IMPROVING INFECTION CONTROL: NURSING PRACTICES IN PESHAWAR TERTIARY CARE HOSPITALS WITH CROSS SECTIONAL STUDY

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Abstract. This study aimed to assess the knowledge and practices of nurses regarding infection control at HMC Hospital. A questionnaire-based survey was conducted among 156 participants, focusing on various aspects of infection control. The results revealed that a significant proportion of nurses were using medical masks (79%) and following color-coding segregation for biomedical waste disposal (81%). However, a lower percentage of nurses were using eye protection (43%) and recapping needles after use (76%). The findings indicated the need for improvement in adherence to infection control practices, particularly in the areas of personal protective equipment usage and safe needle handling. Additionally, a high level of awareness was observed regarding the importance of hand hygiene and biomedical waste generation hazards and legislation, with 79% and 75% of nurses acknowledging their significance, respectively. The study highlights the importance of consistent adherence to infection control practices and emphasizes the need for targeted interventions to enhance knowledge and promote best practices among nurses at HMC Hospital. By addressing the identified gaps, healthcare facilities can strengthen their infection control measures and contribute to improved patient safety and reduced healthcare-associated infections.
Keywords: *infection control, nurses, knowledge, practices, HMC Hospital, questionnaire-based survey*

Introduction

Worldwide, there are approximately 7.1 million cases of nosocomial infections occurring every year, with a mortality rate of 99,000. The prevalence rate of these infections ranges from 7.6% to 10.1% in both developing and developed countries. One of the contributing factors to hospital-acquired infections is the lack of knowledge regarding infection control and poor practices among healthcare workers (Zamir et al., 2003). Hospital-acquired infections can have various consequences, including prolonged hospital stays, increased costs, loss of wages, and even death. In developed countries, approximately 15% of hospitalized patients and 37% of cases reported in the intensive care unit (ICU) are affected by these infections. Conversely, the prevalence rate is higher in developing countries, reaching 19% (Curtis, 2008). Healthcare professionals, including nurses, are constantly exposed to microorganisms, many of which can cause severe or fatal infections (Her et al., 2008). Nurses, in particular, face a higher risk of exposure to various infections during their nursing activities. Other healthcare workers such as physicians, dentists, and nurses also play a role in the transmission of nosocomial infections (Ghanbari et al., 2013). However, the existing literature exploring the knowledge and practices of nurses in this context is limited (Al-Jubouri, 2014). Therefore, further investigation is necessary to understand the impact of

nurses' knowledge and practices on the degree of infection control (Park et al., 2008). In hospitals, infected patients serve as a source of infection transmission to other patients, healthcare workers, and visitors (Ghashghaee et al., 2018). Healthcare-associated infections significantly impact morbidity and mortality rates both within and outside the hospital setting, leading to increased hospitalization time and costs. Consequently, they are recognized as a serious public health problem worldwide. Notably, nosocomial infections rank among the leading causes of death (Al-Jubouri, 2014). Preventing and controlling infections is crucial for the effective functioning of a healthcare system. Infections associated with healthcare, particularly in hospitals, pose a significant risk to patient safety and are among the leading causes of mortality and morbidity, representing a major public health concern (Dasgupta et al., 2015). The prevalence of knowledge-based practices related to infection control varies globally across different countries. For instance, in a study conducted in Palestine (Sheng et al., 2005), the prevalence rate of infection control knowledge among nurses was found to be >80%. In Ethiopia (Saleem et al., 2012), nurses' knowledge about infection control was approximately 83.8%. Conversely, a study from Cairo University (Okanlawon, 2014) revealed that only 10% of the surveyed nurses had satisfactory knowledge about infection control. Similarly, in Mayo Hospital Lahore (Sodhi et al., 2013) reported that 48.2% of nurses had good knowledge regarding infection control.

