Original Article

Evaluation of Compliances to the Hand Hygiene Practices and Assessment of Knowledge about Hand Hygiene among the Healthcare Workers in Intensive Care Unit and Neonatal Intensive Care Unit

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ABSTRACT

Background: Hand hygiene is an essential part of infection control in health-care settings. Moreover, it plays a vital role in preventing hospital-associated infections. **Materials and Methods:** The study was conducted over a 3-month period to evaluate hand washing adherence and assess knowledge related to hand hygiene among healthcare workers (HCWs) in a rural tertiary care teaching hospital in India using the World Health Organization questionnaire and five-point hand hygiene model checklist. **Results:** In terms of hand hygiene practices, a total of 340 instances were observed. The overall level of knowledge about hand hygiene was good (72.4%) among nurses as well as residents/interns (70.7%). However, compliance with hand hygiene was found to be of moderate level – 53% and 51% among nurses and residents, respectively. **Discussion:** Various studies and settings have shown that the percentage of HCWs who do not adhere to hand hygiene may differ. However, it is consistently observed that hand hygiene compliance among HCWs is often not up to the mark. **Conclusion:** Residents and nurses in this study had good knowledge of hand hygiene, however, compliance with hand hygiene was of moderate level. Barriers to compliance could be workload, lack of accessibility to hand hygiene products, forgetfulness, and in some cases, lack of awareness about the importance of hand hygiene.

Keywords: Behavioral change, hand hygiene audit, hand hygiene compliance, hospital-associated infections prevention

INTRODUCTION

Hand hygiene is an essential part of infection control in health-care settings, particularly in hospitals. It plays a vital role in preventing hospital-associated infections (HAIs), which can lead to increased illness, extended hospital stays, higher healthcare costs, and even mortality. Healthcare workers (HCWs) must adhere to proper hand hygiene practices to reduce the risk of transmitting pathogens to patients. Numerous studies have highlighted the impact of hand hygiene on reducing HAIs. The World Health Organization (WHO) has established the "Five Moments for Hand Hygiene" approach to guide HCWs on when to perform hand hygiene. This approach includes specific moments before and after certain patient interactions.

To assess and improve hand hygiene practices, the WHO has developed a standardized questionnaire that

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can be used across different healthcare settings. This questionnaire helps identify any gaps or deficiencies in hand hygiene practices, infrastructure, and resources within health-care facilities. It also enables hospitals to track progress over time and implement corrective measures to promote better adherence to hand hygiene protocols. Using this questionnaire, hospitals can compare their practices with national and international standards, facilitating benchmarking and identifying opportunities for improvement. Effective hand hygiene practices reduce the transmission of HAIs, ultimately leading to better patient safety and outcomes.[1]

As part of the "Clean Care is Safer Care" program, the WHO conducted a global observational study involving healthcare facilities in various countries. The study revealed that on average, hand hygiene compliance among HCWs was only around 40%.[2]

MATERIALS AND METHODS

The study was conducted over a 3-months period from April to June 2023 to evaluate hand-washing adherence and assess knowledge and attitudes related to hand hygiene among HCWs at a tertiary care hospital. Ethical clearance was obtained from the institutional ethical committee.

Hand hygiene compliance was assessed using the WHO's five-point hand hygiene model and checklist. Observations were made during routine patient care in specific units, and multiple trained observers collected the data. The investigation person assessing compliance was different from the one conducting the knowledge assessment using the questionnaire. The WHO questionnaire was used to assess the knowledge of different HCW categories. Nurses, residents including interns, and housekeeping staff directly involved in patient care were included in the sample.

All statistical analyses were performed using Excel and appropriate tools. Informed written consent was obtained from all participants before conducting the questionnaire-based knowledge assessment.

RESULTS

In terms of hand hygiene practices, a total of 340 instances were observed. Among the observed individuals, nurses accounted for 55% of the observations, followed by doctors at 35% and housekeeping staff at 10%. In terms of knowledge about hand hygiene, the study included a total of 112 HCWs, comprising 40% nurses and 60% residents/interns.

The overall level of knowledge about hand hygiene was good (72.4%) among nurses as well as residents/interns (70.7%). However, compliance with hand hygiene was found to be of moderate level – 53% and 51% among nurses and residents, respectively.

Compliance was found to be poor (20%) among housekeeping staff. It was challenging to draw any conclusive analysis for housekeeping staff due to the significantly lower number of observations made for this group.

In only 20% of hand hygiene opportunities out of all observed instances, staff followed all steps of hand hygiene correctly. The primary method used for hand hygiene was alcohol-based hand rub, accounting for 81% of the observed instances.

The highest compliance was observed before aseptic procedures and after the risk of body fluid exposure. On the other hand, the least compliance was observed after patient/patient's environment contact and before initial patient contact.

Decontamination of hands before individual catheter insertion or other procedures that do not require special surgical procedures was 94%. However, decontamination after contact with the patient's intact skin was only 23%. Adherence to hand washing after the removal of gloves was good, at around 60%. Compliance with hand washing before using the cafeteria service was also high, at 95% [Figure 1].

