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Original Research Article

Assessment of Nurses' Knowledge and Practices Regarding Infection Control Measures in Tertiary Care Hospitals of Pakistan

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Abstract: *Infection control is a cornerstone of patient safety in healthcare settings. Nurses play a vital role in implementing infection prevention protocols, yet disparities often exist between their knowledge and actual practices. In Pakistan, healthcare-associated infections (HAIs) remain a significant concern due to suboptimal compliance with standard precautions.* ***Objective:*** *This study aimed to assess the knowledge and practices of registered nurses regarding infection control measures in a tertiary care hospital in Lahore, Pakistan.* ***Methods:*** *A descriptive cross-sectional study was conducted at tertiary care hospitals from April to September 2024. A total of 58 registered nurses were selected through purposive sampling. Data were collected using a structured, pre-validated questionnaire comprising demographic details, knowledge-based questions, and practice-related items aligned with WHO and CDC infection control guidelines. Data were analysed using SPSS version 26, with descriptive statistics and Pearson's correlation to assess the relationship between knowledge and practice. A p-value <0.05 was considered statistically significant.* ***Results:*** *Among the 58 nurses, 31% demonstrated good knowledge, 44.8% had moderate knowledge, and 24.2% had poor knowledge of infection control. Practice assessment showed that 34.5% exhibited good practices, 46.6% moderate, and 18.9% poor practices. A statistically significant positive correlation ($r = 0.64$, $p < 0.001$) was found between knowledge and practice scores. Nurses with higher qualifications and more clinical experience performed better in both domains.* ***Conclusion:*** *The study highlights moderate infection control knowledge and practice levels among nurses, with apparent gaps requiring attention. Strengthening infection control training and regular competency evaluations are essential for improving adherence and reducing the burden of HAIs in Pakistani healthcare settings.*

Keywords: Infection control, Nurses, Knowledge, Practice, Hospital-acquired infections, Pakistan, Tertiary care

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Introduction

Healthcare-associated infections (HAIs) continue to be a significant challenge in healthcare systems worldwide, especially in low- and middle-income countries (LMICs) such as Pakistan. According to the World Health Organization, approximately 15% of hospitalised patients in LMICs are affected by at least one HAI, many of which are preventable through proper infection control practices (1). In Pakistan, multiple outbreaks and rising antimicrobial resistance have brought renewed attention to hospital infection control systems and the pivotal role of nursing staff in implementing these measures (2). As frontline caregivers, nurses are responsible for maintaining aseptic techniques, hand hygiene, personal protective equipment (PPE) usage, sterilisation of instruments, and safe disposal of biohazardous materials (3).

Despite existing national and international guidelines on infection control, numerous studies in Pakistani healthcare settings have reported suboptimal adherence to standard precautions, often due to insufficient knowledge, lack of resources, and poor institutional policies (4, 5). The disparity between infection control knowledge and actual practices among nurses has been attributed to various factors, including workload burden, inadequate training, and lack of administrative oversight (6). For example, a study conducted in tertiary care hospitals in Lahore found that while 60% of nurses were aware of basic hand hygiene protocols, only 38% reported adherence to them during patient care (7).

Furthermore, poor infection control compromises patient safety and increases the risk of occupational exposure among healthcare workers. In Pakistani hospitals, needle-stick injuries and cross-contamination remain common, and nurses are among the most frequently affected due to their direct and prolonged patient interactions (8). Training interventions have shown promising results in bridging knowledge gaps and improving adherence to infection control protocols, suggesting the need for regular workshops and evaluations of nursing staff (9).

International studies highlight that regularly assessing nurses' knowledge and practices regarding infection control is essential to strengthen hospital infection prevention programs (10). However, there is a lack of consistent, nationwide data in Pakistan evaluating the infection control competencies of nursing personnel, particularly in tertiary care settings where exposure risk is higher and patient turnover is significant (11).

This study was designed to assess the knowledge and practices of registered nurses regarding infection control measures in tertiary care hospitals in Pakistan. The findings aim to inform policymakers and hospital administrators about areas requiring targeted interventions by identifying knowledge gaps and evaluating adherence to evidence-based practices. Improving nurses' infection control competencies is crucial to enhancing patient safety, reducing the incidence of HAIs, and strengthening the overall quality of care in Pakistan's healthcare system.