Nurses play a crucial role in preventing and controlling the transmission of infections by implementing standard precautions and maintaining a safe healthcare environment (Al-Jubouri, 2014). Regardless of their roles and settings, nurses can exhibit leadership in infection prevention and control by utilizing their knowledge, skills, and judgment to promptly initiate appropriate infection control procedures (Trautner et al., 2017). Therefore, the objective of this study is to assess the knowledge of healthcare professionals regarding the recommended practices for preventing and controlling healthcare-associated infections (Kaushal et al., 2015). Implementing effective infection control measures in hospitals requires extensive hands-on experience in addition to theoretical training received in educational institutions. A national research paper highlighted that healthcare professionals in different types of surgical wards often fail to adhere to universal infection con- trol protocols. Such negligence on the part of medical staff necessitates strict observation and training to effectively control infections among patients (Sodhi et al., 2013).

Literature review

The literature surrounding infection control practices among nursing staff in Peshawar's tertiary care hospitals reveals a critical need for improvement. Healthcare-associated infections are recognized as a significant threat to patient safety, emphasizing the urgency of addressing the knowledge, skills, and judgment of nursing professionals in this context. The cross-sectional study conducted in two tertiary care hospitals sheds light on the attitudes and practices of nursing staff. The findings indicate variations in knowledge levels between the hospitals, with a substantial percentage of nurses lacking fair knowledge regarding infection control, particularly in the proper use of personal protective equipment (Khan and Pari, 2023). This underscores the necessity for targeted interventions to enhance the competencies of nursing staff. Recommendations include comprehensive training programs and the promotion of authentic sources of information. Bridging these knowledge gaps is crucial not only for the safety of

healthcare workers but also for preventing the transmission of infections within the hospital environment.

The literature review further highlights the pressing issue of needle stick injuries (NSI) among student nurses in tertiary care hospitals. The prevalence of NSI, along with the associated risks of blood-borne diseases, emphasizes the need for preventative measures and control strategies. The positive impact of free vaccination initiatives and government attention to increasing the strength of nursing staff is evident in mitigating the risks of NSI (Khan and Pari, 2023). However, the literature also points to challenges, such as the lack of proper supervision leading to student nurses suffering from needle stick injuries during their practical work. Additionally, the psychological consequences of NSIs including fear, anxiety, and depression, underscore the broader impact on the well-being of healthcare professionals. In summary, the literature review underlines the urgency of addressing infection control practices among nursing staff in Peshawar's tertiary care hospitals. The identified gaps in knowledge and practices call for comprehensive and targeted interventions to improve attitudes and ensure the safety of both healthcare workers and patients.

Materials and Methods

Utilizing a quantitative descriptive cross-sectional approach, it is conducted in two tertiary care hospitals in Peshawar. Gathering a total of 385 samples from both Khyber Teaching Hospital (KTH) and Hayatabad Medical Complex (HMC), with the initial results from KTH published in (Khan and Pari, 2023). It is scheduled for a 3-month period. This study is conducting using a cross-sectional study, with 100 samples will be gathered from each hospital based on previous research findings. All nurses, encompassing students, staff, and head nurses in the two hospitals, are included; except non-nursing medical staff (doctors, ward boys, technicians, and class 4 workers).

Results and Discussion

Based on the education and designation of nurses at HMC (Hamad Medical Corporation), we collected data from a sample of 74 nurses. The variables analyzed include designation, education, and experience. The frequency distribution and percentages for each category within these variables are presented in the *Table 1*. The provided charts and figures reveal the distribution of nurses who participated in the research at HMC. Among the participants, 49% were staff nurses, 15% were student nurses, and 10% were head nurses (*Figure 1*). In terms of education, 38% held an FA degree, 16% had a matriculation qualification, and 13% had a B.A. degree (*Table 2* and *Figure 2*). Regarding experience, 52% of the nurses had 1-10 years of experience, 14% had 10-20 years of experience, 6% had 20-30 years of experience, and 2% had 30-40 years of experience (*Table 3* and *Figure 3*). These findings provide insights into the demographic characteristics and professional backgrounds of the nurses involved in the research at HMC. In *Figure 4*, prefer to touch or examine the patient, 26% of the nurses selected ‘at times with gloves but usually bare-handed’, 22% chose ‘depends on the case’, 20% chose ‘gloves’, and 6% chose ‘bare-handed’. Continuously, frequency of practicing the right technique for wash up, 40% of the nurses answered ‘almost every time’, 25% chose ‘quite often’, and 8% selected ‘always’ (*Figure 5*). Next, satisfaction with knowledge about hygiene, among the nurses, 43% selected ‘satisfactory’, 22%