Around 57% of participants in both groups knew that the main route of cross-transmission of potentially harmful germs between patients is through HCWs' hands when not clean.

Regarding the most frequent source of germs responsible for health-care-associated infections, only 31% of both groups responded correctly that it is germs present on or within the patient's body. However, approximately 31% of nurses and 16% of residents failed to recognize all moments of hand hygiene correctly. Regarding the effectiveness of alcoholic hand rubs compared to hand washing, both residents and nurses exhibited high levels of knowledge of 95% and 94%, respectively.

No significant differences were observed between the groups regarding knowledge about routes of transmission of infection, the most appropriate timing for performing hand hygiene actions, and things that should be avoided to prevent the colonization of hands with harmful germs. A significant difference in knowledge was found regarding the type of hand hygiene method required before giving an injection and after making a patient's bed. In the case of giving injections, only 21% of residents knew the correct

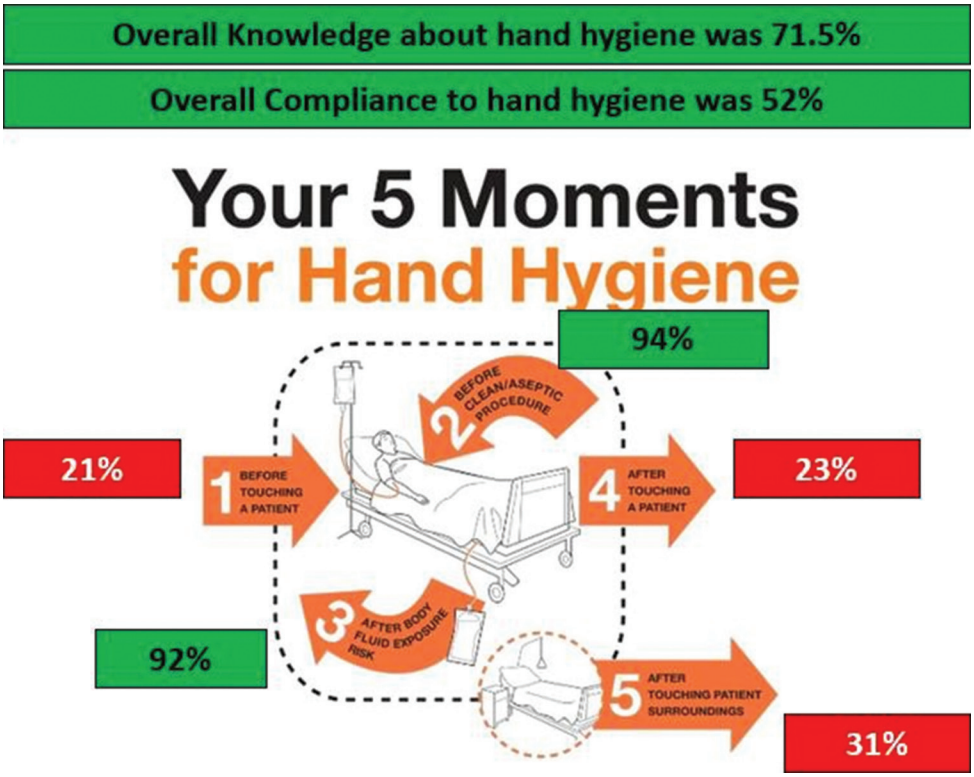

Figure 1: Indication related/moment wise hand hygiene compliance

method, compared to 66% of nurses. For making a patient's bed, only 16% of nurses knew the correct method, compared to 43% of residents.

No significant differences were seen in other situations, such as palpation of the abdomen, after emptying a bedpan, after removing examination gloves, and after visible exposure to blood, with adherence rates of 100%, 97%, 95%, and 82%, respectively, among both residents and nurses. For knowledge regarding the use of artificial nails to decrease colonization, 90.52% of nurses reported correctly, compared to 78.94% of residents [Table 1].

DISCUSSION

Various studies and settings have shown that the percentage of HCWs who do not adhere to hand hygiene may differ. However, it is consistently observed that hand hygiene compliance among HCWs is often not up to the mark.

Factors hindering compliance include workload, limited access to hand hygiene products, forgetfulness, and sometimes, lack of awareness regarding the importance of hand hygiene. Therefore, it is crucial to have education and training programs, along with regular monitoring and feedback, to improve hand hygiene compliance among HCWs.

Between June 2020 and July 2021, a cross-sectional study was conducted in a hospital to assess the knowledge, attitude, and practice of hand hygiene among inpatients. Most participants exhibited an average knowledge score (56.7%) and an average attitude score (62.0%) toward hand hygiene. However, their practice of hand hygiene among healthcare providers received a poor score (50.7%).[3]

Our findings revealed that nurses displayed equal or slightly greater compliance with hand hygiene opportunities and appropriate hand hygiene practices compared to doctors. There could be various factors contributing to the average compliance with hand hygiene among doctors, such as work pressure, high caseload, and potentially an unwillingness to learn from other HCWs.

