

Evaluation of healthcare professionals' hand washing practices, attitudes, and knowledge

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Abstract

Background: Nosocomial infections are primarily transmitted through the hands of healthcare workers (HCWs), making hand hygiene a critical component in preventing the spread of infectious agents. Despite guidelines from organizations such as the CDC, compliance with hand hygiene practices remains suboptimal, especially in developing countries where limited studies exist on the causes of non-compliance. Factors such as lack of awareness, negative attitudes, insufficient resources, and human-related challenges contribute to poor adherence to hand hygiene protocols.

Methods: This study, conducted over six months , aimed to evaluate the knowledge, attitudes, and practices of hand hygiene among HCWs . Data were collected via three tools: an observational form documenting hand hygiene opportunity, a ward inspection form assessing the availability of hand hygiene resources, and a self-administered questionnaire assessing HCWs' knowledge and attitudes. A total of 2,500 hand hygiene opportunities were observed across multiple hospital departments, and 200 HCWs completed the questionnaire. The study focused on procedures such as invasive and non-invasive interventions, personal contact, body fluids handling, and waste disposal.

Results: The study found that nurses performed the majority of observed hand hygiene opportunities . Compliance was higher among doctors (37.5%) compared to other HCWs, but only 11.6% of doctors' hand hygiene opportunities were performed correctly. Routine hand washing was the most common practice (64.2%), while antiseptic hand washing was rare (3.9%). Knowledge scores for nurses (42.6 ± 11.7) were higher than for doctors (39.1 ± 10.5), with the NICU pediatric department having the highest knowledge scores. Nurses had a generally positive attitude towards hand hygiene, with 96% acknowledging its protective role, though only 70.7% believed role modeling could improve practices. The most frequent error in hand hygiene was improper drying and insufficient contact time. Ward inspections revealed that most wards had sinks (80%) but lacked essential resources like paper towels for drying hands (0%).

Conclusion: Hand hygiene practices among HCWs are suboptimal, despite good knowledge and positive attitudes towards hand hygiene. Key issues include improper technique and insufficient resources. To improve compliance, interventions should address both cognitive and resource-related challenges, and strengthen monitoring and role modeling within healthcare settings.

Introduction

Nosocomial infections are predominantly believed to be transmitted through the hands of healthcare workers (HCWs). Hand hygiene plays a pivotal role in controlling the spread of infectious agents, making handwashing (HW) one of the most effective strategies for preventing disease transmission (1). Despite mandates from organizations such as the Joint Commission requiring hospitals to adopt the Centers for Disease Control and Prevention (CDC) hand hygiene guidelines, compliance among HCWs remains suboptimal (2). In developing countries, the scarcity of studies on hand hygiene practices has made it difficult to pinpoint the exact causes of non-compliance (3).

Factors influencing poor adherence to hand hygiene practices include insufficient awareness and limited knowledge among HCWs regarding the significance, proper techniques, methods, and standards of handwashing (4-8). Human-related challenges such as being overburdened with work (6), forgetfulness (9), inadequate staff-to-patient ratios, and negative attitudes towards safety protocols further hinder compliance (4). Additionally, systemic issues like the lack of sufficient supplies, equipment, and resources for maintaining proper hand hygiene, as well as the presence of irritants and allergic reactions to handwashing agents, exacerbate the problem (4, 5, 7, 10). Attitudes towards hand hygiene have been identified as critical predictors of the intention to follow through with appropriate practices (11).

Improved adherence to hand hygiene guidelines has been linked to a significant reduction in hospital-acquired infections, including respiratory infections (13). However, research and audits often overlook the technical aspects of hand hygiene, leaving many questions unanswered in this critical area (13). To achieve effective compliance, interventions must be comprehensive, addressing cognitive, emotional, and behavioral dimensions. These efforts should also prioritize enhancing the availability and accessibility of handwashing facilities and alcohol-based hand rubs (14, 15).

Subjects and Methods

The study focused on evaluating all instances where healthcare workers (HCWs) had the opportunity to perform handwashing. These opportunities included scenarios such as performing invasive procedures, engaging in direct patient contact, conducting non-invasive tasks like measuring blood pressure or temperature, handling body fluids, disposing of waste, or interacting with contaminated surfaces. Multiple instances of handwashing opportunities could be documented for a single HCW.

Two infection control nurses from each of the ten selected wards were trained to observe and document handwashing opportunities using standardized forms. Observations were conducted discreetly, ensuring the natural behavior of HCWs was captured.