answered ‘to some extent’, and 4% chose ‘yes’ (*Figure 6*). In *Figure 7*, frequency of handwashing in non-hospital settings, 66% of the nurses selected ‘before and after eating, after using the toilet’, while 7% chose ‘rarely’. Lastly, teaching of hand washing at medical school, 66% of the nurses chose ‘yes’, while 2%, 3%, and 3% selected ‘just an overview’, ‘never’, and ‘not much’, respectively (*Figure 8*).

Table 1. *Frequency distribution of nurses at HMC based on their designation.*

Designation	Frequency (N)	Percentage (%)
Student nurse	15	20.3
Staff nurse	49	66.2
Head nurse	10	13.5
Total	74	100

Table 2. *Frequency distribution of nurses at HMC based on their education.*

Education	Frequency (N)	Percentage (%)
Matric	16	21.6
FA	38	51.4
BA	13	17.6
MA	7	9.5
Total	74	100

Table 3. *Frequency distribution of nurses at HMC based on their experience.*

Experience	Frequency (N)	Percentage (%)
1-10 years	52	70.3
11-20 years	14	18.9
21-30 years	6	8.1
31-40 years	2	2.7
Total	74	100

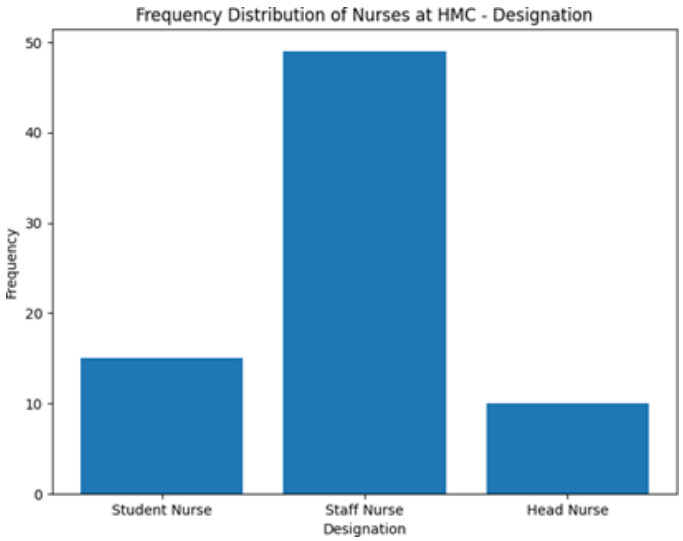

Figure 1. *Frequency distribution of nurses at HMC based on their designation.*

