A Study to Establish the Relationship between Hand Hygiene Compliance and Hospital Associated Infections in an ICU Setup of a Tertiary Care Teaching Hospital

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ABSTRACT

Proper hand hygiene is especially important in a hospital setting where patients may have weakened immune systems and are more susceptible to infections. It is essential for healthcare professionals to follow strict hand hygiene protocols to ensure the safety and well-being of both patients and staff. Hand hygiene audits should be conducted regularly to assess compliance with these protocols and identify areas for improvement. These audits can help identify any gaps in hand hygiene practices and provide opportunities for additional training or education for healthcare professionals. By consistently monitoring and reinforcing proper hand hygiene, hospitals can minimize the spread of infections and create a safer environment for everyone involved in patient care. The present study provides an overview of the hand hygiene audits conducted at a tertiary care hospital in Pune, India, and highlights the areas for improvement and implementation of best practices.

Keywords: Hand hygiene, hand hygiene audit, hospital associated infections.

1. Introduction

Given the current global pandemic, there has been a significant increase in the recognition and significance of hand hygiene practices as a means of mitigating the transmission of infectious diseases [1], [2]. Health authorities have consistently emphasized the importance of regular hand washing with soap and water for a minimum duration of 20 seconds as a straightforward yet very effective measure for reducing the risk of infection [3]. Moreover, it has been advised to use hand sanitizers that contain a minimum of 60% alcohol in situations when access to soap and water is limited [4]. Dr. Ignaz Semmelweis, a Hungarian physician, was one of the pioneers in promoting hand hygiene in the 19th century. He discovered that implementing hand-washing protocols significantly reduced mortality rates among patients in maternity wards. This historical evidence further supports the importance of hand hygiene in preventing the spread of diseases.

Numerous studies have documented a clear correlation between adherence to hand hygiene protocols and the incidence of hospital-acquired illnesses [2], [3]–[7]. The constant observation of evidence supports the notion that the frequency of hospital-acquired illnesses can be reduced by the use of adequate hand hygiene practices [8].

Healthcare workers play a crucial role in preventing the transmission of infections to patients and themselves [9], [10]. By following proper hand hygiene protocols, they can reduce the risk of cross-contamination and ensure a safe healthcare environment [11]. Additionally, regular hand hygiene audits are conducted to assess compliance with hand hygiene protocols and identify areas for improvement [12]. These audits help reinforce the importance of hand hygiene among healthcare workers and provide opportunities for education and training on proper techniques [13], [14]. It serves as a reminder for healthcare workers to consistently practice good hand hygiene habits, ultimately improving patient outcomes and overall infection control measures [15].

In this study, we analyzed the effect of hand hygiene and HAI rates in an ICU of a tertiary care teaching hospital was studied.
2. Methods

A prospective single-centre observational study was carried out for one month at a tertiary care teaching hospital in Pune, India. Observers evaluated adherence to hand hygiene practices daily for one hour. Hand hygiene adherence rates were assessed in different locations within the hospital such as ICU wards, Acute Medical Ward, Acute Surgical Ward (ASW), Female Medical Ward (FMW), Female Surgical Ward (FSW) and among professional categories such as doctors, nurses, auxiliary staffs and paramedical staffs and others. The study was initiated after obtaining approval from the ethics committee. The barriers to hand hygiene were identified by a pre-validated WHO questionnaire.

A trained observer made observations from a designated corner for a duration of 20 minutes +/- 10 minutes. Healthcare workers (HCWs) were monitored for the following:

1. If the act of practising hand hygiene (HH) during suitable instances is as outlined by the World Health Organization’s recommended 5 moments (WHO 5 moments).
2. Whether the act of hand hygiene is executed in its entirety, following the seven movements of hand hygiene.
3. Performed within the stipulated time duration-The recommended time for hand rubbing is 20–30 seconds, while hand washing should be performed for 40–60 seconds.
4. Adequate quantity of hand rub used-An appropriate volume of hand rub, approximately 3 milliliters, must be utilised.

