Volume 4, Issue 3, 2026

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

ASSESSMENT OF HAND HYGIENE KNOWLEDGE AND PRACTICE AMONG STAFF NURSES WORKING IN A TERTIARY CARE HOSPITAL LAHORE, PAKISTAN

Sadia Manzoor[*1], Sadia Bibi[*2], Tayyiba Zia[*3], Shazia Yousaf[*4]

[*1,2,3]*BSN, College of Nursing, University of Child Health Sciences, The Children's Hospital, Lahore, Pakistan*
[*4]*MSN, College of Nursing, University of Child Health Sciences, The Children's Hospital, Lahore, Pakistan*

[*1]sadiamanzoor146@gmail.com, [2] sadiamurtaza139@gmail.com, [3]tayyibazia0342@gmail.com, [4]shaziamahmood123@gmail.com

DOI: https://doi.org/10.5281/zenodo.21526044

Keywords
Hand Hygiene, Knowledge, Practice, Nurses, Infection Control, Tertiary Hospital, Lahore

Article History
Received: 19 January 2026
Accepted: 04 March 2026
Published: 18 March 2026

Corresponding Author: *
Shazia Yousaf

Abstract

Background: *Hand hygiene is one of the most effective measures for preventing healthcare-associated infections (HAIs). Despite being a simple and low-cost intervention, compliance among nurses often remains suboptimal. This study was conducted to assess the knowledge and self-reported hand hygiene practices among staff nurses in a tertiary care hospital in Lahore, Pakistan.*

Objective*: To assess the level of knowledge and evaluate the self-reported practices regarding hand hygiene among staff nurses in a tertiary care hospital.*

Methodology: *A cross-sectional study was conducted over three months among 235 nursing officers working in various wards of Children Hospital, Lahore. A structured, adapted questionnaire from the WHO hand hygiene guidelines, comprising demographic details, WHO-based knowledge items, and Likert-scale practice items was used. Participants were selected through simple random sampling. Ethical approval was obtained, and informed consent was taken from all participants. Data were analyzed using SPSS version 26. Descriptive statistics were used for frequency distribution, while Chi-square and t-tests were applied to assess associations, with $p < 0.05$ considered statistically significant.*

Results: *The majority of nurses had moderate to good knowledge regarding hand hygiene. However, reported practices showed variability, with only a portion of the participants consistently following hand hygiene guidelines. Significant associations were found between knowledge/practice levels and variables such as years of experience and previous training.*

Conclusion: *While knowledge levels were satisfactory, gaps in hand hygiene practices still exist. Regular training and institutional reinforcement are recommended to enhance compliance and reduce HAIs in clinical settings.*

INTRODUCTION

Hand hygiene is one of the most effective and cheapest measures for preventing healthcare-associated infections (HAIs). Its significance among healthcare professionals, especially nurses, is critical, as it directly correlates with infection control and patient safety. The WHO emphasizes that proper hand hygiene is among the most important measures in combating HAIs, making it essential to assess nurses' knowledge and practices, particularly in a tertiary care hospital in Lahore, Pakistan. Nurses represent the largest proportion

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ISSN: (e) 3007-1607 (p) 3007-1593

of healthcare providers and maintain the most frequent, prolonged contact with patients, making their compliance a crucial determinant of care quality and infection control (Lakoh et al., 2021). Despite this well-documented importance, knowledge and practice gaps persist globally and especially in low- and middle-income countries like Pakistan, often due to heavy workloads, inadequate supplies, low motivation, and weak institutional policies. Knowledge deficits frequently hinder optimal compliance, and poor hand hygiene remains a leading cause of HAIs, prolonging hospital stays, raising costs, and worsening antimicrobial resistance and morbidity (Sofiana et al., 2020).

