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Barriers to Effective Hand Hygiene Compliance Among Nurses in Hospital Settings

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Abstract

Hand hygiene is one of the most effective and affordable measures to prevent healthcare-associated infections (HAIs). Despite its recognized importance, adherence among nurses remains suboptimal due to various individual and institutional barriers. Understanding these barriers is crucial to improve compliance and promote patient safety in hospital settings. This study aimed to explore the individual and institutional barriers that hinder effective hand hygiene compliance among nurses working in public hospitals. A qualitative research design was adopted using an interpretivist approach. Data were collected through semi-structured interviews with nine nurses working in different departments of two public hospitals. Thematic analysis was applied to identify recurring themes and patterns related to hand hygiene barriers. Two major themes emerged from the data: Individual Barriers and Institutional Barriers. Individual barriers included lack of continuous education and training, overconfidence, perceived low risk of infection, forgetfulness, influence of others, and skin irritation. Institutional barriers comprised lack of resources, heavy workload, inconvenient sink locations, and reliance on gloves as a substitute for handwashing. The findings indicated that inadequate infrastructure and insufficient institutional support significantly reduce nurses' compliance with hand hygiene practices, despite their awareness of its importance. Both individual and institutional factors contribute to poor hand hygiene compliance among nurses. Addressing these barriers through education, adequate resource provision, workload management, and leadership support is vital to enhance compliance and reduce healthcare-associated infections.

Keywords: Hand Hygiene, Barriers, Nurses, Compliance, Infection Control, Hospital Settings, Qualitative Study

Introduction

Hand hygiene refers to the act of cleaning hands with soap and water or an alcohol-based hand rub to remove dirt, organic matter, and microorganisms (Hillier, 2020). Keywords include "hand hygiene," which means the removal of pathogens from hands to prevent transmission; "healthcare-associated infections (HAIs)," which are infections acquired during healthcare delivery; and "compliance," meaning the degree to which nurses adhere to standard hand hygiene guidelines. Barriers are factors that obstruct compliance, categorized into individual factors such as

knowledge, skills, and confidence, and institutional factors such as workload and resources (Ataiyero, Dyson, & Graham, 2023). Nurses are key agents in infection control, and understanding these barriers is essential to improving patient safety in hospitals (Smith et al., 2019). The prevalence of inadequate hand hygiene remains high worldwide. According to the World Health Organization, healthcare-associated infections affect millions of patients each year, especially in developing countries where infection rates are up to 20 times higher than in developed regions (Ataiyero et al., 2023). In Pakistan, only 38.7% of nurses consistently follow hand hygiene practices (Salman et al., 2018). Studies reveal that adherence varies by shift, with 49.8% compliance in the morning, 35.6% in the evening, and 14.5% at night (Tremblay et al., 2023). Low compliance rates directly contribute to increased morbidity, mortality, and healthcare costs, reflecting an urgent need to identify and overcome barriers (Mouajou et al., 2022). Hand hygiene is the most effective and economical method to prevent HAIs in healthcare settings (Lotfinejad et al., 2021). Ignaz Semmelweis introduced hand disinfection in 1846, proving its role in preventing puerperal fever among mothers (Nwachukwu et al., 2023). Despite historical evidence and global guidelines, compliance among healthcare workers, especially nurses, remains low (Roshan et al., 2020). Studies indicate that even after multiple trainings, healthcare workers often neglect hand hygiene due to behavioral and environmental challenges (Nematian et al., 2017). The consistent practice of hand hygiene is crucial to breaking the chain of infection transmission in hospitals. Individual factors significantly influence compliance with hand hygiene. These include limited knowledge, insufficient education, and poor awareness of infection risks (Bala et al., 2023). Confidence and perceived invulnerability to infection also reduce adherence (Suen et al., 2019). Forgetfulness, low motivation, and lack of reinforcement from peers or supervisors have been cited as major behavioral barriers (Ataiyero et al., 2019). Nurses often perceive themselves as adequately protected and overlook the importance of frequent hand cleaning (Engdaw et al., 2019). Addressing these cognitive and behavioral barriers through education and behavioral reinforcement may enhance adherence. Institutional factors such as inadequate resources, poor infrastructure, and staff shortages play a critical role in poor compliance. Limited access to soap, clean water, or alcohol-based sanitizers and inconveniently located sinks discourage regular hand hygiene (Smith et al., 2019). Work overload and high patient-to-nurse ratios increase time pressure, reducing the likelihood of compliance (Al Ghafari & AbuRuz, 2019). Skin irritation from repeated use of antiseptics and the habitual use of gloves as a substitute for hand washing further hinder adherence (Acquarulo et al., 2019). Environmental limitations thus remain a major structural barrier to effective infection control in public hospitals. In developing nations, including Pakistan, the institutional neglect of infection control policies worsens the issue. Hospitals often lack continuous training, supervision, and monitoring systems for hand hygiene (Harun et al., 2022). Posters and reminders are rarely displayed, and no consistent auditing system exists to assess adherence (Al-Maani et al., 2022). Nurses have reported frustration due to poor managerial support and unavailability of materials needed to perform hand hygiene (Tang et al., 2019). Such systemic shortcomings demonstrate how institutional culture and policies directly shape hygiene behaviors among healthcare providers. Improving compliance requires simultaneous attention to individual and institutional barriers. Educational interventions, proper availability of resources, and reinforcement of behavioral models can enhance adherence among nurses (Iversen et al., 2021). Creating supportive environments with adequate sinks, soap, and sanitizers can improve accessibility and motivation. Empowering nurses through continuous training and leadership engagement can further strengthen hand hygiene practices. Recognizing and addressing these barriers is essential for reducing healthcare-associated infections and promoting a culture of patient safety in hospitals (Sandbøl et al., 2022).