HH adherence rate was analysed using the following formulas:

Hand Hygiene

\[
\text{Adherence Rates} = \frac{\text{Number of HH events} \times 100}{\text{Total HH indication}} \quad (1)
\]

Profession – specific HHAR

\[
\text{HHAR} = \frac{\text{HH performed by each profession} \times 100}{\text{Overall opportunities accessible for that profession}} \quad (2)
\]

A month-wise trend analysis was conducted to observe any notable improvements in the rate of HH adherence throughout the study period.

3. Results

Hand hygiene adherence rates were assessed from different professional categories and locations. The highest average HH adherence rate (HHAR%) was seen among Anaesthetist (87.17%) followed by physiotherapists (83.33%), physicians (80.39%), nursing cadets (82.60%) and nursing officers (80.15%). (Fig. 1). Adherence rates were highest in ASW (83.08%) and ICU wards (81.81%). (Fig. 2). A 100% rate of adherence was observed before to the aesthetic procedure (BEF-ASEPT) while 97.87% adherence was observed after exposure to body fluid (AFT-B.F). Less adherence rate was observed.

No cases of CLABSI and CAUTI during the study period while a single case of VAE was reported. Minor incidences of SSI (1.03%) and Phlebitis (1.06%) were reported (Fig. 3).

Total cases of HAI reported during the study period are summarised in Table I. Majority of the participants had received formal training of hand hygiene. Ninety eight percent agreed that hand hygiene will reduce infections and routinely practised hand hygiene while 95% strictly used alcohol based hand rub. Unhygienic hands of health care workers (65.8%) was considered as the main route of cross-transmission of potentially harmful germs between patients in a health-care facility. The barriers to hand hygiene were identified as compliance fatigue (42.5%), heavy workload (32.5%), inconvenient access to hand hygiene materials (11.6%), lack of awareness (5%), lack of monitoring and feedback (3.3%), peer pressure and organisational culture (1.6%), skin discomfort (1.6%), and use of gloves (1.6%). Other important observations of the survey are summarised in Table II.

4. Discussion

Hand hygiene monitoring in hospital settings is essential for preventing the spread of infections and maintaining patient safety. It involves regular monitoring and
evaluation of hand hygiene practices among healthcare workers to ensure compliance with proper hand hygiene protocols [13]. The direct observation method is a straightforward and economical approach to monitoring hand hygiene adherence [14]. It entails the presence of designated hand hygiene auditors at healthcare facilities for a certain duration, employing a standardised data collection method. Trained observers discreetly watch healthcare workers during patient interactions to assess their hand hygiene practices. Additionally, electronic monitoring systems that use sensors or wearable devices can provide objective data on hand hygiene compliance, allowing for more accurate and efficient monitoring in busy hospital environments [15]. Five moments of hand hygiene have been identified by WHO, including before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching a patient’s surroundings. These moments serve as guidelines for healthcare workers to follow and help prevent the spread of infections in healthcare settings [16].

The WHO recommends that training be provided to hand hygiene auditors to ensure the consistency and accuracy of their findings [17]. The training programme should encompass the accurate identification of opportunities for hand hygiene, comprehension of the appropriate practices for hand hygiene, and the ability to interpret and document the acquired data. The healthcare auditors in this study received extensive training programmes that encompassed all facets of monitoring compliance with hand hygiene in healthcare settings. The training programmes encompassed practical exercises, participatory workshops, and instructional resources to guarantee the auditors’ proficiency in precisely evaluating and documenting hand hygiene practices inside bustling hospital environments. Furthermore, continuous feedback and instruction were
TABLE II: Survey Among Study Group According to WHO Questionnaire