The forms included details on whether handwashing was performed, the type of handwashing carried out, and any errors noted if it was done improperly. Additionally, a separate form assessed the presence of facilities and resources necessary for hand hygiene, such as sinks, soap, drying materials, alcohol-based hand rubs, gloves, hand hygiene guidelines, and educational posters.

Instruments

Three tools were employed in this study:

- a) An observational form for handwashing practices.
- b) A ward inspection form for evaluating the availability of hand hygiene resources.
- c) A self-administered questionnaire to assess HCWs' knowledge and attitudes regarding hand hygiene.

Questionnaire

The questionnaire evaluated the knowledge and attitudes of HCWs, with variations tailored for different staff groups. It included 20 questions for doctors and nurses, and 10 questions for other workers, covering topics such as handwashing indications, techniques, duration, and

materials. Respondents were required to answer each question as True, False, or Unsure. Questions on alcohol-based hand rubs and glove use with handwashing were also included. An attitude assessment for nurses consisted of four questions based on a Likert scale, focusing on their perspectives on improving hand hygiene practices. Responses of "Totally Agree" and "Agree" were classified as positive attitudes. A total score (out of 20) was calculated for both knowledge and attitude sections.

Forms were checked for completeness and consistency before data entry, cleaning, and analysis using SPSS (Statistical Package for Social Sciences) version 11.0. The questionnaire demonstrated a reliability score of 0.680 based on Cronbach's alpha test for internal consistency.

Results

A total of 2,500 hand hygiene opportunities were observed among healthcare workers across various departments. Nurses were observed performing the majority of these opportunities, followed by doctors. Overall, doctors exhibited significantly higher hand hygiene compliance (37.5%) compared to other healthcare workers ($P = 0.000$). However, only 11.6% of the observed opportunities for hand hygiene by doctors were performed correctly.

The departments observed for hand hygiene opportunities included orthopedics, neurosurgery, plastic and general surgery, pediatrics, gynecology, and chest intensive care units, as well as hematology.

Routine hand washing was the most commonly performed hand hygiene practice among healthcare workers (64.2%), while antiseptic hand washing was the least common (3.9%).

Hand washing was more frequently observed after procedures or interventions, but it was more appropriately done before the intervention, except for non-invasive procedures, where the frequency of correct hand hygiene was nearly the same before and after the procedures.

A knowledge questionnaire was completed by 200 healthcare workers, with nurses scoring higher on average (42.6 ± 11.7) compared to doctors (39.1 ± 10.5). Among various departments, the highest mean knowledge scores were found in the Neonatal Intensive Care Unit (NICU) pediatric department. Doctors in general surgery had a high mean score (47.5 ± 8.6), while nurses (48 ± 2.7) and workers (63.3 ± 11.05) in the NICU pediatric department had notable scores as well.

Although nurses in the NICU pediatric department had the highest knowledge score (48.0 ± 2.7), their attitude score was the lowest in the same department (68.0 ± 7.5) (Results not shown in tables).

Regarding attitudes towards hand hygiene, 96% of nurses believed that hand washing protects healthcare workers from infections. Additionally, 97.3% felt that administrative orders and regular monitoring could improve hand hygiene practices, and 92% believed that hand washing was the most effective method to reduce nosocomial infections. However, only 70.7% of nurses had a positive attitude toward improving hand hygiene by observing role models perform proper hand washing.

The most frequent error in hand washing was improper drying and insufficient contact time, accounting for 23.2% of observed cases.

In terms of ward inspections, most wards were equipped with sinks (80%), but none had paper towels available for drying hands.

Table II. Compliance to Hand Hygiene Among Different Departments and Procedures

Departments / Procedures	Hand Washing Done (%)	Appropriate (%)
Departments:		
Orthopedic	(13.9)	(6.9)
Neurosurgery	(13.3)	(0)

Plastic Surgery	(10.9)	(1.3)
General Surgery	(7.8)	(0)
NICU Pediatric	(62.5)	(13.9)
NICU Gynecology	(39.4)	(8.4)
Hematology	(26.6)	(1.1)
Chest ICU	(33.4)	(0)
Procedures:		
Invasive procedures	(34.3)	(4.5)
Non-invasive procedures	(31.9)	(7.7)
Personal contact	(43.9)	(4.4)
Body fluids contact	(39.8)	(11.5)
Contaminated inanimate objects	(20.9)	(1.2)
Waste handling	(26.8)	(1.3)
After using gloves	(61.4)	(2.6)

Discussion

Hand hygiene is essential for preventing cross-infections in healthcare settings; however, adherence to established guidelines is often suboptimal (16). Although the techniques for proper hand hygiene are straightforward, the factors influencing healthcare workers' hand hygiene behavior are complex, making its study challenging (17).