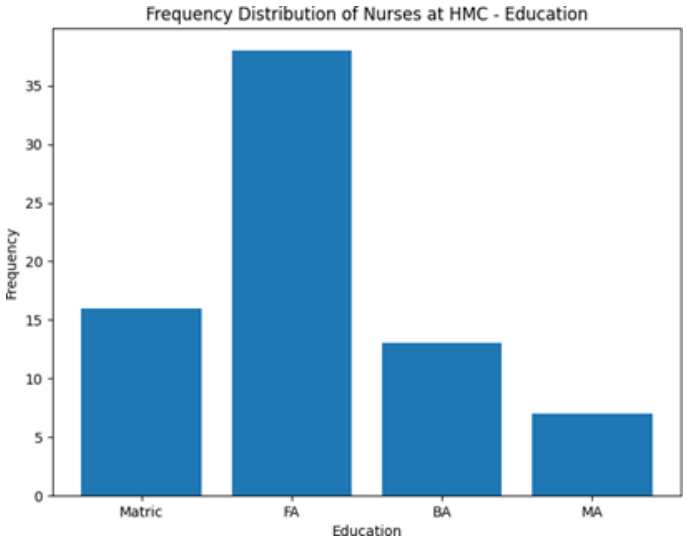

Figure 2. *Frequency distribution of nurses at HMC based on their education.*

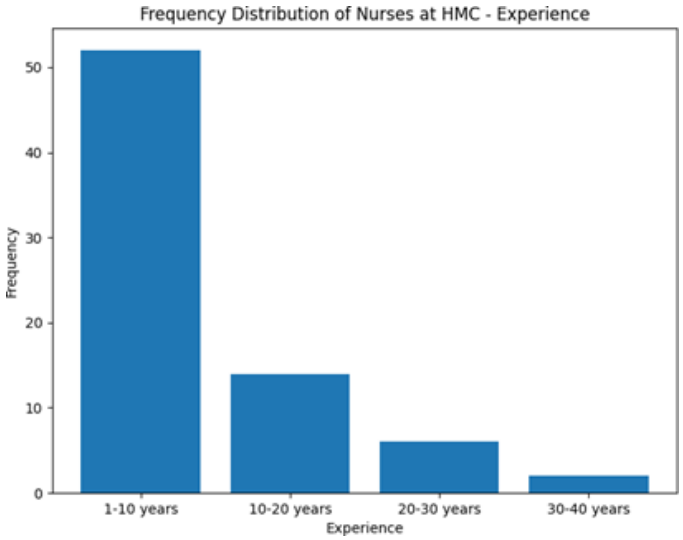

Figure 3. *Frequency distribution of nurses at HMC based on their experience.*

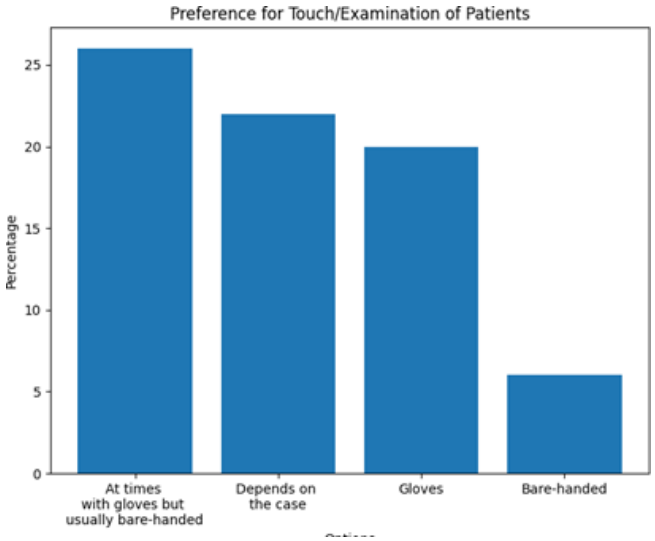

Figure 4. *Preference for touch/examination of patients.*

Figure 5. *Frequency of practicing the right technique for wash up.*

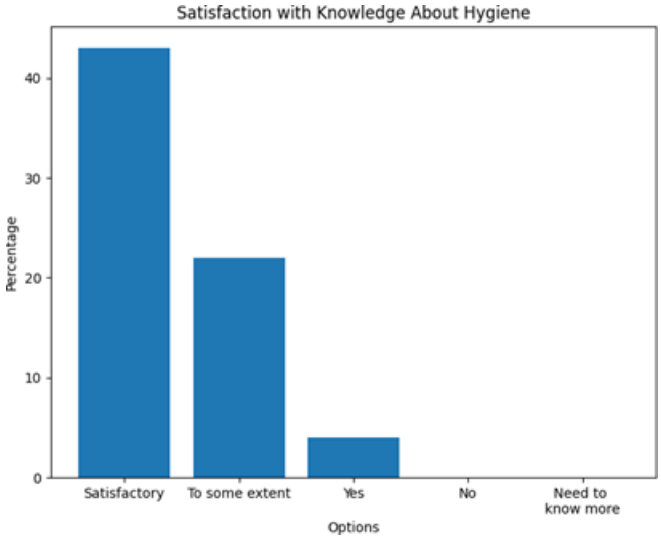

Figure 6. *Satisfaction with knowledge about hygiene.*

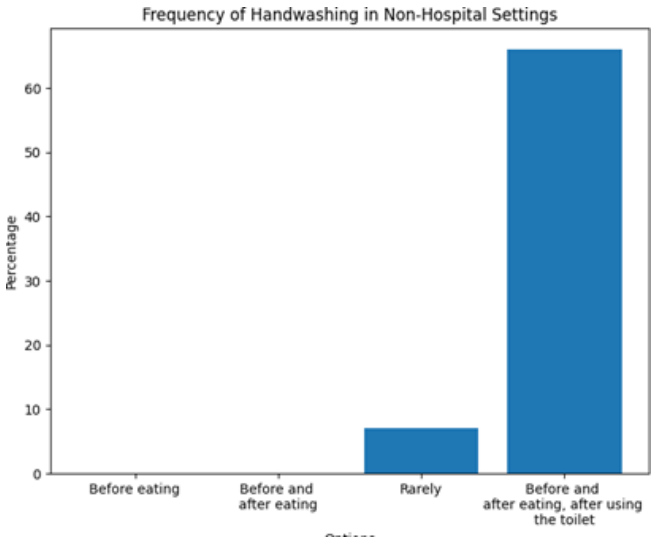

Figure 7. *Frequency of handwashing in non-hospital settings.*

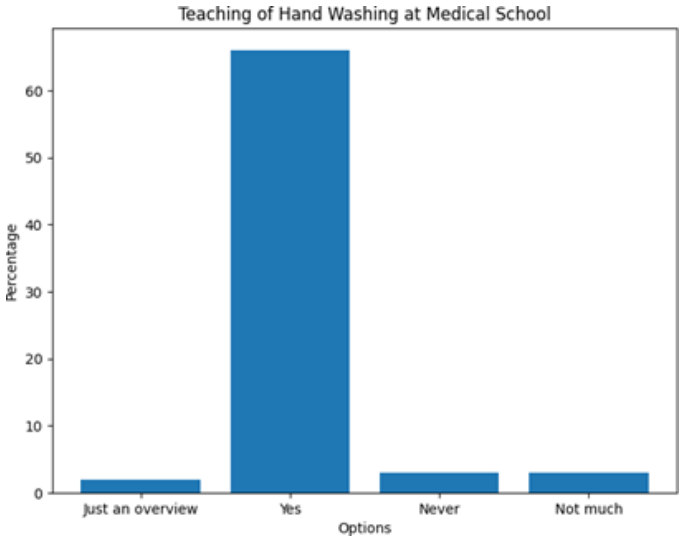

Figure 8. *Teaching of hand washing at medical school.*

The study conducted a comprehensive analysis of the infection control knowledge and practices among health-care workers in tertiary care hospitals. By administering a questionnaire-based survey to 156 participants from two tertiary care hospitals, KTH, the researchers obtained valuable insights into the participants' understanding and implementation of infection control measures. The dataset collected from the participants was meticulously analyzed, taking into consideration their education level, designation, experience, and knowledge reflected in their responses to the questionnaire. The analysis of the KTH data based on education level, designation, and experience shed light on the demographic characteristics of the participants. The frequency figures and tables clearly illustrate that a significant proportion of the participants belonged to the staff nurse category, constituting 65% of the sample. Furthermore, it was observed that a considerable number of nurses possessed a matriculate or F.A. qualification, with each category comprising 36% of the participants. Regarding professional experience, the majority of nurses reported having between 1 to 10 years of experience, accounting for 40% of the sample, followed by those with 10 to 20 years of experience, making up 26% of the participants. These findings align with previous studies, which have consistently indicated that nurses with lower educational attainment and less experience tend to exhibit lower levels of knowledge and adherence to infection control practices (Elsayed Fawzi et al., 2019).