<table>
<thead>
<tr>
<th>S. No</th>
<th>Questionnaire</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Did you receive a formal training in Hand Hygiene in last 3 years</td>
<td>Yes (91); No (29)</td>
</tr>
<tr>
<td>2.</td>
<td>Does Hand Hygiene help in reducing Healthcare Associated Infections?</td>
<td>Agree/Strongly agree (118); Disagree (2)</td>
</tr>
<tr>
<td>3.</td>
<td>Do you routinely use an alcohol-based hand rub for hand hygiene?</td>
<td>Yes (115); No (5)</td>
</tr>
<tr>
<td>4.</td>
<td>What do you think is the most effective way of Hand Hygiene?</td>
<td>Alcohol based handrub (16); Both soap + water + sterillium (1); Soap + water (103)</td>
</tr>
<tr>
<td>5.</td>
<td>Do you routinely practice Hand Hygiene?</td>
<td>Yes (118); No (9)</td>
</tr>
<tr>
<td>6.</td>
<td>Which of the following is the main route of cross-transmission of harmful germs</td>
<td>Air circulating in hospital (5); Health-care workers’ hands when not clean (79); Patients’ exposure to colonized surfaces (beds, chairs, tables, floors) (22); Sharing non-invasive objects (stethoscopes, pressure cuffs, etc.) between patients (14)</td>
</tr>
<tr>
<td>7.</td>
<td>What is the most frequent source of germs responsible for healthcare-associated infections?</td>
<td>Germs already present on or within the patient (33); Hospital air (4); The hospital environment (surfaces) (79); The hospital’s water system (4)</td>
</tr>
<tr>
<td>8.</td>
<td>Which of the following hand hygiene actions prevents transmission of germs to the patient?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Before touching a patient</td>
<td>Yes (117); No (3)</td>
</tr>
<tr>
<td></td>
<td>• Immediately after risk of body fluid exposure</td>
<td>Yes (89); No (31)</td>
</tr>
<tr>
<td></td>
<td>• After exposure to immediate surroundings of patient</td>
<td>Yes (120); No (0)</td>
</tr>
<tr>
<td></td>
<td>• Immediately before a clean/aseptic procedure</td>
<td>Yes (117); No (3)</td>
</tr>
<tr>
<td></td>
<td>• After touching a patient</td>
<td>Yes (113); No (7)</td>
</tr>
<tr>
<td>9.</td>
<td>Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true?</td>
<td>True (91), False (21)</td>
</tr>
<tr>
<td></td>
<td>• Hand rubbing is more rapid for hand cleansing than hand washing</td>
<td>True (84), False (36)</td>
</tr>
<tr>
<td>10.</td>
<td>What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?</td>
<td>60 seconds (33); 20 seconds (55); 10 seconds (26); 3 seconds (6)</td>
</tr>
<tr>
<td>11.</td>
<td>Which type of hand hygiene method is required in the following situations?</td>
<td>Rubbing (76); Washing (40); None (4); Rubbing (40); Washing (79); None (1)</td>
</tr>
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<td></td>
<td>• Before palpation of the abdomen</td>
<td>Rubbing (22); Washing (97); None (1)</td>
</tr>
<tr>
<td></td>
<td>• Before giving an injection</td>
<td>Rubbing (18); Washing (112)</td>
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<tr>
<td></td>
<td>• After emptying a bedpan</td>
<td>Rubbing (20); Washing (100)</td>
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<tr>
<td></td>
<td>• After removing examination gloves</td>
<td>Rubbing (20); Washing (120)</td>
</tr>
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<td>12.</td>
<td>Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?</td>
<td>Yes (113); No (7); Yes (103); No (17); Yes (101); No (19); Yes (61); No (59)</td>
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<tr>
<td>13.</td>
<td>What do you think are the barriers to Hand Hygiene?</td>
<td>Compliance fatigue (51); Heavy workload (39); Inconvenient access to Hand Hygiene resources (14); Lack of awareness (6); Lack of monitoring and feedback (4); Peer pressure &amp; organization culture (2); Skin irritation (2); Use of gloves (2)</td>
</tr>
</tbody>
</table>
offered to the auditors to improve their abilities and ensure the uniformity of their observations.

