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Original Research Article

Hand Hygiene Audit and Practices among Resident Doctors and Nursing Staff Working at Pediatric and Neonatal Intensive Care Unit: An Observational Study

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ABSTRACT

Background: To lower the frequency of healthcare-associated infections (HCAIs), it is critical to analyze existing hand hygiene (HH) practices among healthcare workers (HCWs), identify gaps, and implement corrective actions. We planned to evaluate HCWs' hand hygiene routines with this objective in mind.

Methods: The study focused on postgraduate resident doctors and nursing staff's hand hygiene habits over three months at a teaching hospital providing tertiary care. Direct observation and survey-based cross-sectional methods were utilized, with an observation tool and questionnaire employed for data collection; the observation period for hand hygiene compliance lasted six to eight weeks, with observations made at random intervals during morning, evening, and night shifts in the PICU and NICU.

Results: The study observed a statistically significant compliance rate for hand hygiene among nursing staff and resident doctors, with 160 out of 172 observations demonstrating hand hygiene practices. Adequate hand hygiene performance was observed in 69.4% of cases, which was also statistically significant. Alcohol-based hand rub was more frequently used than soap. The analysis of knowledge, attitude, and practices included 20 resident doctors and 24 nursing staff in the PICU and NICU. The results showed that 97% of participants had received hand hygiene education in the past year, and nearly 100% used alcohol hand rub consistently. Most respondents, 90% of resident doctors and 83.4% of nursing staff recognized the significant impact of healthcare-associated infections on patient outcomes. Additionally, 85% of nursing staff and 95% of resident doctors agreed that maintaining good hand cleanliness is essential for reducing healthcare-associated illnesses.

Conclusion: The findings of this study revealed that the participants had an excellent knowledge of hand hygiene. To emphasize the value of hand washing for both patients and healthcare workers, we advise providing the appropriate tools and holding instructional workshops. Such measures would significantly improve attitudes towards hand hygiene, reducing preventable infections, shorter hospital stays, and cost savings in healthcare.

Keywords: Hand hygiene performance, Knowledge, attitude and practices in doctors and nurses

INTRODUCTION

A nosocomial or healthcare-associated infection (HCAI) presents itself in a patient obtaining care in a hospital or other healthcare institution, and it is not present or incubating at the time of admission.[1] HCAI plays a crucial role in hospitalizations being extended and antibiotics being used for longer than

necessary, all of which lead to the formation of antibiotic resistance, a considerable increase in financial burden, high expenditures for patients and their families, and an excess of mortality.[1,2] Infections acquired in hospitals place additional strain on the healthcare system. Hand hygiene compliance reduces this burden considerably.[3] Any act of cleansing the hands is generally called "hand hygiene"(HH).HCAI complicates 5-10% of hospital admissions in developed countries while surpassing 25% in underdeveloped nations.[4]

HCAI surveillance and prevention must be prioritized to make healthcare environments and institutions safer.[5] According to the Centers for Disease Control and Prevention (CDC), one in every 31 hospital patients and one in every 43 nursing home residents develops an HCAI (an infection while being treated in a medical facility) on any given day. Furthermore, the CDC estimates that on any given day, almost half of hospital patients and one in every 12 nursing care residents receive an antimicrobial medicine.[6] According to the International Nosocomial Infection Control Consortium, the HCAI prevalence in India is approximately 9.06 infections per 1,000 intensive care unit (ICU) patient days; the HCAI infection rate in India can range between 4.4 and 83.09 percent across different hospitals, which is significantly higher than in other wealthy countries.[7]

One of the most effective strategies to avoid transmitting infectious diseases in hospitals is practicing appropriate hand hygiene in everyday life.[8] Numerous studies have shown that implementing organized infection management programs is cost-effective to lower HCAI. An observational single-center study by Hoffmann et al. based on direct observation and feedback. Between 2013 and 2017, hand hygiene performance in 12 intensive care units was evaluated. The outcomes were 10 315 "my five moments for hand hygiene" observed. During the research period, the mean hand hygiene compliance rate grew from 75.1% to 88.6%, representing an estimated 4.5% annual increase. However, compliance varies by professional category (physicians: between 61.2% and 77.1%; nurses: between 80.2% and 90.9%; others: between 61.3% and 82.4%).[9]

A study by Helena Ojanperä et al[10] in Finland about Hand-hygiene compliance by hospital staff and incidence of health-care-associated infections found that, between 2013 and 2018, the link nurses conducted 52115 hand-hygiene observations. Annual hand hygiene compliance improved from 76.4% (2762/3617) in 2013 to 88.5% (9034/10 211) in 2018 (P 0.0001). During the same period, the number of health-care-associated infections reduced from 2012 to 1831, and their incidence per 1000 patient days decreased from 14.0 to 11.7 (P 0.0001). The monthly incidence of healthcare-associated infections and hand-hygiene compliance had a modest but statistically significant negative connection (r = 0.48; P 0.001). With direct observation and feedback, doctors' and nurses' compliance with hand hygiene practices increased, and this shift was connected with a decrease in the incidence of healthcare-associated infections. More research is needed to determine the role of hand cleanliness in preventing HCAI.