A meta-analysis conducted in 2022 reviewed various studies on hand hygiene compliance among physicians and nurses in hospitals in high-income nations. The study found that nurses had a higher weighted pooled compliance rate of 52%, while doctors had a rate of 45%. This signifies that those

Table 1: Statistical difference between the two groups regarding knowledge of hand hygiene

S. No.	Questions with answers	Nurses (Group 1) (%)	Residents/Interns (Group 2) (%)	Z-score	*P*-value	Statistical difference
1.	Routinely use hand rub	100	100	0.00	-	Insignificant
2.	Cross transmission route is healthcare worker's hand when not clean	57	57	0.00	-	Insignificant
3.	The most common source of germs responsible for HCAI is germs present on or within the patient's body	31	31	0.00	-	Insignificant
4.	To recognize all moments of hand hygiene correctly	69	88	2.38	0.008	Significant
5.	HCW transmission prevention HH moment	68	68	0.00	-	Insignificant
6.	Hand rubbing is more rapid for hand cleansing than handwashing with soap and water – True	95	94	0.22	0.412	Insignificant
7.	Hygienic hand disinfection dries the skin out more than hand washing with soap (Ans. – False)	79	26	6.54	0.005	Significant
8.	Hand washing and hand rubbing are recommended to be performed in sequence (Ans. – False)	42	43	0.10	0.460	Insignificant
9.	What is the recommended duration of hygienic hand disinfection (Ans. 20 s)	73	48	2.77	0.002	Significant
10.	Which type of hand hygiene method is required in these situations: rubbing (R). washing (W) or none (N)?					
	Before palpitation of the abdomen (Ans. R)	100	97	1.43	0.076	Insignificant
	Before giving an injection (Ans. R)	21	66	-5.36	0.0004	Significant
	After emptying a bedpan (Ans. W)	95	82	2.27	0.011	Insignificant
	After removing examination gloves (Ans. R/W)	100	100	0.0	-	Insignificant
	After making a patient's bed (Ans. R)	16	43	3.31	0.0004	Significant
	After visible exposure to blood (Ans. W)	100	83	3.70	0.0001	Significant
11.	What should be avoided as associated with the increased likelihood of colonization of hands with harmful germs?					
	Wearing rings on the hands (Ans. yes)	100	83	3.70	0.0001	Significant
	Damaged skin (Ans. yes)	100	91	2.57	0.005	Significant
	Wearing artificial fingernails (Ans. yes)	95	97	0.51	0.305	Insignificant
	Regular use of skin care lotion (Ans. no)	63	77	1.58	0.057	Insignificant

HCAI: Healthcare-associated infection, HCW: Healthcare worker

nurses demonstrated better adherence to hand hygiene practices compared to physicians.[4] Few other studies also found higher compliance among nursing staff compared to doctors.[5,6]

An observational study was conducted to identify the predictors of non-compliance with hand washing during routine patient care. The study revealed an inverse relationship between hand hygiene compliance and workload, suggesting that as workload increases, hand hygiene compliance tends to decrease.[7]

The compliance of HCWs with hand hygiene protocols in a hospital setting was investigated through an extensive review of various studies. The findings of this systematic review indicate that overall compliance with hand hygiene practices was frequently found to be below optimal levels. Various factors, including workload, time limitations, and limited availability of hand hygiene products, were identified as significant obstacles to achieving compliance.[8]

A study was carried out to evaluate hand hygiene behaviors, knowledge, and attitudes among health-care professionals. The findings revealed insufficient knowledge among health-care professionals regarding hand hygiene, specifically in terms of the correct duration and technique for hand hygiene. The study emphasized the necessity for focused education and training to enhance knowledge and compliance.[9]

The WHO conducted a study that concentrated on creating a uniform hand hygiene observation method. This method involved experts who were trained to evaluate the adherence of HCWs to hand hygiene standards. The study successfully pinpointed crucial factors that influenced compliance and proved to be an effective tool for monitoring and enhancing hand hygiene practices.[10]

A study in southern India observed a low adherence rate of 44% in private neonatal intensive care units (NICUs) and 12% in public NICUs.[11] In a tertiary care hospital in North India, a 3-year study found improved compliance with hand washing over time, while hand rub compliance remained stable.[12] Another study in a NICU found higher non-compliance rates at night compared to daytime, but our study did not use cameras or monitor nighttime compliance.[13] A study done on undergraduate medical students' knowledge and compliance to hand hygiene found a need for

training on hand hygiene practices starting from the 1st year of medical school.[14,15]

CONCLUSION

Residents and nurses in this study had good knowledge of hand hygiene; however, compliance with hand hygiene was of moderate level. Barriers to compliance could be workload, lack of accessibility to hand hygiene products, forgetfulness, and in some cases, lack of awareness about the importance of hand hygiene.

Education, training, and monitoring are essential for improving hand hygiene compliance and reducing the incidence of HAIs. The use of the WHO questionnaire and standardized observation method can help healthcare facilities assess their current practices, identify areas for improvement, and enhance patient safety.

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