The overall data showed that ASW and ICU wards had the highest HH adherence rate. This is attributed to the strict protocols and monitoring systems in place in these wards, as well as the heightened awareness and emphasis on infection control in these high-risk areas. Additionally, the availability of dedicated resources and specialised training for healthcare professionals working in surgery and ICU settings have contributed to the higher hand hygiene adherence rate observed. The lowest adherence rate was observed in the female medical and surgical ward compared to other hospital units. This is due to a variety of factors, such as a higher patient-to-nurse ratio, increased workload, and limited access to hand hygiene resources. Additionally, the nature of the medical and surgical ward involves more complex procedures and a greater need for direct patient contact, which could contribute to a higher risk of transmission and potentially lower adherence to hand hygiene practices.

Profession-specific hand hygiene adherence rate was highest among anesthesiologists, physiotherapists and physicians followed by nurses. This could be attributed to the frequently hands-on patient-facing nature of their work and their heightened consciousness regarding the significance of hand hygiene. Furthermore, these practitioners may be educated and trained more extensively on infection control procedures than other healthcare personnel. Additionally, the survey results indicate that healthcare professionals who have direct contact with patients have a greater understanding of the risks associated with inadequate hand hygiene and take appropriate measures to ensure the safety and well-being of both themselves and their patients. This was similar to a study [18] on healthcare-associated infection prevention and control practices at a tertiary care hospital in South India, which revealed that doctors exhibited the highest adherence rate at 67.5%, followed closely by nurses at 66.4%. On the contrary, a study conducted at paediatric and neonatal wards by Scheithauer et al. [19] where compliance rate of nurses (57%, 66%) was significantly higher than physicians (29%, 52%).

The presence of these barriers to hand hygiene can have a substantial impact on the overall efficacy of hand hygiene protocols in healthcare environments. Organizations must prioritise the resolution of these challenges through the implementation of methods such as system change, consistent training and teaching, audit and feedback, enhancing the availability of hand hygiene supplies, and cultivating a culture of responsibility and assistance. System change may involve implementing electronic monitoring systems to track compliance, establishing clear policies and procedures, and providing regular feedback and reinforcement to healthcare professionals. Providing healthcare professionals with comprehensive education and training on the importance of hand hygiene, proper hand-washing techniques, and the use of hand sanitisers can greatly contribute to increased compliance. Additionally, ongoing education and training sessions can help reinforce the importance of hand hygiene and keep healthcare professionals updated on any new guidelines or protocols.

Regular audits can assess compliance rates and identify areas for improvement while providing feedback to healthcare professionals can help them understand their performance and motivate them to adhere to proper hand hygiene protocols. Implementing a system of continuous monitoring and feedback can lead to a culture of accountability and continuous improvement in hand hygiene practices. The creation of a safety culture is essential in ensuring that hand hygiene practices are consistently followed in healthcare settings. This involves establishing clear expectations and guidelines for hand hygiene, as well as providing ongoing education and training to healthcare professionals. Additionally, fostering open communication and collaboration among staff members can encourage shared responsibility for patient safety and promote a culture where hand hygiene is prioritised and valued.

Based on this study, we recommend that healthcare facilities regularly assess and monitor hand hygiene compliance to identify areas for improvement. Implementing a system for reporting and addressing non-compliance can help to reinforce the importance of hand hygiene and hold individuals accountable for their actions. Furthermore, incorporating technology such as electronic monitoring systems or reminders can provide real-time feedback and reminders to healthcare professionals, further enhancing adherence to hand hygiene practices.

The main limitation of this study was that the variation of HHAR in other locations such as OPDs, and long-term care wards was not assessed where the patient-healthcare workers ratio and risk of transmission were higher. Also, observation periods were based on convenience sampling and were not randomized.

5. Conclusion

These results suggest that healthcare workers have a crucial role in promoting and maintaining a safe and healthy environment for both patients and staff, and hand hygiene audits are an effective tool for monitoring and improving compliance among healthcare professionals. By regularly assessing hand hygiene practices, healthcare facilities can identify areas of improvement and implement targeted interventions to ensure proper hand hygiene is consistently practised. This not only helps protect patients from infections but also contributes to overall patient safety and quality of care.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

References