Methodology

This study employed a qualitative, cross-sectional research design guided by the interpretivist philosophy, focusing on understanding nurses' perceptions and experiences regarding barriers to hand hygiene. The design allowed for in-depth exploration of individual and institutional factors influencing hand hygiene compliance. Semi-structured interviews were conducted using a pre-validated questionnaire adapted from previous research (Hebden, Cervantes, & Monsees, 2023). The qualitative approach was selected to capture the subjective viewpoints of nurses working in diverse hospital environments and to identify key themes explaining the low adherence to hand hygiene practices in public healthcare settings.The target population consisted of registered nurses working in public hospitals of Lahore, including Sir Ganga Ram Hospital and Mayo Hospital. Participants were selected from various departments such as general operation theatre, gynecology operation theatre, pediatric ICU, emergency, and oncology units to ensure diverse representation. Purposive sampling was used to recruit nurses who had at least one year of clinical experience. A total of nine nurses (eight females and one male) participated in the study. Their ages ranged from 25 to 42 years, and educational qualifications varied from General Nursing Diplomas to Post RN BSc Nursing. The sample size was considered adequate for qualitative research, as data saturation was achieved after the ninth interview, ensuring no new information emerged.

Data Collection and Analysis

Data were collected through face-to-face semi-structured interviews lasting 15–20 minutes each. The interview guide included demographic questions and open-ended items focusing on knowledge, institutional resources, workload, and personal challenges related to hand hygiene. All interviews were conducted in English and Urdu, recorded with participants' consent, and later transcribed verbatim. Thematic analysis was applied to identify recurring patterns and categorize findings under two major themes: individual barriers and institutional barriers. Ethical considerations were maintained throughout the study, including informed consent, confidentiality, and voluntary participation. Findings were triangulated with literature to ensure validity and reliability of the results.

Results and Analysis

Table 1: Demographic Characteristics of Participants (n = 9)

Variable	Categories	Frequency (n)	Percentage (%)
Gender	Female	8	88.9
	Male	1	11.1
Age (years)	25–30	4	44.4
	31–40	3	33.3
	41–45	2	22.2
Education	General Nursing	3	33.3
	BSc Nursing	5	55.6
	Post RN BSc Nursing	1	11.1
Experience (years)	1–5	2	22.2
	6–10	3	33.3
	11–15	2	22.2
	>15	2	22.2

Table 1 shows the demographic profile of nine nurses who participated in the study. The majority of the participants were females (88.9%), while only one was male (11.1%). Most nurses (44.4%) were between 25–30 years of age, followed by 33.3% aged 31–40 years. Over half of the

participants (55.6%) held a BSc Nursing qualification, whereas 33.3% had General Nursing education. Regarding experience, one-third (33.3%) had 6–10 years of experience, and 22.2% each had 1–5, 11–15, or more than 15 years of experience. This indicates a diverse and experienced group of nurses across different educational levels and age groups.