Systematic reviews show nurses typically demonstrate higher compliance than other healthcare professionals due to frequent patient interaction, though compliance varies widely across settings—from as low as 11.3% to as high as 87% (Liu et al., 2013; Firdaus et al., 2020). This variability shows that improving knowledge alone is insufficient; an integrative approach combining education, monitoring, leadership commitment, and infrastructural support is needed (Soy et al., 2023). Such discrepancies are shaped by training, resources, and organizational culture, underscoring the need for continuous educational interventions (Ahmed et al., 2020). Training that combines theory with practical demonstration and feedback significantly boosts compliance, especially when nurses understand its direct implications for patient safety (Saleh et al., 2022). Structured training, audits, feedback systems, and a culture of safety further enhance knowledge and adherence (Oyibo, 2022). Teker et al. (2015) found such initiatives reduced infection rates and improved perceptions of hand hygiene's importance, while Hamadah et al. (2015) showed comprehensive training improved hygiene among medical students and instilled patient-centered care. Mentorship, peer modeling, and institutional incentives also matter—compliance rises substantially when nurses receive proper training and resources (Teker et al., 2015), especially when hand hygiene becomes embedded in professional identity and daily routine (Sofiana et al., 2020).

Environmental factors matter too: availability of hand rubs, sinks, soap, and towels enables proper practice, while visible reminders, monitoring, and non-punitive feedback correlate with better compliance. Lack of these resources fosters suboptimal practice and false security (Zil-E-Ali et al., 2017). In Pakistan, resource constraints and overburdened infrastructure compound these issues. Zil-E-Ali et al. (2017), surveying healthcare professionals in Lahore, found significant knowledge and compliance gaps in tertiary care, citing poor training, supply shortages, and weak supervision as key barriers.

Tertiary hospitals treat complex, often immunocompromised patients—surgical, ICU, or invasive-procedure cases—making them especially vulnerable to HAIs, with nurses central to prevention (Ahmed et al., 2020). Improving compliance also mitigates antimicrobial resistance, since ineffective hygiene fuels HAI escalation amid rising multidrug-resistant organisms; understanding nurses' knowledge enables tailored training strategies (Sofiana et al., 2020). This evidence can also inform institutional policy: where knowledge is adequate but practice poor, behavioral strategies are needed; where both are lacking, comprehensive retraining is required (Carter et al., 2015).

The WHO's "My Five Moments for Hand Hygiene" framework offers a useful guide for structured practice, and this research helps gauge its real-world implementation (Sendall et al., 2019). Identifying environmental and perceptual barriers can inform safer strategies, while involving nurses in policy development can improve compliance through ownership (Moro et al., 2017). Overall, given persistent non-compliance and knowledge deficits, this study evaluates hand hygiene knowledge and practice among nurses in a Lahore tertiary care hospital, contributing to local infection control and the broader global push for safer healthcare.

Problem Statement

In Pakistan investigated hand hygiene compliance among healthcare workers, identifying it as a serious public health concern due to continued poor adherence despite widespread awareness of

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ISSN: (e) 3007-1607 (p) 3007-1593

its importance Iqra Zia et al. (2022). Limited evidence is available that systematically evaluates both the knowledge and actual practices of hand hygiene among nurses in these settings. Without accurate assessment, the development of effective strategies to improve compliance and enhance patient safety remains a challenge. Therefore, it is imperative to explore the current status of hand hygiene knowledge and practices among staff nurses working in a tertiary care hospital in Lahore to guide infection control efforts and policy formulation.

Objectives

1. To assess the level of knowledge regarding hand hygiene among staff nurses working in a tertiary care hospital in Lahore.

2. To evaluate the hand hygiene practices followed by staff nurses in clinical settings.

Operational Definition

1. Hand Hygiene Knowledge:

The level of understanding demonstrated by nurses regarding hand hygiene guidelines, techniques, and timing, as measured by their correct responses to structured multiple-choice questions based on WHO standards.

2. Hand Hygiene Practice:

The frequency and consistency with which nurses perform hand hygiene during patient care, assessed through self-reported behaviors using a Likert scale in the practice section of the questionnaire.

