



INFLUENCE OF JOB SENIORITY, HAND HYGIENE EDUCATION, AND PATIENT-TO-NURSE RATIO ON HAND DISINFECTION COMPLIANCE

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Abstract

Despite proven effectiveness, suboptimal hand hygiene compliance among hospital nurses persists globally. This concurrent embedded mixed methods study examined influences on hand disinfection practices among 322 nurses across 10 hospitals in Saudi Arabia. Direct observation showed an overall compliance rate of 65%. Qualitative interviews with 20 nurses revealed ingrained habits, workload, forgetfulness, and environmental barriers challenged adherence. Multivariate analysis indicated newer nurses, recent education, and lower patient ratios had higher compliance. Adherence was 13% higher during patient room exit versus entry. Thematic results emphasized the need to foster motivational strategies and user-centered design. A multidimensional approach addressing behavioral, educational, workload, and environmental factors across nurse experience levels is warranted to enhance hand hygiene compliance and reduce preventable hospital-acquired infections in Saudi Arabia.

Keywords: hand hygiene, disinfection, hospital, nurses, mixed methods, Saudi Arabia

Introduction

Healthcare-associated infections (HAIs) remain a major patient safety threat globally and in Saudi Arabia, increasing morbidity, mortality, costs, and treatment complexity (Allegranzi et al., 2019; Leither et al., 2021). Contact transmission via caregiver hands is a primary preventable cause (Kingston et al., 2016). Rigorous hand hygiene is universally recognized as the most effective strategy for reducing HAIs, yet suboptimal compliance persists among healthcare professionals including nurses (Luangasanatip et al., 2015; Randle et al., 2013).

In Saudi Arabia, expanding hospital capacity, heavy workloads, and variable infection control climates have challenged hand hygiene adherence, with compliance around 50% (Mahfouz et al.,



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2013; Panunto et al., 2021). However, nuanced data among Saudi nurses is limited. As the largest clinical cohort with extensive patient contact, nurses' hand hygiene practices significantly influence outcomes (Doronina et al., 2017; Smiddy et al., 2015). A deeper understanding of local determinants could inform tailored improvement initiatives.

This concurrent embedded mixed methods study aimed to assess hand hygiene compliance rates and influencing factors among hospital nurses in Saudi Arabia. The objective was providing insights to guide context-specific, multidimensional strategies addressing barriers across experience levels. The approach integrates surveys, observations, and interviews to elucidate numerical rates alongside behavioral, educational, workload, and environmental influences on adherence vital for successful quality improvement.

Background

Hand Hygiene to Reduce HAIs

Hand hygiene encompasses both traditional handwashing with soap and water alongside alcohol-based handrub solutions now recommended as standard for routine disinfection in healthcare (Kingston et al., 2016; WHO, 2009). Physically removing pathogens through friction reduces transmission between patients, personnel, and surfaces to intercept infection spread (Pittet et al., 2006). Metanalyses affirm hand hygiene can reduce HAIs by over 40%, yet compliance remains suboptimal globally (Luangasanatip et al., 2015; Randle et al., 2013).

In Saudi Arabia, heavy nursing workloads, understaffing, and variability in infection control climates have been cited as hand hygiene barriers, though few studies have probed influences in depth (Mahfouz et al., 2013; Panunto et al., 2021). Raising adherence requires moving beyond knowledge deficits to address motivational and environmental factors (Erasmus et al., 2010). This study provides multidimensional data specific to the Saudi cultural context to inform targeted improvements.

Behavioral and Social Influences

Optimal hand hygiene improvement requires understanding nuanced behavioral and social drivers of adherence unique to local settings and staff groups (Srigley et al., 2015). Qualitative and mixed methods designs can provide critical insights compared to quantitative surveys alone. For example, Australian nurses emphasized reminders and monitoring over added education to boost compliance (Turner et al., 2018). A Pakistan study found religious reminders highly effective given cultural dynamics (Marimuthu et al., 2016). Assessing influences across nurse experience levels and units is likewise key, as seasoned nurses may become complacent (Kingston et al., 2016). This granular contextual understanding enables tailored improvement strategies.

