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Hand hygiene: A prospective interventional study on compliance of health care workers in a tertiary care hospital in India

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ABSTRACT

Background: Hand Hygiene (HH) involves cleaning of hands by using alcohol-based hand rubs or washing the hands with soap and water when visibly soiled and hygiene is known to reduce the incidence of hospital acquired infections. Besides complacency, the lack of enough resources for HH are known to reduce the compliance. **Methods:** A prospective interventional study was conducted to assess HH compliance before and after intervention among health care workers including doctors and nurses in 6 intensive care units, over 7 months period from December 2018 to June 2019. **Results:** Hand hygiene compliance rate was low before intervention. The difference was statistically significant (p value <0.5) in all ICU's except Neonatal ICU which already had a good compliance. Overall HH rate of respiratory ICU (91%) and cardiovascular thoracic ICU (90%) was highest. The difference was statistically significant (p value <0.5) for moment 1,2 and 3 but not for moments 4 and 5. HH compliance rate was better in nurses than doctors. To increase HH compliance, repeated trainings onsite are effective and providing resources for HH makes them fulfilling responsibility of cleaning hands.

Introduction

During patient care, hands of health care workers (HCWs) are contaminated by microorganisms in and around patients' surroundings leading to health care associated infections (HCAI). World health organization has listed HCAI as the 10th most common cause of hospital death each year [1-3].

Hand hygiene (HH) is the most important factor for preventing HCAI. Health care associated infections is a major burden on hospitals and

society, worldwide. The concept of HH was conceptualized in early 19th century by Ignas Semmelweiss. Hand hygiene is a key aspect of the care provided to hospitalized patients [4]. Hand hygiene usually refers to hand washing with soap and water, or cleaning hands by using antiseptic solution or alcohol-based hand rubs [5]. Hand hygiene saves lives, so it is very important to study knowledge of HCWs about HH [6,7]. Every year 15 October is celebrated as 'Global Hand Washing day' to motivate the people around the world about the

importance of HH. In hospital settings, it is equally important to provide accessories needed for HH like soap, water, sanitizer, towel at all the places along with supervision during patient care to improve HH compliance. Hand hygiene compliance should be monitored by hospital authorities. Therefore, the study was planned with the aim to assess designed intervention on HH compliance among the health care workers at intensive care units (ICUs) of a tertiary care hospital along with auditing the availability of resources for HH.

Methods

A Prospective interventional study was conducted to assess HH compliance among doctors and nurses in 6 ICUs namely trauma ICU/TICU, medical ICU/MICU, pediatric ICU/ PICU, neonatal ICU/NICU, cardiovascular thoracic ICU / CVTSICU and respiratory ICU/ RICU of a 1500 bedded tertiary care hospital situated in south west part of India over a 7 months period from December 2018 to June 2019. A total of 135 HCWs including doctors (58), nurses (60) and other workers (17) were observed for HH compliance. Hand hygiene audit data was collected by infection control nurses (ICNs) using the Speedy Audit app bimonthly for 3 months before intervention. HH compliance was recorded for all 5 WHO moments of hand hygiene [8].

SpeedyAudit is a free hand hygiene auditing app that works on mobile devices, allowing to capture hand hygiene actions, precautions and personal protective equipment with phone or tablet. The tool captures 4 and 5 moments and In/Out standards of auditing. The tool also lets us easily view reports on your mobile device - with date, location and profession filters. When auditing is over, you can easily send a CSV version of your data to your email account for further data analysis.

SpeedyAudit include a web-based reporting portal aggregating data from multiple auditors and sites, automating data analysis and report creation.

For auditing supply of HH products like liquid soap, alcohol or chlorhexidine based hand rub products ICNs took multiple rounds on regular basis in ICUs, interviewed staff nurses and also went through indent books of ICUs. Similarly follow up was taken with hospital drug supply store to regularise supply of Hand hygiene products to ICUs. Interventions following these observations were done as follows [9].

1. Educational and training interventions:

- Workshops
- On site demo
- Reminder posters

2. Intervention tools working on the attitude and perception

- HH Auditing data was displayed in the monthly Hospital Infection Control Committee (HICC) meetings.
- The ICU with Best compliance rate was awarded with a certificate of excellence at the monthly HICC meeting
- Pre- and post-HH imprints of palms were taken on Agar plates and were shown to HCWs after overnight incubation to emphasize the importance of HH

3. Making the HH resources available

The resources for HH like alcohol-based or chlorhexidine-based hand rubs and hand washing solutions were provided by continuous liaising with the drug supply store

- Pre- and post-intervention data was analyzed.

Results

A total of 135 HCWs including doctors (58), nurses (60) and other workers (17) were observed for HH compliance in 6 ICUs of a tertiary care hospital.

