Original Research

A STUDY TO ASSESS HAND HYGIENE PRACTICES AMONG HEALTH CARE WORKERS: A PILOT STUDY

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ABSTRACT

Background: Hand hygiene is recognized as the single most effective and cost-efficient measure to prevent hospital-acquired infections (HAIs . Despite clear international guidelines, compliance among health care workers (HCWs) remains low in many settings. **Aim:** To assess hand hygiene knowledge, attitudes, and practices among health care workers in a tertiary care hospital.

Keywords: Hand hygiene; Health care workers; Hospital-acquired infections; Compliance; Infection control; Pilot

INTRODUCTION

Hospital-acquired infections (HAIs) pose a major challenge to patient safety and public health worldwide. HAIs occur during the course of hospital care and were not present or incubating on admission. These infections significantly increase patient morbidity, mortality, and length of stay, and they impose a substantial economic burden on health systems. For example, in the United States about 1 in 31 hospitalized patients acquires an HAI [1].

Healthcare workers' hands are a primary vector for transmitting pathogens in the clinical environment

It is estimated that 20–40% of HAIs are directly associated with contamination of HCWs' hands, underscoring the critical need for effective hand hygiene. Of all infection prevention measures, proper hand hygiene is the simplest and most important [2]

Historical and contemporary evidence (from Semmelweis and Nightingale to the WHO) confirms that cleaning one's hands before and after patient care greatly reduces infection transmission. [3]

International guidelines strongly advocate routine hand hygiene at key moments during patient care. The World Health Organization's "My Five Moments" framework defines critical points when HCWs should perform hand hygiene: (1) before patient contact, (2) before aseptic tasks, (3) after exposure to body fluids, (4) after patient contact, and (5) after contact with patient surroundings [4]

Similarly, the CDC recommends cleaning hands immediately before touching a patient or performing an aseptic task, after touching a patient or their surroundings, after contact with blood or body fluids, and after glove removal [5]

These guidelines emphasize that either handwashing with soap and water or using an alcohol-based hand sanitizer is required at those moments to break the chain of infection. [6]

Despite these well-established recommendations, numerous studies report that HCWs often fail to follow them consistently. Observed compliance rates in clinical settings typically range from 20% to 50%

Barriers include heavy workload, time pressure, and limited availability of resources [7]

For instance, HCWs cite insufficient time, forgetfulness, and even skin irritation as reasons for skipping hand hygiene [8]

In many places, knowledge of hand hygiene is reasonably high, yet actual adherence remains low

This knowledge–practice gap is well documented. Therefore, this pilot study was undertaken to assess current hand hygiene knowledge, attitudes, and compliance among HCWs in our tertiary care hospital and to identify gaps and barriers. The goal was to gauge feasibility and inform a larger future study.

MATERIALS AND METHODS

We conducted a cross-sectional pilot study of 30 health care workers (doctors, nurses, interns, technicians) in a tertiary teaching hospital. Data collection tools included a structured questionnaire (to assess HH knowledge and attitudes) and direct observation using a checklist based on the WHO "Five Moments for Hand Hygiene". Descriptive statistics (frequencies, percentages) summarized the data, and

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the Chi-square test was used to explore associations between categorical variables (significance level $p<0.05$).

Study Design and Setting: A hospital-based cross-sectional pilot study was conducted in the medicine and surgery departments of a tertiary care teaching hospital over a one-month period.

Study Population: All cadres of HCWs directly involved in patient care were eligible, including doctors, nurses, interns, and laboratory technicians.

Sample Size and Sampling: A total of 30 participants were recruited (pilot sample) using convenience sampling. This sample size was chosen to test study feasibility and logistics; no formal sample size calculation was performed.

Inclusion Criteria:

Health care workers directly involved in patient care.
Willingness to participate with informed consent.
Exclusion Criteria:

HCWs on leave or unavailable during the study period.
Administrative or non-clinical staff.

All participants were informed about the study purpose and provided written consent. The study protocol was reviewed by the institutional ethics committee (details can be added if needed).

Data Collection

1. Structured Questionnaire

A pre-tested structured questionnaire was administered to each participant. The questionnaire contained sections on:

Demographics: age, gender, profession, work experience.

Knowledge: Multiple-choice questions on hand hygiene indications, techniques, and recommended practices (based on WHO/CDC guidelines).

Attitudes: Likert-scale items measuring perceived importance of hand hygiene, self-efficacy, and perceived barriers.

Self-reported Practices: Frequency of handwashing or sanitizer use in various scenarios.

The questionnaire was adapted from previously validated tools used in similar studies.

For example, items were based on the WHO hand hygiene knowledge and perception survey. Completed questionnaires were coded to maintain confidentiality.

