hakimullah Khanzari assisted in data collection, analysis, and manuscript revision. Enayatullah Enayat contributed to the literature review and data interpretation. All authors reviewed and approved the final manuscript.

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