Hand hygiene compliance was calculated automatically by speedy Audit app by using following formula [8,9].

$$\text{HH compliance} = \frac{\text{No of HH done events}}{\text{No of opportunities/indications for HH}} \times 100$$

Figure 1 shows overall HH compliance rate of all ICUs before and after intervention. HH compliance rate of all ICUs was low before intervention as compared to after intervention. The difference was statistically significant (p value <0.5) in all ICU's except NICU which already had a good compliance. Overall HH rate of respiratory ICU (91%) and CVTS ICU (90%) was highest.

Hand hygiene compliance rate was audited for all 5 WHO HH moments viz moment 1-Before touching the patient, moment 2-Before aseptic procedure, moment 3- after body fluid exposure, moment4- after touching a patient and moment 5- after touching patient's environment. There was increase in HH compliance rate for all moments post-intervention (**Figure 2**). The difference between HH compliance rate pre- and post-intervention was statistically significant (p value

<0.5) for moment 1,2, and 3 but not for moments 4 and 5.

Hand hygiene compliance rate was analysed according to professions of HCWs like doctors and nurses. It was observed that HH compliance rate in doctors before intervention was only 14% which improved to 83% post-intervention (**Figure 3**). Hand hygiene compliance rate in nurses pre-intervention was 34% which improved to 93% post-intervention (**Figure 4**). Overall HH compliance rate among nurses was better than

doctors both before and after intervention (**figures 3 &4**).

It was observed that the major obstacle to improve HH was lack of awareness about steps and moments of HH. Also regular availability of HH resources like alcohol-based or chlorhexidine-based hand rubs and liquid handwash solutions was a major problem at our hospital. These obstacles were overcome by various interventions mentioned in methodology. The supply for resources for HH were regularised by continuous follow-up with drug store and administration.

Figure 1. Overall HH compliance rate (%) of all ICUs Before and after intervention.

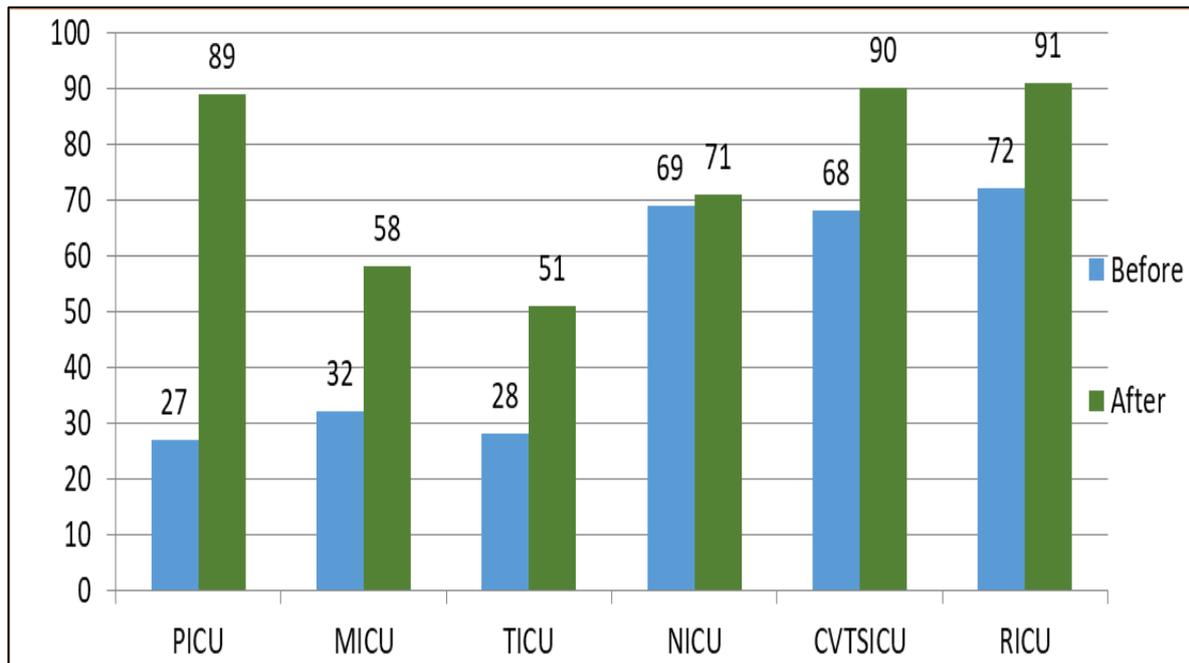


Figure 2. Moment specific HH compliance rate before and after intervention.