It is worth noting that while the results provide valuable insights, they also highlight areas for improvement in infection control practices among healthcare workers. The study reveals a knowledge gap, particularly among nurses with lower education levels and less experience. This finding underscores the importance of targeted interventions and continuous training programs to enhance the understanding and implementation of infection control protocols. By addressing these gaps, healthcare facilities can strengthen their infection prevention strategies and ultimately improve patient safety outcomes (Cruz, 2019). Moreover, the study emphasizes the need for ongoing monitoring and evaluation of infection control practices in tertiary care hospitals. Regular assessments can help identify areas of weakness and facilitate the development of tailored interventions to address specific knowledge gaps. By adopting a

multidimensional approach that encompasses education, training, and regular performance evaluations, healthcare institutions can foster a culture of infection control excellence among their staff (Brooks et al., 2021). In summary to this section, this study provides valuable insights into the infection control knowledge and practices of healthcare workers in tertiary care hospitals. The findings highlight the importance of addressing knowledge gaps and enhancing adherence to infection control protocols, particularly among nurses with lower education levels and less experience. By implementing targeted interventions and continuous training programs, healthcare facilities can strengthen their infection prevention strategies and ultimately improve patient safety outcomes. Ongoing monitoring and evaluation of infection control practices are essential to identify areas for improvement and foster a culture of infection control excellence within healthcare institutions.

The findings of this study underscore the significance of education and experience in shaping the infection control knowledge and practices of healthcare workers. These results hold valuable implications for the design and implementation of tailored training programs aimed at enhancing infection control knowledge and practices, particularly among healthcare workers with lower education levels and less experience. The study employed a questionnaire-based survey, involving 156 participants from two tertiary care hospitals, KTH. The participants were queried on various aspects of infection control knowledge and practices, and their responses were analyzed based on three key categories: education level, designation and experience, and the knowledge reflected in their answers (Iliyasu et al., 2016). The analysis of nurses' knowledge in this study yields crucial insights into the existing gaps between knowledge and practice in the realm of infection control. While a majority of the nurses demonstrated adequate knowledge about infection control, they were not consistently translating that knowledge into practice. For instance, when asked about their preferred patient examination methods, only 31% of nurses indicated a preference for using gloves, with 26% occasionally opting for gloves, and 23% depending on the specific case. These findings highlight an inconsistency in glove usage, a fundamental practice in infection control. Similar observations have been reported in prior studies, underscoring the significance of consistent glove use in mitigating healthcare-associated infections. Furthermore, the survey investigating the frequency of correct wash-up technique utilization in an operating theater setting reveals the need for improvement in infection control practices among healthcare workers. While 42% of nurses reported always employing the correct wash-up technique, 27% indicated doing so almost every time, and 11% reported quite frequent adherence. Only 2% admitted to never practicing the correct wash-up technique. These findings indicate room for enhancement in the consistency of infection control practice adherence, even among healthcare workers possessing knowledge about infection control. In summary, the outcomes of this study emphasize the significance of consistent adherence to infection control practices among healthcare workers. The findings can inform the development of targeted interventions aimed at enhancing infection control practices and curbing healthcare-associated infections. The results shed light on diverse facets of infection control practices among healthcare workers. The analysis of nurses' knowledge and practices underscores the presence of gaps in the consistent application of infection control measures, despite adequate knowledge levels. These findings provide valuable insights for the development of targeted interventions aimed at improving infection control practices and preventing healthcare-associated infections (Iliyasu et al., 2016).