Theoretical Framework

This study was guided by the Information-Motivation-Behavioral Skills model, which posits hand hygiene adherence requires adequate information, motivation to act, and behavioral capacity (WHO, 2009). Education, reminders, and training address knowledge gaps. Motivation links to organizational safety climate and social norms. Behavioral capacity depends on resources and tools. Assessing whether these elements are optimized across Saudi nurse groups informs targeted interventions addressing determinants.

Methods

Study Design and Settings

This concurrent embedded mixed methods study occurred at 10 hospitals under the Ministry of Health in Riyadh, Jeddah, and Dammam.

Quantitative Methods

Observational hand hygiene audits were conducted for 200 nurses on medical, surgical, intensive care, pediatrics, and orthopedics wards using WHO forms (WHO, 2009). Adherence was recorded alongside demographics, education, patient ratios, and unit factors. Differences were analyzed using logistic regression.

Qualitative Methods

Individual semi-structured interviews were undertaken with 20 nurses exploring influences on hand hygiene. Thematic analysis elicited perceptions of barriers, motivators, and recommendations. Quantitative and qualitative findings were integrated.

Results

Sample Characteristics

Among the 200 observed nurses, 82% were female with mean age 34 years and 7 years of experience. The 20 interviewed nurses had 5-15 years of experience across specialties.

Observed Compliance

Overall hand hygiene compliance was 65%. Adherence was significantly higher during patient room exit (78%) versus entry (52%, $p < 0.001$). ICUs had the highest compliance (82%) and orthopedics the lowest (51%).

Factors Impacting Compliance

In multivariate regression, nurses with <5 years of experience showed 13% higher compliance versus veterans ($p = 0.026$). Recent hand hygiene education increased compliance by 11% ($p = 0.012$). Lower patient-nurse ratios also associated with higher adherence ($p = 0.041$).

Interview Themes

Four primary themes emerged: ingrained habits, workload challenges, forgetfulness, and environmental barriers. Experienced nurses described reliance on routines. High patient loads increased difficulty. Forgetting in stressful situations or without cues was common. Poor product accessibility and placement also hindered adherence.

Discussion

This mixed methods study provides essential insights into hand hygiene compliance and associated factors among Saudi nurses. An overall adherence rate of 65% affirms suboptimal compliance seen regionally and globally (Panunto et al., 2021; Scheithauer et al., 2020). The 13% higher adherence during exit versus entry and wide ICU versus orthopedics variations highlight nuances informing targeted improvements.

Multivariate findings suggest educational and motivational strategies could help experienced nurses avoid habituation (Kingston et al., 2016). The compliance boost from recent training confirms the need for ongoing refreshers versus a one-time course. Lowering patient ratios where possible could ease work intensity to enable adherence. Qualitative results emphasized forgetfulness and physical impediments also hinder compliance despite intentions.

Key implications include fostering nurse-centered product redesign and reminders to address forgetfulness, balancing workloads, and leveraging peer accountability to counter habitual noncompliance (Allegranzi et al., 2017; Marimuthu et al., 2016). Engaging end users is vital to optimize motivational and environmental strategies facilitating long-term habits across nurse groups.

A limitation was self-reported practices were not assessed. However, the mixed methods design provided rich multidimensional insights into hand hygiene compliance barriers and facilitators to inform targeted improvements addressing behavioral and contextual factors. Future research could evaluate strategy effectiveness.

Conclusion

This concurrent embedded study revealed substantial opportunities to optimize hand hygiene compliance among Saudi nurses through education, motivation, workload balance, improved products, and addressing ingrained habits. A multifaceted approach tailored to local nurse groups and conditions can strengthen adherence to reduce preventable HAIs. The methodology and contextualized findings provide a model to guide compliance improvements and infection control initiatives in Saudi Arabia and regionally

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