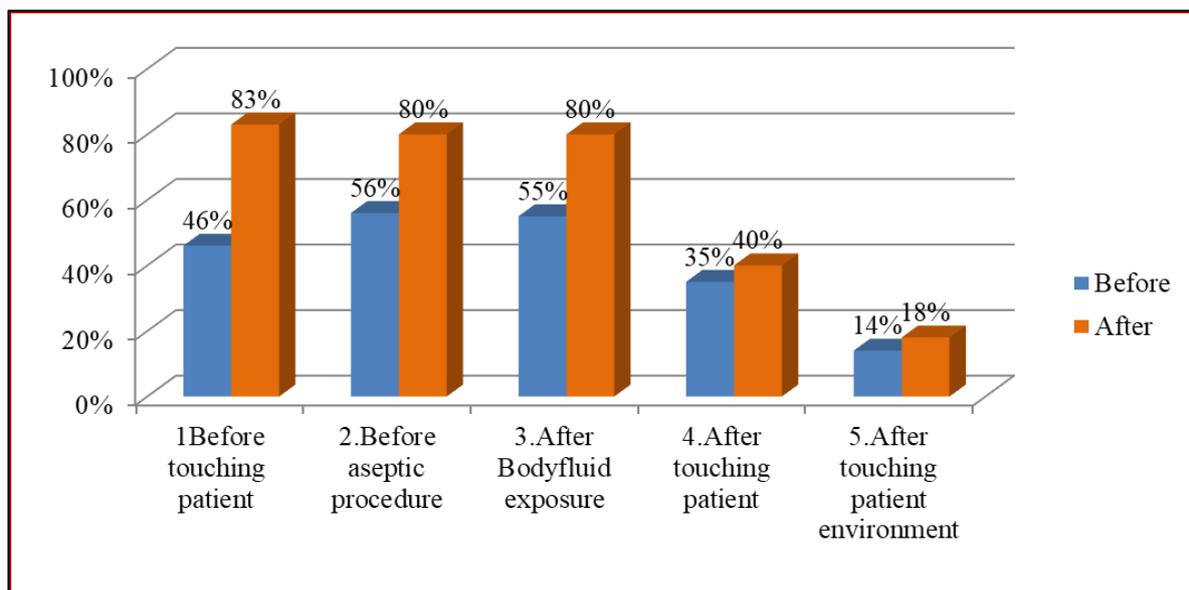


Figure 3. Profession specific HH compliance rate of doctors before and after intervention.

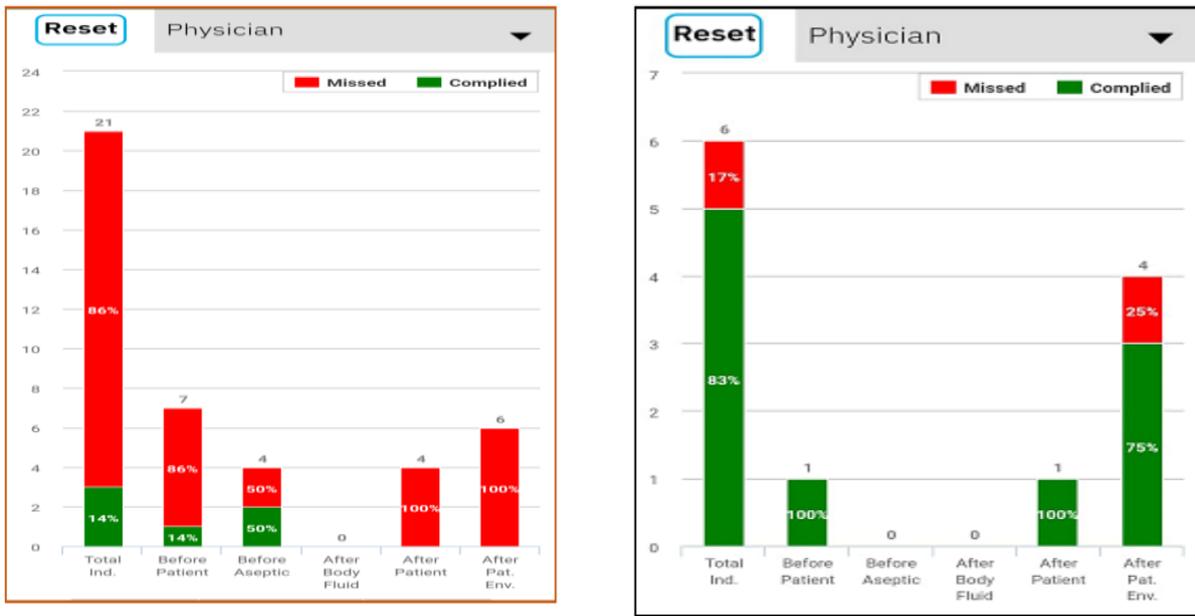


Figure 4. Profession specific HH compliance rate of Nurses before and after intervention

