

Assessment of Staff Nurses' Knowledge, Attitudes, and Practices Regarding Infection Prevention and Control for Reducing Nosocomial Infections

Husna Bibi*, Areej Iftikhar, Rimsha, Savera Shahid, Khudija Mushtaq, Khawer Saeeda

Department of Nursing, College of Nursing and Midwifery, Fatima Jinnah Medical University, Lahore, Pakistan

*Corresponding author's email address: husnasarfraz92@gmail.com

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Abstract: Nosocomial infections remain a major cause of morbidity, mortality, and prolonged hospital stay worldwide, particularly in low- and middle-income countries. Nurses play a pivotal role in infection prevention and control (IPC) due to their continuous patient contact. Assessing nurses' knowledge, attitudes, and practices (KAP) is essential for identifying gaps and strengthening infection control strategies in hospital settings. **Objective:** To assess the knowledge, attitudes, and practices of staff nurses regarding infection prevention and control measures aimed at reducing nosocomial infections at a tertiary care hospital in Lahore, Pakistan. **Methods:** A quantitative descriptive cross-sectional study was conducted among 385 registered staff nurses working in adult clinical departments of Sir Ganga Ram Hospital, Lahore, from February to June 2025. Participants were recruited using convenience sampling. Data were collected using a structured, self-administered questionnaire adapted from the World Health Organization hand hygiene assessment tool that covered socio-demographic characteristics, knowledge, attitudes, and practices related to IPC. Descriptive statistics were used to summarize KAP levels, while inferential analysis examined associations between demographic variables and KAP scores. Data were analyzed using SPSS version 25. **Results:** Among the 385 participants, 88.3% were female, and the majority were aged between 20 and 30 years. Overall, 91% of nurses demonstrated good knowledge of infection prevention, and 85% exhibited positive attitudes toward IPC. High awareness of the importance of hand hygiene before and after patient contact was observed (97.7%). However, notable knowledge gaps persisted, particularly regarding the correct use of alcohol-based hand rubs (46.8%). Despite favorable knowledge and attitudes, only 50.6% of nurses demonstrated good infection prevention practices, with lower compliance observed before patient contact and after glove removal. No statistically significant association was found between demographic variables and KAP scores ($p > 0.05$). **Conclusion:** Although staff nurses demonstrated strong knowledge and positive attitudes toward infection prevention and control, practical adherence to IPC measures was suboptimal. Targeted interventions focused on behavioral reinforcement, ongoing training, and improved institutional support are required to bridge the gap between knowledge and practice and reduce the burden of nosocomial infections.

Keywords: Infection prevention and control, nosocomial infections, hand hygiene, nurses, knowledge, attitude, practice

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Introduction

Infection prevention and control (IPC) is a paramount aspect of healthcare that directly affects patient outcomes, especially in hospital settings. Nosocomial infections (NIs), which are infections acquired in healthcare facilities, pose a significant risk, resulting in prolonged hospital stays, increased medical costs, and heightened morbidity and mortality rates. The urgency to address this public health concern has intensified in the wake of global health crises, particularly during the COVID-19 pandemic, which underscored the vulnerabilities of healthcare systems and the critical role of healthcare professionals, especially nurses, in infection control (1, 2).

Nurses serve on the front lines in mitigating the spread of infections, and their understanding of IPC protocols is essential not only for their safety but also for that of patients (3, 4). Research indicates that nursing staff have knowledge gaps regarding available guidelines and best practices for preventing nosocomial infections. For instance, studies have suggested that nurses with inadequate training or awareness of these protocols contribute to increases in infection rates (5, 6). A systematic review has demonstrated that structured educational interventions significantly enhance nurses' knowledge and competence regarding infection control practices (7, 8).

Moreover, nurses' attitudes and practices regarding IPC are influenced by various factors, including prior training, institutional support, and patient-to-nurse ratios. For example, inadequate nursing staff numbers and high patient loads can severely hinder the implementation of effective IPC

measures, ultimately resulting in increased healthcare-associated infections (9, 10, 11). This relationship emphasises the need for continued education and policy adjustments to support infection prevention efforts. In addition, cultural and contextual factors uniquely affect healthcare practices in countries with varying resource levels and healthcare infrastructure, such as Pakistan. The Pakistani healthcare system faces challenges, including limited access to ongoing training for staff, insufficient resources, and systemic healthcare delivery issues, which can exacerbate the risks of nosocomial infections (12, 13). Therefore, it's crucial to evaluate nurses' current knowledge, attitudes, and practices in Pakistani healthcare institutions to develop effective strategies that align with local needs and health challenges.