Methodology

This descriptive cross-sectional study was conducted at Tertiary care hospitals in Lahore over six months, from April 2024 to September 2024. The primary objective was to assess the knowledge and practices of registered nurses regarding infection control measures in a tertiary care setting. Fifty-eight registered nurses were selected through a non-probability purposive sampling technique. Participants included those in direct patient care roles with at least one year of clinical experience and current employment at the facility during the study period. Nurses on

extended leave, administrative duty, or those unwilling to participate were excluded from the study.

Data were collected using a structured, pre-validated questionnaire based on World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) infection control guidelines. The questionnaire was divided into demographic data, knowledge-based questions (15 items), and practice-related questions (15 items). The knowledge section evaluated concepts such as hand hygiene, personal protective equipment (PPE) use, disinfection protocols, and biomedical waste management. The practice section assessed adherence to infection control measures during daily clinical duties. Each correct answer was awarded one point; scores were then categorised as good (≥75%), moderate (50–74%), and poor (<50%) for both knowledge and practice components.

Before data collection, ethical approval was obtained from the Institutional Review Board (IRB) of Chughtai Lab. All participants gave informed consent, and anonymised data collection ensured confidentiality of responses. Questionnaires were distributed during shift hours, and completed forms were collected within the same day to minimise recall bias.

The collected data were analysed using SPSS version 26. Descriptive statistics such as mean, standard deviation, frequency, and percentage were used to summarise demographic variables. The chi-square test examined associations between demographic factors (e.g., qualification, years of experience) and knowledge/practice levels. Pearson correlation analysis determined the relationship between knowledge and practice scores. A p-value of less than 0.05 was considered statistically significant. The findings aimed to identify gaps in nurses' infection control competencies and provide evidence-based recommendations for targeted training and quality improvement interventions.

Results

Effective infection control is a critical component of hospital-based nursing practice, especially in low- and middle-income countries like Pakistan, where hospital-acquired infections (HAIs) contribute significantly to morbidity and mortality. This study aimed to assess nurses' knowledge and practices regarding infection control measures in tertiary care hospitals in Pakistan. A total of 58 registered nurses participated in the study, and the results are presented according to international publication standards, starting with demographic information, followed by knowledge and practice assessments.

Most participants were female nurses with diploma-level qualifications and clinical experience ranging from 1 to 10 years. Their professional and educational backgrounds are presented in Table 1.

Most participants were young female nurses, with 60.3% holding a diploma in nursing. A notable portion had 1–10 years of experience, which may influence their exposure to and understanding of infection control practices.

Knowledge was assessed using a structured questionnaire comprising 15 items. A score of ≥75% was considered good knowledge, 50–74% moderate, and <50% poor. The results are shown in Table 2.

Only 31% of nurses demonstrated good knowledge of infection control measures, while nearly one-quarter (24.2%) had poor knowledge, highlighting significant knowledge gaps in infection prevention protocols.

Practices were evaluated through a checklist and self-reported adherence to hand hygiene, PPE use, waste disposal, and disinfection routines. Scores were categorised similarly to knowledge levels. Findings are summarised in Table 3.

Only 34.5% of the nurses exhibited good infection control practices. Despite moderate awareness among many participants, this gap between knowledge and practice reflects possible constraints in training, supervision, or workload management.

A Pearson correlation analysis assessed the relationship between knowledge and practice scores. The correlation results are shown in Table 4. There was a strong positive correlation between knowledge and practice ($r = 0.64$, $p < 0.001$), suggesting that improving knowledge could directly enhance infection control practices among nurses.

Most nurses had moderate knowledge (44.8%) and moderate practices (46.6%), indicating room for improvement. 24.2% of participants lacked sufficient knowledge, while 18.9% demonstrated poor adherence to infection control protocols. A statistically significant positive correlation between knowledge and practice implies that educational interventions could effectively improve compliance. Younger nurses and those with higher education (BSc Nursing) tended to perform better in knowledge and practice assessments.