MATERIALS AND METHODS

Study Design

A descriptive cross-sectional study design was utilized to collect and analyze data.

Study Setting

The research was performed in the Children's Hospital, Lahore, Pakistan.

Sample Size

A sample size of 235 was calculated using the following formula.

$$n = z^2 \frac{\alpha/2 \times P(1-P)}{e^2}$$

Sampling Technique

Simple Random sampling technique was utilized to select participants.

Data Collection Tool

Data were collected using a **structured, adapted questionnaire** from the WHO hand hygiene knowledge questionnaire for health care workers (WHO, 2009) and based on WHO 5 moments of hand hygiene. The tool consisted of three parts.

- **Demographic Information:** Age, gender, educational qualification, years of experience, and previous training in hand hygiene.
- **Knowledge Assessment:** Multiple-choice questions based on WHO hand hygiene guidelines to evaluate participants' knowledge.
- **Practice Assessment:** A set of Likert-scale items to assess the frequency and consistency of hand hygiene practices during clinical care.

Data Analysis

The collected data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version. 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics, knowledge scores, and practice levels.

To examine associations between demographic variables (e.g., age, experience, education) and hand hygiene knowledge and practice, Chi-square tests and independent t-tests were applied where appropriate. A p-value of less than 0.05 was considered statistically significant.

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RESULTS

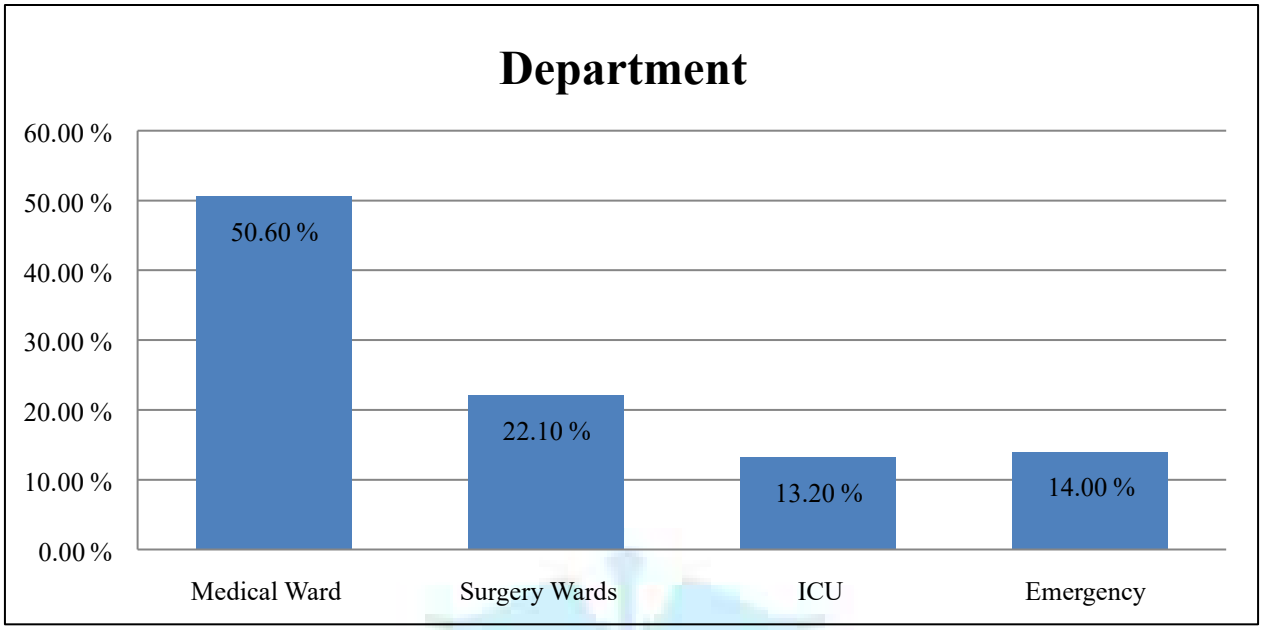

Figure 1: Department-wise Distribution of Staff Nurse

The majority of staff nurses in this study were from the medical ward (119, 50.6%), followed by surgery wards (52, 22.10%), emergency (33, 14%), and ICU (31, 13.2%). This distribution indicates that half of the respondents were from the medical ward, which may influence the overall findings related to hand hygiene knowledge and practices due to the varying nature of care across departments.