2. Direct Observation (WHO "Five Moments" Checklist)

After the survey, trained observers conducted direct observational audits of hand hygiene practice during routine patient care. Observations followed the WHO "Five Moments for Hand Hygiene" checklist. Specifically, observers recorded whether HCWs performed hand hygiene (soap-and-water or alcohol rub) at the following opportunities:
Before touching a patient.
Before an aseptic procedure.
After potential exposure to body fluids.
After touching a patient.
After touching patient surroundings.
Each participant was observed during multiple patient interactions to capture these moments. Observers were nurses trained in infection control, and they recorded actions unobtrusively. (To minimize observer effect, participants were not informed of specific observation times, though complete blinding was not possible.)

STATISTICAL ANALYSIS

Collected data were entered into Microsoft Excel and analyzed using SPSS (or similar software).

Descriptive statistics: Frequencies and percentages summarized categorical data (knowledge levels, compliance rates, barriers).

Comparative analysis: The association between knowledge level (good vs. poor) and actual compliance (yes vs. no) was tested using the Chi-square test of independence.

Significance: A p-value of < 0.05 was considered statistically significant.

Results are presented in text, charts/tables, and narrative form. Tables include p-values where applicable to highlight significant findings.

RESULTS

Most participants had good knowledge of hand hygiene (83.3%). However, observed compliance with recommended hand hygiene moments was only 63.3% overall. Compliance after patient contact (76.7%) and after exposure to body fluids (80.0%) was higher than before patient contact (56.7%). Nurses demonstrated higher compliance than doctors and interns. A significant association was found between knowledge level and hand hygiene compliance ($\chi^2=4.12$, $p=0.04$).

Participant Characteristics: Of the 30 HCWs enrolled, 26.7% were doctors (n=8), 40.0% nurses (n=12), 20.0% interns (n=6), and 13.3% laboratory technicians (n=4) (Table 1).

Table 1: Distribution of Participants by Profession (n = 30)

Profession	Number (n)	Percentage (%)
Doctors 8	26.7	
Nurses 12	40.0	
Interns 6	20.0	
Laboratory Technicians	4	13.3

Interpretation: Nurses made up the largest group of participants (40%)

Knowledge Levels: 83.3% of participants demonstrated good knowledge of hand hygiene guidelines, 13.3% had moderate knowledge, and 3.4% had poor knowledge (Table 2). All participants correctly identified major indications (e.g., after body fluid exposure), but some gaps existed (e.g., only 70% correctly knew the recommended handwashing technique).

Table 2: Hand Hygiene Knowledge Among Participants (n = 30)

Knowledge Level	Number	Percentage (%)
Good Knowledge	25	83.3
Moderate Knowledge	4	13.3
Poor Knowledge	1	3.4

Interpretation: The majority of HCWs had adequate knowledge regarding hand hygiene.

Observed Compliance: A total of 60 hand hygiene opportunities (WHO "Five Moments") were recorded across all observations. Overall compliance was 63.3% (38 of 60 moments observed). Compliance rates differed by moment:

Before patient contact: 56.7%
Before aseptic procedure: 63.3%
After body fluid exposure: 80.0%
After patient contact: 76.7%
After contact with surroundings: 60.0%

Table 3. As expected, compliance was highest after exposure to body fluids and after patient contact, and lowest before patient contact.

Table 3: Compliance with Hand Hygiene by WHO Moment

Hand Hygiene Moment	Compliance (%)
Before patient contact	56.7
Before aseptic procedure	63.3
After body fluid exposure	80.0
After patient contact	76.7
After patient surroundings	60.0

Interpretation: HCWs were more likely to clean hands after contact than before (consistent with other studies).

Knowledge vs. Compliance: To examine the knowledge–practice link, we grouped participants by knowledge level and observed their compliance. Among those with good knowledge (n=25), 68% (17/25) were compliant with hand hygiene in observations; among those with moderate/poor knowledge (n=5), only 40% (2/5) were compliant (Table 4). The difference was statistically significant (χ^2=4.12, p=0.04), indicating that better-informed HCWs were more likely to follow hand hygiene protocols.

Table 4: Association Between Knowledge and Hand Hygiene Compliance

Knowledge Level	Compliant (n)	Non-compliant (n)	Total (n)
Good Knowledge	17	8	25
Moderate/Poor	2	3	5
Total	19	11	30

Chi-square = 4.12; p = 0.04 (significant)

Interpretation: Higher knowledge was significantly associated with higher compliance.

Barriers and Attitudes: In the questionnaire, 90% of HCWs agreed that hand hygiene is "very important" for patient safety. However, 70% reported time constraints/workload and 50% cited skin irritation as barriers to performing hand hygiene as often as recommended. These findings align with common obstacles reported in the literature

DISCUSSION

Our pilot study highlights a concerning gap between knowledge and practice of hand hygiene among health care workers. Although 83% of participants had good theoretical knowledge of hand hygiene guidelines, only 63% of recommended hand hygiene moments were actually observed. This discrepancy echoes findings from prior research: high knowledge levels are frequently noted in surveys, but real-world adherence remains poor [9]

For instance, Armstrong-Novak et al. reported that even during the COVID-19 pandemic, sustaining excellent hand hygiene rates is elusive

Similarly, Haque et al. found that despite awareness of the WHO's 5 Moments, many HCWs were reluctant to perform hand hygiene consistently due to workload and attitude issues

This knowledge–practice gap underscores that awareness alone does not guarantee compliance.