The findings of the study indicate that a considerable proportion of nurses demonstrated adherence to certain infection control practices. Specifically, a high percentage of nurses reported using medical masks (79%) and following color-coding segregation for biomedical (BM) waste disposal (81%). However, a smaller percentage of nurses reported using eye protection (43%) and recapping needles after use (76%). These results underscore the need for enhancing the consistency of adherence to infection control practices, particularly in terms of using personal protective equipment and adopting safe needle handling practices. Similar findings have been reported in prior studies, emphasizing the importance of targeted interventions to improve adherence to infection control practices (Hweidi et al., 2018). Furthermore, the study revealed a high level of awareness among nurses regarding the significance of hand hygiene and the hazards and legislation related to BM waste generation, with 79% and 75% of nurses acknowledging their importance, respectively. These findings align with previous research highlighting the role of education and awareness in promoting infection control practices among healthcare workers. In summary, the results of this study underscore the significance of consistent adherence to infection control practices among healthcare workers. The findings provide valuable insights for the development of targeted interventions aimed at improving infection control practices and preventing healthcare-associated infections. Enhancing adherence to infection control measures, such as the use of personal protective equipment and safe needle handling, should be a priority. Additionally, continuing efforts to raise awareness and provide education on hand hygiene and BM waste management are crucial in promoting optimal infection control practices among healthcare workers (Blomgren et al., 2021).

Conclusion

In conclusion, this study shed light on the knowledge and practices of nurses regarding infection control at HMC Hospital. The findings highlighted both areas of strength and areas for improvement. The majority of nurses demonstrated good compliance with certain infection control practices, such as the use of medical masks and adherence to color-coding segregation for biomedical waste disposal. However, there were notable gaps in the consistent use of eye protection and safe needle-handling practices. The study emphasized the importance of continuous education and training programs to enhance nurses' knowledge and promote consistent adherence to infection control practices. Addressing these gaps through targeted interventions can significantly contribute to reducing healthcare-associated infections and improving patient safety at HMC Hospital. It is recommended that healthcare facilities, including HMC Hospital, prioritize ongoing education and training initiatives to reinforce the importance of infection control practices among nursing staff. By ensuring a comprehensive understanding of infection control guidelines and providing regular updates on best practices, healthcare facilities can create a culture of patient safety and minimize the risk of healthcare-associated infections. Further research is warranted to explore the underlying factors contributing to the observed gaps in infection control practices and to evaluate the effectiveness of educational interventions in improving nurses' adherence to infection control guidelines. Continuous monitoring and evaluation of infection control practices are essential for maintaining a safe and healthy environment for both patients and healthcare workers.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

REFERENCES

[1] Al-Jubouri, M.B.A.J. (2014): Assessment of Nurse's Knowledge about Nosocomial Infection at Hospitals in Baghdad City. – Journal of Kufa for Nursing Science 4(1): 6p.

[2] Blomgren, P.O., Lytsy, B., Hjelm, K., Swenne, C.L. (2021): Healthcare workers' perceptions and acceptance of an electronic reminder system for hand hygiene. – Journal of Hospital Infection 108: 197-204.

[3] Brooks, S.K., Greenberg, N., Wessely, S., Rubin, G.J. (2021): Factors affecting healthcare workers' compliance with social and behavioural infection control measures during emerging infectious disease outbreaks: Rapid evidence review. – BMJ Open 11(8): 8p.

[4] Cruz, J.P. (2019): Infection prevention climate and its influence on nursing students' compliance with standard precautions. – Journal of Advanced Nursing 75(5): 1042-1052.

[5] Curtis, L.T. (2008): Prevention of hospital-acquired infections: review of non-pharmacological interventions. – Journal of Hospital Infection 69(3): 204-219.

[6] Dasgupta, S., Das, S., Chawan, N.S., Hazra, A. (2015): Nosocomial infections in the intensive care unit: Incidence, risk factors, outcome and associated pathogens in a public tertiary teaching hospital of Eastern India. – Indian Journal of Critical Care Medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine 19(1): 14-20.

[7] Elsayed Fawzi, S., Fathi Sleem, W., Saleh Shahien, E., Abdullah Mohamed, H. (2019): Assessment of Knowledge and Practice Regarding Infection Control Measures Among Staff Nurses. – Port Said Scientific Journal of Nursing 6(1): 83-100.

[8] Ghanbari, M.K., Shamsi, M., Farazi, A.A., Khorsandii, M., Eshrati, B. (2013): The survey of knowledge, self-efficacy and practice of nurses astandard precautions to prevent nosocomial infections in hospitals of Arak University of Medical Sciences in 2013. – Journal of Arak University of Medical Sciences 16(7): 45-54.