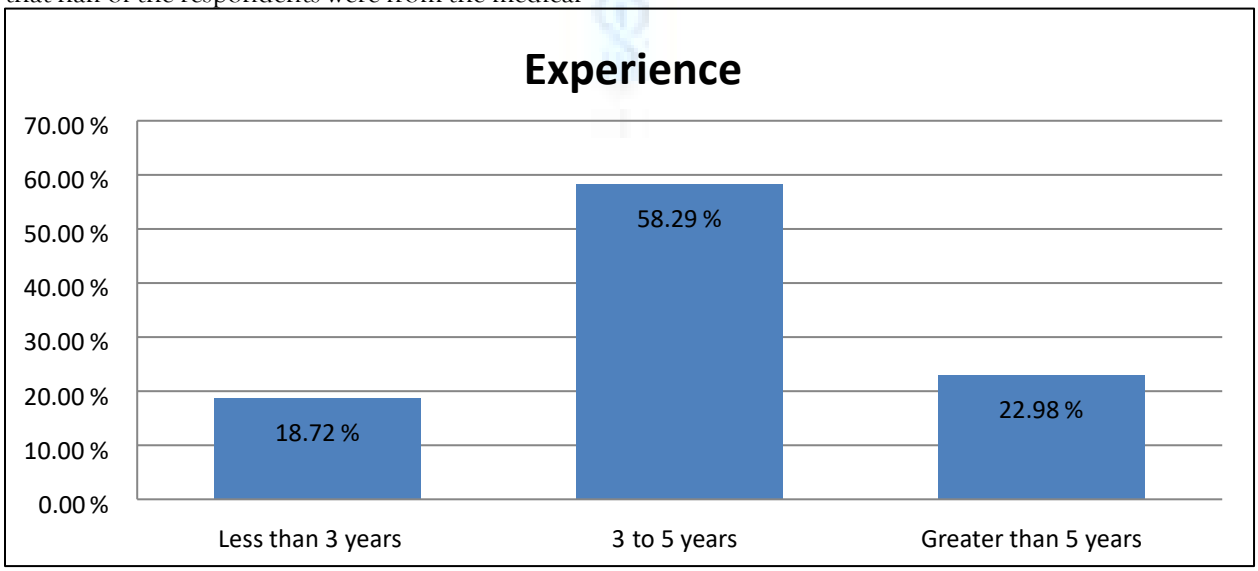

Figure 2: Work Experience of Staff Nurses

Most staff nurses (137, 58.29%) had 3 to 5 years of work experience. This was followed by those with greater than 5 years of experience (54, 22.98%) and those with less than 3 years (44,

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18.72%). The high proportion of nurses with mid-level experience suggests a reasonably skilled workforce, which may influence hand hygiene practices and adherence to protocols.