Table 4.2: Themes, Sub-Themes, Descriptions, and Participants' Quotes

Theme	Sub-Theme	Description	Participants' Quotes
1. Individual Barriers	Knowledge, Skills & Education	Nurses possess awareness about hand hygiene but lack updated training and continuous reinforcement.	"Yes, I know about barriers of hand hygiene." "Hands are the primary source of infection; we carry infection through hands."
	Confidence	Overconfidence among nurses reduces adherence to proper handwashing steps.	"Nurses believe they follow hand hygiene, but actual compliance is low."
	Perceived Risk of Infection	Some nurses underestimate infection risks due to workload and routine familiarity.	"We know hand hygiene is important, but due to rush, we ignore it sometimes."
	Memory	Forgetfulness and multitasking cause neglect of handwashing.	"Due to shortage of time, we often forget to wash hands between patients."
	Influence of Others	Lack of role modeling from senior staff discourages consistent compliance.	"Doctors and senior nurses don't always follow hand hygiene, so juniors don't either."
	Skin Irritation	Frequent use of sanitizers causes irritation, discouraging adherence.	"We avoid alcohol rub because it causes dryness and itching."
2. Institutional Barriers	Environment & Resources	Lack of soap, water, and sanitizers limits compliance.	"Resources are not available, soap and water are missing in wards."
	Work Overload	Heavy patient ratios prevent nurses from taking time for handwashing.	"Only one nurse attends 50–100 patients; no time for hand hygiene."
	Inconvenient Location of Sinks	Sinks are distant or outside wards, causing practical difficulty.	"Sinks are not available in wards; we go far to wash hands."
	Always Wearing Gloves	Gloves are used as a substitute for handwashing.	"When soap and sinks are not available, I use gloves instead."

The qualitative findings revealed two major themes Individual Barriers and Institutional Barriers that affect nurses' compliance with hand hygiene practices. Under the individual barriers,

participants expressed that although they possess adequate knowledge and awareness about hand hygiene, continuous training and reinforcement are lacking. Overconfidence and routine familiarity often lead to neglect of proper handwashing steps. Some nurses underestimate the perceived risk of infection, considering it a minor concern amidst their busy schedules. Forgetfulness during multitasking was also identified as a recurring issue that contributes to noncompliance. Furthermore, nurses highlighted the influence of others as a significant factor in shaping their behavior toward hand hygiene. They reported that when senior nurses and doctors fail to follow proper hand hygiene protocols, it negatively impacts the commitment of junior staff. Additionally, skin irritation caused by frequent use of alcohol-based sanitizers discourages regular adherence to handwashing practices, as nurses prefer to avoid discomfort and dryness resulting from repeated use of disinfectants. The second theme, Institutional Barriers, emphasized challenges related to environmental and organizational factors. Nurses pointed out the unavailability of basic resources such as soap, water, and hand sanitizers in public hospitals, making compliance difficult. Heavy workload and high patient ratios further prevent nurses from taking time to wash their hands between procedures. Moreover, the inconvenient location of sinks often outside the wards adds to the difficulty, forcing nurses to skip handwashing. Some participants also reported relying on gloves as a substitute for proper hand hygiene due to resource shortages and time constraints, indicating a need for improved institutional support and infrastructure.

Discussion

The findings of the present study revealed that both individual and institutional barriers significantly contribute to the low adherence to hand hygiene practices among nurses working in public hospitals. Although most nurses demonstrated awareness regarding the importance of hand hygiene, compliance was hindered by multiple factors such as lack of continuous training, overconfidence, inadequate resources, and heavy workloads. These findings are consistent with the study by Ataiyero, Dyson, and Graham (2023), who found that nurses' self-reported hand hygiene compliance is often higher than actual practice due to overconfidence and limited institutional support. Similarly, Salman et al. (2018) reported that despite adequate knowledge, Pakistani nurses faced practical barriers such as limited resources and poor supervision that hindered compliance, reinforcing the challenges observed in the present study. The current study found that nurses' knowledge, skills, and education were adequate, yet this did not necessarily translate into improved hand hygiene behavior. This result aligns with Nasution et al. (2023), who explained through the Health Belief Model that awareness and perceived susceptibility alone are insufficient to ensure adherence unless supported by institutional reinforcement and behavioral motivation. Likewise, Ataiyero, Dyson, and Graham (2019) emphasized that educational interventions must be continuous and paired with practical monitoring to sustain hand hygiene compliance. The consistency between these findings suggests that regular training and follow-up programs are crucial in transforming theoretical knowledge into consistent hygienic behavior. Another major finding was the influence of overconfidence and the perceived low risk of infection, which led to inconsistent hand hygiene practices. This observation supports the findings of Salman et al. (2018), who noted that healthcare workers often claimed compliance but were unaware of their lapses in hand hygiene performance. Similarly, Tremblay et al. (2023) used electronic monitoring to reveal discrepancies between nurses' perceived and actual hand hygiene behaviors, confirming that self-assessment tends to overestimate true compliance. These findings contrast slightly with Nasution et al. (2023), who suggested that confidence can be a motivating factor when combined with proper behavioral reinforcement and institutional recognition. The theme of work overload and time constraints was another prominent finding influencing noncompliance.