[9] Ghashghaee, A., Behzadifar, M., Azari, S., Farhadi, Z., Bragazzi, N.L., Behzadifar, M., Shahri, S.S.S., Ghaemmohamadi, M.S., Ebadi, F., Mohammadibakhsh, R., Seyedin, H. (2018): Prevalence of nosocomial infections in Iran: A systematic review and meta-analysis. – Medical Journal of the Islamic Republic of Iran 32: 10p.

[10] Her, S., Kim, I.S., Kim, K.H. (2008): Factors affecting on the level of practice on nosocomial infection management among operating room nurses. – Korean Journal of Adult Nursing 20(3): 375-385.

[11] Hweidi, I.M., Barbarawi, M.A., Tawalbeh, L.I., Al-Hassan, M.A., Al-Ibraheem, S.W. (2018): Surgical site infections after craniotomy: a matched health-care cost and length of stay study. – Journal of Wound Care 27(12): 885-890.

[12] Iliyasu, G., Dayyab, F.M., Habib, Z.G., Tiamiyu, A.B., Abubakar, S., Mijinyawa, M.S., Habib, A.G. (2016): Knowledge and practices of infection control among healthcare

workers in a Tertiary Referral Center in North-Western Nigeria. – Annals of African Medicine 15(1): 34-40.

[13] Kaushal, G., Doke, P., Shah, A., Verma, V. (2015): An analysis of knowledge, attitude and practices regarding standard precautions of infection control and impact of knowledge and attitude of ICU nurses on self-reported practices of infection control. – International Journal of Research Foundation of Hospital and Healthcare Administration 3(2): 79-85.

[14] Khan, R., Pari, B. (2023): INFECTION CONTROL FOR TERTIARY CARE, PAKISTAN: A CROSS-SECTIONAL STUDY OF STAFF ATTITUDES AND PRACTICES. – Quantum Journal of Social Sciences and Humanities 4(3): 101-111.

[15] Okanlawon, F.A. (2014): Infection control: nurses' knowledge and practice of universal precaution in Delta State, Nigeria. – African Journal of Medicine and Medical Sciences 43(2): 127-134.

[16] Park, S.Y., Shin, D.S., Lee, H.G., Kim, H.S. (2008): Compliance with nosocomial infection control and related factors among emergency room nurses. – Journal of Korean Academy of Fundamentals of Nursing 15(2): 153-160.

[17] Saleem, M., Vaish, A.K., Idris, M.Z., Sonkar, A.A., Agarwal, J., Singh, M., Singh, S.K., Srivastava, V.K. (2012): Pattern of nosocomial infection among patients admitted in medical and surgical wards of a secondary care hospital in north India-an epidemiological evaluation. – Indian Journal of Community Health 24(4): 285-290.

[18] Sheng, W.H., Chie, W.C., Chen, Y.C., Hung, C.C., Wang, J.T., Chang, S.C. (2005): Impact of nosocomial infections on medical costs, hospital stay, and outcome in hospitalized patients. – Journal of the Formosan Medical Association 104(5): 318-326.

[19] Sodhi, K., Shrivastava, A., Arya, M., Kumar, M. (2013): Knowledge of infection control practices among intensive care nurses in a tertiary care hospital. – Journal of Infection and Public Health 6(4): 269-275.

[20] Trautner, B.W., Greene, M.T., Krein, S.L., Wald, H.L., Saint, S., Rolle, A.J., McNamara, S., Edson, B.S., Mody, L. (2017): Infection prevention and antimicrobial stewardship knowledge for selected infections among nursing home personnel. – Infection Control & Hospital Epidemiology 38(1): 83-88.

[21] Zamir, D., Polychuck, I., Leibovitz, I., Reitblat, T., Zamir, C., Scharf, S. (2003): Nosocomial infections in internal medicine departments. – Harefuah 142(4): 265-268.