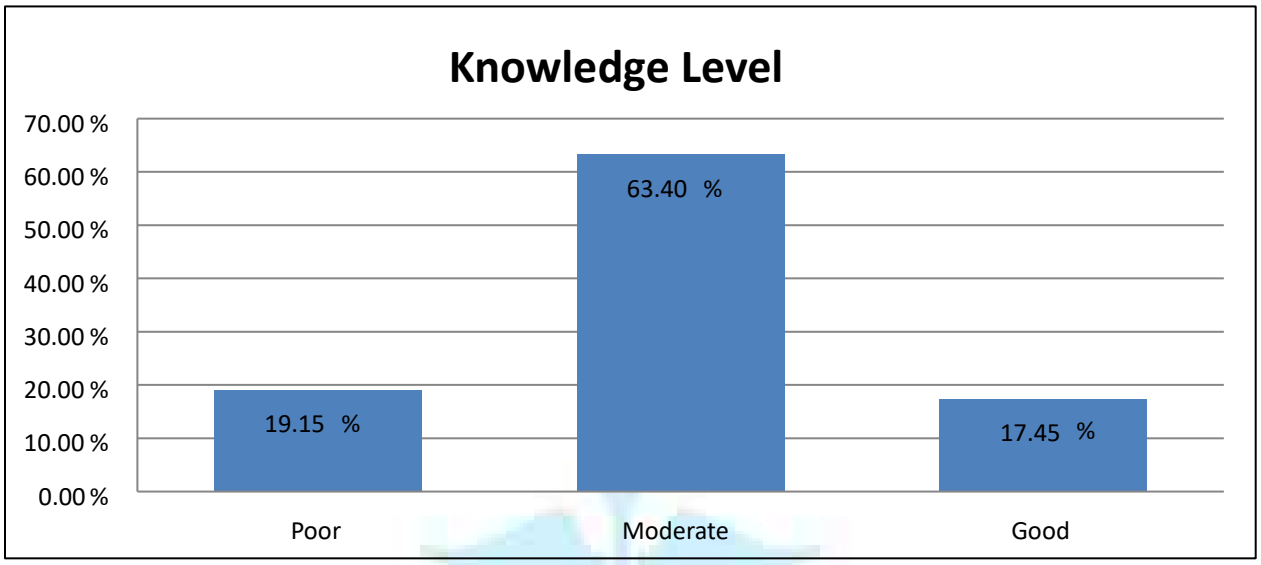

Figure 3: Distribution of Hand Hygiene Knowledge Levels among Staff Nurses

The majority of staff nurses (149, 63.40%) demonstrated a moderate level of knowledge regarding hand hygiene. A smaller proportion had poor knowledge (45, 19.15%), while (41, 17.45%) showed a good level of knowledge. These results indicate that while most nurses possess a fair understanding, there is room for improvement through targeted training and awareness programs.