In this study, the overall compliance with hand hygiene among healthcare workers was 34%, a rate consistent with the findings of Patarakul [9], who noted that compliance among healthcare workers before patient contact was less than 50%. Similarly, this rate aligns with Pittet's [18] findings, where only 48% of the 20,000 observed hand hygiene opportunities were met during routine care in a teaching hospital. Our results indicate a need for hand hygiene improvement programs, as they showed better compliance than Kim [19], who reported a compliance rate of 22.1%.

Regarding compliance in specific departments, the chest intensive care unit (ICU) had a 33.4% compliance rate, the NICU in pediatrics showed 62.5%, and the NICU in gynecology had 39.4%. These figures were notably higher than those observed by Rosenthal [20], who found a compliance rate of 23.1% before implementing hand hygiene education, training, and performance feedback in a medical-surgical ICU and coronary ICU. Our findings are also in line with Lipsett's [21] study, which reported compliance rates ranging from 28% to 74%. Our results were also comparable to those in the study by Won [12], who reported a 43% compliance rate in a level III NICU at a teaching hospital.

Doctors demonstrated the highest hand hygiene compliance (37.5%), compared to nurses (36.4%) and housekeepers (22.6%). This contrasts with Lipsett's [21] study, where nurses had a higher compliance rate (50%) than doctors (15%) and supporting nursing personnel (37%). Closing the gap between knowledge and attitude in nurses, particularly in pediatric NICUs, could enhance their compliance with hand hygiene practices.

Proper hand hygiene techniques, such as ensuring full contact of all hand surfaces with the decontaminating agent, have long been recognized as essential (13). In our study, 23.2% of observed hand hygiene opportunities involved improper technique, with common issues including insufficient contact time (less than 30 seconds) and improper drying. Basurrah [17] reported suboptimal hand washing durations across medical and surgical wards in Riyadh, while Kuzu [22] found that 79.8% of healthcare workers did not dry their hands properly. Improving compliance in this regard requires appropriate health education programs.

Hand hygiene practices among healthcare workers are influenced by a range of cognitive, socioeconomic, and technical factors, particularly for doctors, irrespective of the healthcare setting [22]. Administrative support [22] and improved availability of resources [23] play a key role in enhancing adherence to hand hygiene, which, in turn, boosts infection control efforts in hospitals. Our ward inspections revealed significant deficiencies in supplies and resources necessary for proper hand hygiene. Only 10% of wards had automatic sinks and hand drying materials, and soap was available in only 40% of sinks. Ji [24] identified water shortages as a significant factor in non-compliance, accounting for 22% of cases. In our study, 20% of observed wards lacked sinks altogether. Ensuring the availability of essential materials and supplies is a crucial step toward improving hand hygiene compliance.

Alcohol-based hand rubs are more effective at reducing bacterial counts than hand washing with antimicrobial soaps [25, 26]. In our study, routine hand washing with soap was observed in 64.2% of opportunities, compared to 99.3% in Kuzu's study [22]. Alcohol-based hand rubs accounted for 31.7% of the observed opportunities, which is lower than the 52.2% reported by Wendt [27] in Germany. To improve alcohol-based hand rub compliance, it is necessary to increase availability and conduct continuous education. Whitby [28] found that introducing alcohol-based hand rubs without accompanying behavioral modification programs proved ineffective.

In relation to invasive procedures, hand hygiene was performed in 20.6% of opportunities before procedures and 7.9% after procedures. These figures compare to 13.8% and 35.6% in Arenas' study [29], which observed healthcare workers in hemodialysis units in Spain. Healthcare workers must be diligent in preventing infection transmission to patients. Enhancing awareness of this issue is critical. Kim [19] found a positive link between glove use and subsequent hand disinfection, and in our study, hand hygiene was observed in 61.4% of the opportunities after glove removal.

Nurses in our study exhibited a higher positive attitude toward hand hygiene as a protective measure for healthcare personnel (96.0%) compared to 86.2% in an ICU study in Italy [30]. Additionally, 97.3% of nurses believed that hand hygiene practices could be improved through administrative orders, which contrasts with Harris's [31] findings, where healthcare workers were less supportive of interventions involving rewards and punishments and more inclined toward interventions that facilitate hand washing.

Relying solely on hand hygiene to reduce infections is unlikely to succeed if other factors, such as environmental hygiene, crowding, staffing levels, and education, are insufficient [17]. In this study, staff in 7 out of 10 wards had received formal education on hand hygiene, but only 30% of the observed wards had written hand hygiene guidelines. These guidelines should be implemented across all hospital wards.

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