Given the escalating burden of nosocomial infections in Pakistan, this study aims to assess staff nurses' knowledge, attitudes, and practices regarding IPC. Understanding these dynamics is vital for implementing tailored educational interventions that equip nursing staff with the skills needed to combat infection effectively. The insights gained from this research will serve as a foundation for improving IPC methods and ultimately reducing the incidence of NIs within Pakistani healthcare settings, contributing to better patient safety and health outcomes.

Methodology

A quantitative descriptive cross-sectional study design was employed to assess staff nurses' knowledge, attitudes, and practices regarding the prevention and control of hospital-acquired infections. The study was



conducted at Sir Ganga Ram Hospital, Lahore, over six months, from February to June 2025, following formal approval of the research proposal. The study setting included multiple adult clinical departments of the hospital to ensure representation of nurses involved in direct patient care.

The study population comprised registered staff nurses working at Sir Ganga Ram Hospital, Lahore. Nurses with a minimum of one year of clinical experience in adult care settings and possessing a valid nursing qualification certificate were included. Participation was voluntary, and only those willing to provide informed consent were enrolled. Nursing students, interns, visiting students, administrative staff, and nurses who were critically ill or on maternity, educational, or annual leave during the data collection period were excluded to avoid response bias and ensure data relevance.

Convenience sampling was used to recruit participants. The sample size was calculated using Cochran's formula for descriptive studies, assuming a 95% confidence level, a margin of error of 5%, and a population proportion of 0.5 to maximise sample size. Based on these assumptions, the calculated sample size was 385 participants, which was achieved during data collection.

Data were collected using a structured, self-administered questionnaire developed with reference to the World Health Organization Hand Hygiene Knowledge Questionnaire for Healthcare Professionals. The tool consisted of four sections: socio-demographic characteristics, knowledge, attitudes, and practices related to infection prevention and control. The knowledge section included 10 dichotomous items scored as yes or no, with higher scores indicating better knowledge. The attitude section comprised 13 dichotomous items assessing perceptions, beliefs, and perceived barriers related to infection prevention. The practice section consisted of 8 items measured on a frequency-based scale that assessed the consistency of hand hygiene behaviours in routine clinical situations. Before the main study, a pilot test was conducted on 10% of the sample to evaluate the questionnaire's clarity, feasibility, and internal consistency. Data from the pilot study were not included in the final analysis. Reliability testing yielded a Cronbach's alpha value greater than 0.7, confirming acceptable internal consistency of the instrument. Content validity was ensured through expert review and alignment with established WHO infection control guidelines.

After obtaining ethical approval from the Research Ethics Committee of Fatima Jinnah Medical University, Lahore, and administrative permission from Sir Ganga Ram Hospital, data collection was initiated. Participants were briefed about the purpose of the study, assured of confidentiality and anonymity, and informed that no financial incentives were associated with participation. Written informed consent was obtained before questionnaire distribution. Completed questionnaires were collected on the same day to minimize non-response and data loss.

Data were coded, entered, and analyzed using SPSS statistical software version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic variables and KAP levels. Knowledge, attitude, and practice scores were converted to percentages and categorized according to predefined criteria. Inferential statistical tests were applied to examine associations between demographic variables and KAP levels, with a p-value greater than 0.05 considered statistically non-significant.

All ethical principles for research involving human participants were strictly followed. Participant confidentiality was maintained throughout the study, and data were used solely for academic and research purposes.

Access to collected data was restricted to the research team and supervisory authority.

Results

A total of 385 staff nurses participated in the study. The majority were female (88.3%), with male nurses constituting 11.7%. Most participants were aged 20–25 years (51.9%), followed by 25–30 years (42.9%). A large proportion were single (71.2%). Regarding education, 61.6% held a bachelor's degree, while 31.4% had a nursing diploma. Only a small fraction possessed postgraduate qualifications. (Table 1).