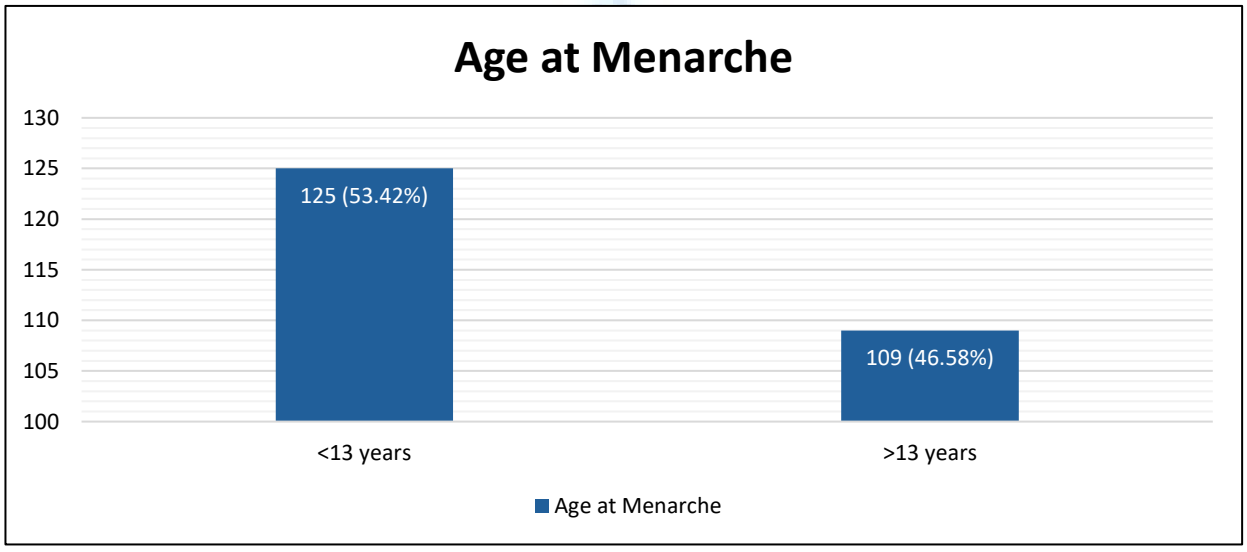

Figure 4: Distribution of Staff Nurses according to their age at Menarche

Almost half of the staff nurses, 125 (53.42%), demonstrated that they were less than 13 years old when they had their first menstrual period i.e. Menarche. While 109 (46.58%) reported that they had their Menarche when they were >13.

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ISSN: (e) 3007-1607 (p) 3007-1593

Table 1: Descriptive Statistics of Age, Knowledge & Practice

Descriptive Statistics	Mean	Std. Deviation
Age in years	33.34	7.63
Knowledge Score	6.26	1.86
Practice Score	12.35	4.41

Table 1 shows the average age of staff nurses was 33.34 years, with a standard deviation of 7.63. The mean knowledge score was 6.26 with a standard deviation of 1.86, reflecting a moderate understanding of hand hygiene. The average practice score was 12.35, with a standard deviation of 4.41, indicating variability in hand hygiene practices among staff nurses.

These values provide insight into the overall distribution and consistency of responses.

Table 2: Association between Knowledge Level and Practice Level of Hand Hygiene Among Staff Nurses

	Knowledge Level			
Practice Level	Poor	Moderate	Good	P-Value
Poor	36	19	8	<0.001
Moderate	6	108	5	
Good	3	22	28	
Total	45	149	41	

Table 2 shows the Chi-square test revealed a statistically significant association between knowledge level and practice level of hand hygiene among staff nurses ($p < 0.001$). A large proportion of nurses with poor knowledge also demonstrated poor practice (36), while those with moderate knowledge primarily exhibited moderate practice (108). Notably, the majority of nurses with good knowledge (28) practiced good hand hygiene. These results indicate that better knowledge is significantly linked to improved hand hygiene practices.

Table 3: Association of Knowledge Level with Department and Experience of Staff Nurses

	K knowledge Level			
	Poor (n =45)	Moderate (n = 149)	Good (n =41)	P-Value
Department				
Medical Ward	22	80	17	0.604
Surgery Wards	11	31	10	
ICU	6	16	9	
Emergency	6	22	5	
Experience				
Less than 3 years	32	9	3	<0.001

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ISSN: (e) 3007-1607 (p) 3007-1593

3 to 5 years	9	123	5	
Greater than 5 years	4	17	33	

Table 3 shows the Chi-square test showed no significant association between knowledge level and the department of staff nurses (p = 0.604), indicating that departmental placement did not influence hand hygiene knowledge. However, a statistically significant association was found between knowledge level and years of experience (p < 0.001). Nurses with less than 3 years of experience mostly had poor knowledge (32 out of 45), while those with 3 to 5 years of experience predominantly had moderate knowledge (123 out of 149). Nurses with more than 5 years of experience showed a higher proportion of good knowledge (33 out of 41), suggesting that increased experience contributes to improved understanding of hand hygiene practices.