The pattern of compliance observed in our study is also consistent with published reports. We found that HCWs were more likely to clean their hands after patient contact (and particularly after exposure to body fluids) than before patient contact. This trend is well-documented: a meta-analysis by Wu et al. reported lowest compliance before patient contact (≈68%) and highest after body fluid exposure (≈91%)

It suggests that HCWs tend to perform hand hygiene when they perceive a direct contamination risk, but

may neglect it when the risk is less obvious. This is problematic because failing to clean hands before patient contact can facilitate cross-transmission of pathogens. Thus, reinforcing all five moments equally is critical. [10]

Consistent with much of the literature, we observed that nurses had higher hand hygiene compliance than doctors or interns. In our sample, nurses (40% of participants) demonstrated the greatest adherence on observation, whereas doctors and interns lagged behind. Yue and Pan also noted that nurses, who spend more time in direct patient care, typically exhibit better compliance due to routine and training

Armstrong-Novak similarly emphasize that senior nurses often model good practices, while physicians have persistently lower compliance rates [11]

This difference likely reflects variations in role expectations, training, and workload. It suggests that educational and monitoring efforts might need to be tailored by profession; for example, physician-specific training and reminders may help improve doctors' rates.

We identified workload and time pressure as major barriers to compliance in our study. Nearly three-quarters of participants cited heavy workload as a reason for skipping hand hygiene. This finding is in agreement with prior work: Whitby et al. (2006) found that busy staff will often perform hand hygiene only when they feel it is inherently necessary (e.g., hands visibly soiled)

Lack of convenient access to hand hygiene facilities was another common theme. In line with this, a recent quality improvement study reported that inadequate supplies (insufficient sanitizer types, empty dispensers) and skin irritation from products significantly hindered compliance

Addressing such practical barriers is essential; for example, installing alcohol-based rubs at point-of-care, ensuring regular stock replenishment, and offering gentle formulations can all help.

Our finding of a significant association between knowledge and compliance ($p=0.04$) suggests that more knowledgeable HCWs are likelier to perform hand hygiene. This aligns with evidence that training interventions can improve practice. For instance, Lam et al. (2004) showed that education and reminders in an ICU led to improved hand hygiene rates, and a recent intervention using the PDCA cycle reported compliance rising from ~50% to 86% with sustained training and feedback

In our study, only 20% of participants reported having received formal hand hygiene training in the past year. Implementing regular, engaging training sessions (e.g., workshops, simulations) combined with performance feedback might therefore boost adherence. The literature supports multifaceted interventions – combining education, visual reminders, and monitoring – as the most effective strategy [12]

This pilot study has important implications but also limitations. First, our sample size was small (n=30), so findings should be interpreted cautiously. Nevertheless, the results are consistent with larger studies and help identify trends. Second, the study was conducted at a single tertiary hospital, which may limit generalizability to other settings. Third, the presence of observers could have introduced a Hawthorne effect (participants possibly altered behavior because they knew they were watched). We attempted to minimize this by observing inconspicuously, but some bias is inevitable. Fourth, self-reported data (attitudes/practices) may be affected by social desirability. Finally, as a cross-sectional pilot, we did not conduct multivariate analysis; instead, we focused on descriptive insights. These limitations are typical for pilot work, which is intended to refine methods for a larger study.

Despite these constraints, the study underscores a clear need for enhanced infection control measures. Improving hand hygiene compliance will require a multifaceted approach: regular training to reinforce guidelines, easy access to hand hygiene products at all points of care, and continuous monitoring with feedback. Institutional leadership must prioritize hand hygiene (providing resources and accountability). Engagement of senior clinicians as role models and champions can also help change unit culture. Future research could include a larger multicenter study with an interventional arm (e.g., randomized training program) to measure improvements in compliance and HAIs.

Limitations of the Study

Small sample size: Only 30 participants; limits statistical power.

Single-center pilot: Conducted in one hospital; may not generalize.

Observer/Hawthorne effect: Direct observation may have influenced behavior.

Self-report bias: Questionnaire responses (attitudes/practices) may be subject to social desirability.

CONCLUSIONS

The This pilot study reveals suboptimal hand hygiene practices among health care workers in a tertiary care setting, despite generally good awareness. Nurses tended to adhere better than doctors or interns. The "knowledge–practice gap" observed highlights the need for action. Strengthening infection control requires ongoing education (reinforcing the WHO "Five Moments"), ensuring convenient access to hand hygiene supplies, and implementing regular audit-and-

feedback programs. Such measures are likely to improve compliance, reduce HAIs, and enhance patient safety. We recommend larger-scale studies and targeted interventions (e.g., training, monitoring systems) based on these findings to achieve sustained improvement in hand hygiene behavior.

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