Nurses frequently reported attending to large patient loads, leaving them with little time to wash hands properly. This finding is in agreement with Ataiyero et al. (2019), who reported that staffing shortages and excessive workloads in African hospitals were major determinants of poor hand hygiene compliance. Similarly, Tremblay et al. (2023) observed that nurses' performance declined during peak working hours, indicating that workload intensity directly affects hygiene adherence. However, in facilities where workload was supported by structural organization and supervision, compliance improved, suggesting that institutional support can mitigate this barrier. Institutional factors such as lack of resources and inconvenient sink locations were also significant barriers. Nurses expressed frustration over the unavailability of soap, water, or sanitizers and the poor accessibility of sinks. This aligns with the findings of Ataiyero et al. (2023), who identified inadequate infrastructure and lack of supplies as key institutional barriers to hand hygiene in Nigerian hospitals. Similarly, Salman et al. (2018) emphasized that even when awareness exists, compliance remains low in resource-limited environments. These findings together reinforce that physical and organizational support is vital for the translation of knowledge into consistent hygienic practice among healthcare workers. The study also identified glove overuse and skin irritation as physical and behavioral deterrents to regular hand hygiene, as nurses often avoided frequent use of alcohol-based sanitizers due to dryness and discomfort. This finding corresponds with Acquarulo et al. (2019), who demonstrated that excessive glove use can create a false sense of safety, leading nurses to neglect handwashing altogether. Similarly, Tremblay et al. (2023) found that reliance on gloves was inversely correlated with hand hygiene performance. These findings emphasize the need for awareness campaigns addressing misconceptions about glove use and promoting hand care strategies to prevent irritation and dryness.

Overall, the results of this study reinforce the global evidence that both individual behavior and institutional support systems are interdependent in ensuring effective hand hygiene compliance. Consistent with Ataiyero et al. (2019), the present findings indicate that improving hand hygiene requires a multidimensional approach that combines education, supervision, and adequate infrastructure. The convergence of results across studies demonstrates that while knowledge and awareness are essential, sustainable compliance can only be achieved through behavioral reinforcement and system-level reforms. Hence, hospitals must prioritize continuous education, adequate resource allocation, and monitoring systems to overcome these persistent barriers and strengthen infection prevention practices among nurses.

Conclusion

The findings of this study demonstrated that both individual and institutional factors play a critical role in influencing nurses' compliance with hand hygiene practices in public hospital settings. Although nurses possessed sufficient knowledge and awareness about the importance of hand hygiene, adherence remained suboptimal due to barriers such as overconfidence, forgetfulness, time constraints, and skin irritation. Institutional barriers, including lack of resources, inconvenient sink locations, and excessive workloads, further compounded the problem. These challenges collectively contribute to low compliance rates, which increase the risk of healthcare-associated infections and compromise patient safety.

Recommendations

1. **Regular Training Programs:**
   Organize periodic training and refresher workshops on hand hygiene practices to update nurses on current WHO guidelines and reinforce correct techniques.

2. **Adequate Resource Provision:**
   Ensure consistent availability of essential supplies such as soap, water, alcohol-based sanitizers, and hand towels in all wards and departments.
3. **Improved Infrastructure:**
   Install conveniently located sinks and hand hygiene stations near patient care areas to facilitate easy access and reduce time barriers.
4. **Monitoring and Supervision:**
   Implement regular monitoring systems and supervision by infection control teams to ensure compliance and provide constructive feedback.
5. **Leadership and Role Modeling:**
   Encourage senior nurses and physicians to serve as role models by demonstrating proper hand hygiene behavior to influence junior staff positively.
6. **Workload Management:**
   Address staffing shortages and workload distribution to allow nurses sufficient time to perform proper hand hygiene between patient interactions.
7. **Skin Care Measures:**
   Provide skin-friendly, pH-balanced hand sanitizers and moisturizers to prevent irritation and promote frequent handwashing without discomfort.
8. **Behavioral Reinforcement:**
   Incorporate hand hygiene reminders through posters, digital alerts, and peer encouragement programs to sustain motivation among healthcare workers.

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