Overall, knowledge regarding infection prevention was high, with correct responses exceeding 85% for most core items. Nearly all participants recognized the importance of hand hygiene before and after patient contact (97.7%) and the necessity of wearing gloves when exposed to blood or other body fluids (91.9%). However, important knowledge gaps persisted. Approximately 20% believed hand hygiene was unnecessary if hands were not visibly dirty, and 53.2% were unaware that alcohol-based hand rubs must be rubbed until dry to be effective. (Table 2).

Most nurses demonstrated positive attitudes toward infection prevention, with 93.8% identifying HAI prevention as a core nursing responsibility. Training coverage was high (94.3%), and supervisory emphasis on hand hygiene was reported by 92.5%. Nevertheless, structural and environmental barriers were frequently reported, including inconvenient sink placement (70.9%), inconsistent availability of hand hygiene agents (62.3%), and skin irritation from frequent hand hygiene (58.4%). (Table 3).

Despite strong knowledge and favorable attitudes, practice adherence was suboptimal. Only 50.6% reported always performing hand hygiene before patient contact, and 44.7% consistently practiced hand hygiene after glove removal. In contrast, compliance was markedly higher after exposure-related activities, such as after wound care (97.1%), after toilet use (94.0%), and after contact with blood or body fluids (90.6%). (Table 4). Based on predefined scoring criteria, 91% of nurse's demonstrated good knowledge, 85% showed positive attitudes, while only 50.6% achieved good practice levels. Statistical analysis revealed no significant association between demographic variables and KAP scores ($p > 0.05$). (Figure 1).

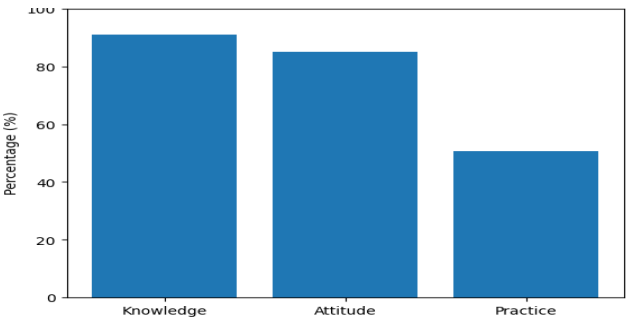


Figure 1. Overall Knowledge, Attitude, and Practice levels among staff nurses regarding hospital-acquired infection prevention.

Table 1. Socio-demographic characteristics of staff nurses (n = 385)

Variable	Category	n	%
Gender	Male	45	11.7
	Female	340	88.3
Age (years)	20–25	200	51.9
	25–30	165	42.9
	30–35	20	5.2
	Married	111	28.8

Education	Single	274	71.2
	Diploma	121	31.4
	Undergraduate	6	1.6
	Graduate	237	61.6
	Master's	21	5.5

Table 2. Knowledge of staff nurses regarding infection prevention (n = 385)

Knowledge item (Correct response)	Correct n (%)
Intact skin can harbor pathogens	334 (86.8)
Gloves do not provide complete protection	288 (74.8)
Hand hygiene reduces pathogen transmission	335 (87.0)
Hand hygiene before and after patient contact	376 (97.7)
Gloves required for blood/body fluid exposure	354 (91.9)
Alcohol rub is effective only when rubbed until dry	180 (46.8)
Gloves should not be reused between patients	378 (98.2)

Table 3. Attitudes and perceived barriers to infection prevention (n = 385)

Attitude / Barrier	Agree n (%)
Hand hygiene agents are not always available	240 (62.3)
Clean towels are not always available	306 (79.5)
Sinks inconveniently located	273 (70.9)
Hand hygiene causes skin irritation	225 (58.4)
Hand hygiene interferes with nurse-patient interaction	200 (51.9)
Hand hygiene reduces infection transmission	321 (83.4)
HAI prevention is Part of the nursing role	361 (93.8)

Table 4. Hand hygiene practices of staff nurses (n = 385)

Practice situation	Always n (%)	Often n (%)
Before patient contact	195 (50.6)	190 (49.4)
After patient contact	327 (84.9)	58 (15.1)
After toilet use	362 (94.0)	23 (6.0)
After blood/body fluid exposure	349 (90.6)	36 (9.4)
Before wound care	334 (86.8)	51 (13.2)
After wound care	374 (97.1)	11 (2.9)
After removing gloves	172 (44.7)	213 (55.3)