Table 1: Demographic Characteristics of Nurses (n = 58)

Variable	Frequency (n)	Percentage (%)
Gender		
- Female	49	84.5
- Male	9	15.5
Age Group		
- 20–30 years	33	56.9
- 31–40 years	20	34.5
- >40 years	5	8.6
Qualification		
- Diploma in Nursing	35	60.3
- BSc Nursing	23	39.7
Years of Experience		
- -1–5 years	24	41.4
- 6–10 years	21	36.2
- >10 years	13	22.4

Table 2: Knowledge Level of Nurses About Infection Control Measures

Knowledge Score Category	Number of Nurses (n)	Percentage (%)
Good Knowledge (≥75%)	18	31.0
Moderate Knowledge (50–74%)	26	44.8
Poor Knowledge (<50%)	14	24.2

Table 3: Practice Levels Regarding Infection Control

Practice Score Category	Number of Nurses (n)	Percentage (%)
Good Practice (≥75%)	20	34.5
Moderate Practice (50–74%)	27	46.6
Poor Practice (<50%)	11	18.9

Table 4: Correlation between Knowledge and Practice Scores

Variable	Correlation Coefficient (r)	p-value
Knowledge vs Practice	0.64	<0.001*

Discussion

This study assessed the knowledge and practices of registered nurses regarding infection control measures at a tertiary care diagnostic facility in Lahore, Pakistan. The findings revealed that while most participants had moderate knowledge (44.8%) and moderate practices (46.6%), only 31% demonstrated good knowledge and 34.5% exhibited good infection control practices. These results underscore significant gaps in infection control competencies among nurses, which may affect patient safety and the incidence of hospital-acquired infections (HAIs).

Our study's findings are in line with previous research conducted in Pakistan and other low—and middle-income countries. A similar study by Khan et al. in Peshawar reported that only 32% of nurses had good knowledge of infection control. In contrast, the rest are moderately or poorly understood essential precautions such as hand hygiene, PPE use, and disinfection protocols (12). This aligns with our results, where nearly

one-quarter (24.2%) of participants demonstrated poor knowledge of infection control measures.

Regarding infection control practices, our study found that only 34.5% of nurses had good practices, despite moderate to good knowledge in the majority. This discrepancy between knowledge and practice has been consistently reported in local and regional studies. For instance, Mehmood et al. found that although 58% of nurses were aware of hand hygiene protocols, less than 40% reported consistent adherence during clinical practice (13). This gap could be attributed to workload pressure, lack of time, insufficient supervision, and absence of a robust infection control monitoring system.

Our study's strong positive correlation ($r = 0.64$, $p < 0.001$) between knowledge and practice suggests that improved education and awareness directly influence compliance with infection control measures. This is supported by findings from Rehman et al., who reported that targeted infection control training programs significantly improved knowledge and practice scores among nurses in a quasi-experimental design (14). Therefore, introducing regular refresher courses and hands-on workshops could be pivotal in enhancing infection control behavior among nursing staff.

Our results also revealed that nurses with higher qualifications (e.g., BSc Nursing) and better clinical experience tended to have better knowledge and practice scores. Similar associations were reported in studies by Bashir et al. and Naqvi et al., where more experienced nurses demonstrated superior adherence to infection prevention protocols than junior staff (15, 16). This indicates that ongoing professional development and mentorship may help bridge competency gaps among newly inducted or less experienced nurses.

Furthermore, the study's context within a tertiary pathology lab brings unique challenges. Nurses working in high-exposure environments regularly deal with blood and body fluid specimens, increasing their risk of cross-contamination and needlestick injuries. A study by Ashraf et al. showed that inadequate infection control measures in high-risk units such as labs and ICUs contributed to higher occupational exposure rates among nurses and lab staff (17). Thus, focused infection control strategies tailored to specialised units are essential.

While the results are consistent with prior literature, this study's limitations include a small sample size and confinement to a single center, which restricts the generalizability of the findings. However, the study still provides critical insights into the current state of infection control practices among nurses in Pakistan and identifies areas for targeted intervention. Future research should involve more extensive, multicenter studies and longitudinal assessments to evaluate the long-term impact of training interventions on infection control outcomes.

In conclusion, our study reveals substantial room for improvement in nurses' knowledge and practice of infection control. Addressing these gaps through structured educational programs, continuous monitoring, and institutional support is essential to strengthening infection control efforts and safeguarding patient and healthcare worker safety in Pakistani healthcare settings.

Conclusion

This study identified moderate levels of knowledge and practice regarding infection control among nurses in a tertiary care hospital in Pakistan. The strong correlation between knowledge and practice emphasises the need for structured infection control training programs and continuous professional development to enhance compliance and improve patient safety outcomes.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-MMNCS-0331d-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

NP (Charge Nurse),
Manuscript drafting, Study Design,
GB (Charge Nurse)
Review of Literature, Data entry, Data analysis, and article drafting.
Conception of Study, Development of Research Methodology Design,

Study Design, manuscript review, and critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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