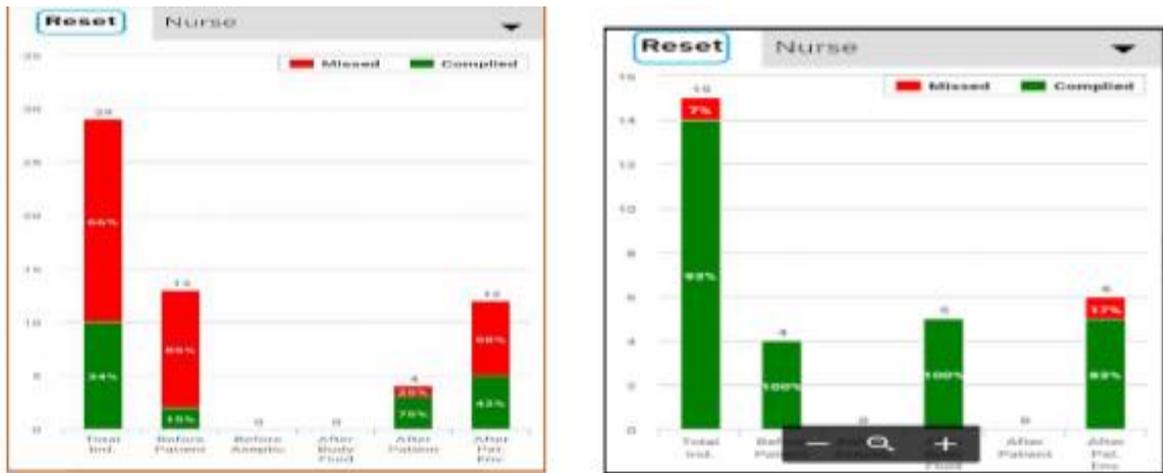


Figure 5. Interventions for HH (Auditing by ICNS, onsite training).



Discussion

Hand hygiene is one of the most important, simple, inexpensive, and easy to implement measure to prevent HCAs. Over the years it has been emphasized to have higher HH compliance rate, but there are many factors leading to low compliance rates in hospitals across both developed and developing countries. There are many factors which influence HH compliance such as, certain professional category (Doctors, Nurses, Support staff), specific care areas (Out Patient Department, ICU, emergency room), overcrowding of ICUs [8-10].

So it is important to audit HH compliance according to profession, location as well as according to moments of HH. If any cadre or location is found to have low compliance targeted interventions can be done.

There is paucity of literature in the Indian scenario related to interventional studies for HH compliance. In a study by **Sastry et al.** in Pondicherry [10] compliance was more in nurses than doctors and for moments 3 & 4. The present study showed low compliance in doctors than nurses preintervention but there was statistically significant improvement in HH compliance by doctors and nurses after intervention. Postintervention statistically significant improvements were also seen in moments 1,2 and 3 of HH. In another study by **Siddharth et al.** [11] only results of post-training were available in which there was improvement for moments 1 and 4.

Nair et al. [12] studied knowledge, attitude, and practice of HH among medical and nursing students in India. They found that nursing students had more knowledge and compliance in HH than medical students ($p < 0.05$). Similarly, **Van de Mortel et al.** in Italy [13] found that hand hygiene knowledge and practices were significantly higher in nursing students than among medical students. In contrast, **Abdelaziz and Bakr** [14] found a significantly higher compliance in doctors than other groups of health care workers.

In the present study, availability of resources for HH was important for improving HH compliance in HCWs similar to findings by **Pittet et al.** [15].

The various recommendations and strategies to improve HH compliance has crucial impact on HCAI rate. These are important in motivating HCWs and causing increased awareness

among them. Interventions in the form of increased availability of resources, on site trainings, continued HH education, putting up posters related to HH, encouraging areas or staff with higher hand hygiene compliance in the form of certificates, continuous monitoring of critical areas of HH compliance and presenting data in monthly meetings have proved useful in improving HH compliance, staff behavioural changes and reduced HCAI rates. Availability of alcohol based hand rubs and continued education are important to build knowledge and increase compliance.

Summary and conclusions

The present study shows that there is a need to focus on correct HH practices. Also multiple strategies are crucial in bringing awareness among HCWs leading to improved HH compliance. To increase awareness in HCWs regarding HH, there is need for data presentation, encouragement in monthly meetings. Continued education, on site trainings, and providing resources for HH, will make the HCWs aware to fulfil the responsibility of following HH practices. This study also shows that special focus should be on moment 4 (after touching the patients) and moment 5 (after touching the patient's surroundings), which are usually neglected.

Conflicts of interest : Nil.

Financial disclosure: Nne

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