Discussion

The findings of this study on the knowledge, attitudes, and practices (KAP) of staff nurses regarding infection prevention and control reveal several critical insights. Out of 385 participating nurses, a substantial majority were female (88.3%), predominantly aged 20–30 years. These demographics align with global trends indicating a higher representation of women in the nursing profession, as highlighted in the literature (14). When examining the knowledge of infection prevention, nearly all respondents (97.7%) acknowledged the significance of hand hygiene before and after patient contact. While this is a promising finding, gaps remain. Specifically, 53.2% of nurses were unaware that alcohol-based hand rubs must be rubbed until dry to be effective. This aligns with research by Nguyen et al., which highlighted inadequate knowledge on hand hygiene among nursing professionals despite a general awareness of its importance (15). Similarly, Zahara et al. reported discrepancies between knowledge and practice in a Pakistani hospital, indicating that awareness of hand hygiene does not always translate into execution (16). The positive attitudes toward infection prevention were noteworthy, with 93.8% of participants identifying healthcare-associated infection (HAI) prevention as a core responsibility. High training coverage (94.3%) suggests that institutions are prioritizing education; however, the reported structural and environmental barriers, such as inconvenient sink locations (70.9%) and inconsistent availability of hand hygiene agents (62.3%),

mirror findings by Turan and Eskimez, who concluded that such barriers significantly impact compliance with hand hygiene practices (17). This indicates a need for systematic improvements in the healthcare environment to enhance compliance.

While knowledge and attitudes among participants were robust, practice adherence was concerning, with only 50.6% of nurses reporting consistent hand hygiene before patient contact. This conforms to findings from Shahbaz et al., who also reported a paradox where high knowledge levels did not correspond with favorable practice adherence (18). Compliance was much higher in instances like after wound care (97.1%), which could be attributed to the immediate visibility of risks involved in such actions, similar to results reported by Idris et al., who noted context-specific motivations for adherence to hygiene practices (19).

Furthermore, the lack of significant associations between demographic variables and KAP scores ($p > 0.05$) contrasts with findings by Mwesigye et al., in which knowledge and practice varied significantly across demographic lines (20). This result may highlight the need for further exploration into how other contextual factors, such as workload and institutional culture, could influence KAP beyond demographics.

In comparison, the study's findings on compliance with hand hygiene practices highlight a common challenge across global healthcare settings, as numerous studies have reported similar trends of low adherence despite high knowledge levels. For instance, in research conducted in Saudi Arabia, it was reported that healthcare workers' compliance was also

lower than expected, given their knowledge (21). Therefore, targeted interventions focusing on habit formation, reinforced through continuous education and adherence reminders, are vital.

In summary, this study highlights critical areas in the infection prevention landscape among nursing staff, demonstrating that while knowledge and attitudes are generally positive, there remains urgent work to enhance practical compliance through infrastructural support and continual education. A comprehensive approach that includes training, the accessibility of hygiene resources, and the fostering of a culture of compliance may ameliorate these discrepancies.

In Pakistan, where healthcare systems face challenges, including resource constraints and high patient volumes, enhancing infection control knowledge and practice is crucial. The findings of this study contribute valuable insights into the current state of nursing practice in Pakistan and provide a foundation for developing tailored interventions that address both knowledge and practice gaps in the local context.

Conclusion

This study highlights a critical discrepancy between staff nurses' knowledge, attitudes, and actual practices in infection prevention. While most nurses possessed adequate knowledge and expressed positive attitudes toward preventing hospital-acquired infections, adherence to recommended infection control practices remained insufficient. These findings underscore the need for sustained educational programs, improved availability of hand hygiene resources, and organizational strategies that promote consistent compliance with IPC guidelines. Strengthening institutional policies and addressing environmental barriers may substantially enhance nursing practices and contribute to improved patient safety and reduced nosocomial infection rates in tertiary care hospitals.

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-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

HB

Manuscript drafting, Study Design,

AI

Review of Literature, Data entry, Data analysis, and drafting article.

R

Conception of Study, Development of Research Methodology Design,

SS

Study Design, manuscript review, critical input.

KM (Principal)

Manuscript drafting, Study Design,

KS (Assistant Nursing Instructor)

Review of Literature, Data entry, Data analysis, and drafting article.

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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