Table 4: Association of Hand Hygiene Practice Level with Department and Experience of Staff Nurses

	Practice Level			
	Poor (n =63)	Moderate (n =119)	Good (n =53)	P-Value
Department				
Medical Ward	28	65	26	0.300
Surgery Wards	18	21	13	
ICU	5	17	9	
Emergency	12	16	5	
Experience				
Less than 3 years	30	9	5	<0.001
3 to 5 years	22	92	23	
Greater than 5 years	11	18	25	

Table 4 shows the Chi-square test showed no significant association between hand hygiene practice level and department (p = 0.300), indicating that practice patterns were broadly similar across medical, surgery, ICU, and emergency units. In contrast, practice level was significantly associated with years of experience (p < 0.001). Among nurses with less than 3 years of experience, poor practice was most common (30 of 44). Those with 3 to 5 years of experience most frequently demonstrated moderate practice (92 of 137). Nurses with greater than 5 years of experience showed the highest proportion of good practice (25 of 54). These findings suggest that hand hygiene practice improves with increasing experience.

Table 5: Comparison of Knowledge and Practice Scores across Departments of Staff Nurses

	n	Mean	Std. Deviation	P-Value
Knowledge Score				
Medical Ward	119	6.27	1.83	0.607

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Surgery Wards	52	6.02	1.99	
ICU	31	6.58	1.86	
Emergency		6.33	1.80	
Total	235	6.26	1.86	
Practice Score				
Medical Ward	119	12.43	4.16	0.258
Surgery Wards	52	12.00	4.76	
ICU	31	13.58	4.29	
Emergency	33	11.48	4.76	
Total	235	12.35	4.41	

Table 5 shows that one-way ANOVA was used to compare mean knowledge and practice scores among staff nurses working in different departments. The analysis revealed no statistically significant difference in knowledge scores across departments (p = 0.607), with mean scores ranging from 6.02 in surgery wards to 6.58 in ICU. Similarly, no significant difference was observed in practice scores between departments (p = 0.258), although the ICU had the highest mean practice score (13.58), while emergency nurses had the lowest (11.48). These findings indicate that departmental assignment did not significantly influence knowledge or practice related to hand hygiene.

Table 6: Comparison of Knowledge and Practice Scores by Years of Experience Among Staff Nurses

	n	Mean	Std. Deviation	P-Value
Knowledge Score				
Less than 3 years	44	4.27	2.15	<0.001
3 to 5 years	137	6.36	1.15	
Greater than 5 years	54	7.65	1.68	
Total	235	6.26	1.86	
Practice Score				
Less than 3 years	44	9.05	4.72	<0.001
3 to 5 years	137	12.64	3.82	
Greater than 5 years	54	14.33	4.14	
Total	235	12.35	4.41	

Table 6 shows that one-way ANOVA revealed a statistically significant difference in both knowledge and practice scores based on years of experience (p < 0.001 for both). Nurses with less than 3 years of experience had the lowest mean knowledge score (4.27) and practice score (9.05).

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Those with 3 to 5 years of experience had higher mean scores (6.36 for knowledge and 12.64 for practice), while the highest scores were observed among nurses with more than 5 years of experience (7.65 for knowledge and 14.33 for practice). These findings indicate that hand hygiene knowledge and practice improve significantly with increased clinical experience.

DISCUSSION

The results of the study on hand hygiene knowledge and practices among staff nurses at a tertiary care hospital in Lahore provide critical insights into the correlation between knowledge levels, practice behaviors, departmental influences, and work experience. Of the staff nurses surveyed, a notable majority (50.6%) were from medical wards, with others distributed across surgery, emergency, and ICU departments. This categorization highlights that the majority of participants are engaged in a high-contact environment where adherence to hand hygiene protocols can significantly mitigate healthcare associated infections (HAIs) (Hammerschmidt & Manser, 2019).

The findings reveal that a considerable proportion of nurses (58.29%) possess 3 to 5 years of experience. This mid-level experience is often ideal for cultivating competent healthcare professionals who understand and apply infection control measures effectively (Sofiana et al., 2020). However, those with less than three years of experience exhibited poorer knowledge and practice levels, emphasizing that experience directly contributes to an improved grasp of hand hygiene protocols (Sofiana et al., 2020). Previous literature supports this, noting that sustained clinical exposure can enhance compliance and knowledge (Dutta et al., 2020).

In terms of knowledge and practice scores, while the majority demonstrated moderate capability, 63.40% possessed a moderate level of knowledge, and 50.64% exhibited moderate practice adherence. This is consistent with findings from studies indicating that while nurses may understand the importance of hand hygiene, translating that knowledge into practice remains a challenge (Herbert et al., 2013; Nguyen et al., 2022). The observed disparity between knowledge and practice in this study underscores the complexities surrounding healthcare behaviors, where even moderately knowledgeable staff may not adhere to protocols due to factors such as forgetfulness, environmental obstacles, or inherent attitudes towards hygiene practices (Le et al., 2019).

Statistical analysis, especially the Chi-square tests, confirmed a significant relationship between knowledge and practice levels, indicating that better understanding directly correlates with improved adherence to hand hygiene practices ($p < 0.001$) (Sofiana et al., 2020). This finding aligns with the recommendations from several studies that highlight the necessity of continuous education to enhance compliance (Dutta et al., 2020; Sofiana et al., 2020). Specifically, nurses with poorer knowledge predominantly demonstrated poorer practice, confirming that educational interventions targeting hand hygiene could effectively improve practice levels (Herbert et al., 2013; Cruz & Bashtawi, 2016). Those with rich clinical experiences showcased better knowledge and practice scores, reaffirming evidence from prior literature that emphasizes training on infection control tailored to the varying levels of clinical experience among nurses (Maheshwari et al., 2014).

Despite these insights, departmental differences did not show significant effects on knowledge or practice levels ($p = 0.604$ and $p = 0.300$ respectively). This finding is somewhat unexpected, as one might expect departments that handle more critical cases, such as the ICU, to instill higher compliance or understanding levels. Research indicates that regular training and the presence of hand hygiene interventions can mitigate departmental variances in compliance; thus, the absence of such significant differences in this context could indicate an overall need for improved educational structures (Hammerschmidt & Manser, 2019).

Collectively, these findings reiterate the importance of effective educational interventions that actively engage nurses, especially those newly entering the workforce or assigned to high-contact departments. Recommendations include

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ISSN: (e) 3007-1607 (p) 3007-1593

incorporating hand hygiene training as a continual aspect of healthcare education, utilizing role models to demonstrate best practices, and fostering an organizational culture that prioritizes hygiene compliance (Thakker & Jadhav, 2015). Such initiatives are essential not only to enhance hand hygiene practices among nurses but also to protect patient safety and reduce the prevalence of HAIs.

The assessment of hand hygiene knowledge and practices among nurses highlights existing gaps and the need for systematic educational enhancements. Regular training programs, role modeling by experienced staff, and visually engaging reminders can potentially foster a stronger culture of compliance, ultimately benefiting patient outcomes in healthcare settings.

CONCLUSION

This study assessed hand hygiene knowledge and practices among staff nurses in a tertiary care hospital in Lahore, Pakistan. The majority of nurses demonstrated moderate levels of both knowledge and practice. Statistically significant associations were found between knowledge and practice levels, indicating that better knowledge contributes to improved hand hygiene behavior. Moreover, both knowledge and practice scores significantly increased with years of experience, highlighting the positive impact of clinical exposure. However, no significant differences were observed across departments. These findings underscore the need for targeted training programs, especially for less experienced nurses, to enhance hand hygiene compliance and reduce the risk of healthcare-associated infections.

Limitations of the Study

- The study was conducted in a single tertiary care hospital in Lahore, which may limit the generalizability of findings to other settings or regions.
- Self-reported responses regarding hand hygiene practices may be influenced by social desirability bias, potentially overstating actual compliance.
- The cross-sectional design captures data at a single point in time and does not assess changes or improvements over time.
- The study did not include direct observation of hand hygiene practices, which could have provided more accurate and objective data.
- Certain contextual factors such as availability of supplies (e.g., hand rubs, sinks) and staffing ratios were not measured, which may influence hand hygiene behavior.

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