The term "Standard Precautions" refers to the fundamental concepts of infection control that must be followed in all healthcare institutions.[1,4] An infection spread by contaminated hands of medical personnel and other caregivers, a common occurrence globally, becomes more prevalent in middle-and low-income countries (LMICs) like India.[11,12] Resource-constrained situations, such as crowded Sick neonatal care units (SNCUs)/ Neonatal intensive care units (NICUs), may exacerbate poor hand hygiene.[13]

To address hand washing difficulties, the World Health Organization (WHO) offered "My five moments for hand washing." Before performing aseptic and clean operations, before handling a patient, after touching a patient, after touching the patient's surroundings, and after being in danger of exposure to bodily fluids are the five moments that need hand washing (Figure 1). Healthcare-associated infections remain a significant issue in the majority of intensive care units. Hand cleanliness is the easiest and most efficient way to avoid these problems.[14]

The specified hand hygiene practices must be evaluated, gaps must be observed and identified, and remedial action must be taken to reduce HAIs. We examined healthcare workers' (HCW) hand hygiene habits from this perspective. This study aimed to

evaluate the performance rate of hand hygiene (HH) and the resident doctor and nursing staff working in the pediatric and neonatal critical care unit of a multi-specialty teaching hospital and medical college in central India.

MATERIAL & METHODS

We conducted our research in a multi-specialty teaching hospital that hosts 200 MBBS students each year and 260 postgraduate resident doctors across all faculties for three years, from 1 July 2022 to 30 September 2022. It's a direct observation study and survey-based cross-sectional research.

We used two different observation tools and a questionnaire in this investigation. The six-to-eight-week observation period for hand hygiene compliance was observed after approval from the Institutional Ethics Committee.

In the Neonatal and Pediatric Intensive Care Units (NICU and PICU), observations of patient-specific activities (HH opportunities) were made at random intervals of 20 minutes during the morning, evening, and night shifts. At the beginning of each observation period, a random patient from the target ICU was chosen, and they were under continuous surveillance for the whole 20-minute period.

The single observer covertly watched any medical professionals, such as resident doctors and nursing staff, who interacted with the target patient throughout this time in different shifts. Many HH opportunities were observed for 20 resident doctors and 24 nursing staff. The Hand Hygiene Technical Reference Manual provided by the World Health Organization was used to help prepare the observation tool (WHO).[4]

The participants in this study were postgraduate resident doctors and nursing staff from Neonatal and Pediatric Intensive Care Units who had worked at the hospital for at least six months. We wanted to know the compliance of Hand Hygiene in our NICU AND PICU as a part of an internal audit. As resident doctors and nursing staff work round the clock in rotation in these ICUs, we want to see any variation in hand hygiene performance in various duty shifts.

Nursing students were excluded as they are posted only for limited hours in the NICU and PICU. The sample size was not calculated as we have observed different opportunities for various patients by on-duty resident doctors or nursing staff. The assessment of knowledge was done for all resident doctors and nursing staff posted in the NICU and PICU. We have excluded senior residents, faculty working in the pediatrics department and nursing staff of the pediatric ward. A convenient sampling method was used for sample collection.

Operational definitions

Hand hygiene

Hand hygiene is keeping one's hands-free of microbes by washing them with soap and water or using alcohol-based hand rubs according to instructions in the five moments of hand hygiene.[14]

Health Care Workers

Doctors, nurses, physiotherapists, X-ray technicians, unit assistants, and cleaning attendants are all examples of healthcare workers who work in ICUs and care for patients.[4]

Hand hygiene opportunity

It is a moment during health-care activities when hand hygiene is necessary to interrupt germ transmission by hand. It constitutes the denominator for calculating hand hygiene compliance, i.e., the number of times HCWs performed hand hygiene in all observed moments when required.[4]

Adequate Hand Hygiene

When performing hand hygiene, the individual performs all the steps in the recommended time (Figures 2 and 3).[4]

Inadequate Hand Hygiene

When performing hand hygiene, the individual performs HH by skipping one or more steps or does not follow the guidelines provided by WHO (Figures 2 and 3).[4]

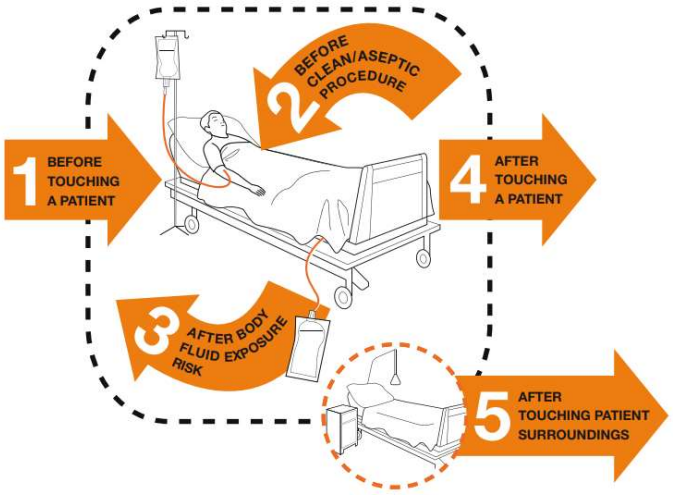

Figure 1: 5 moments of hand hygiene by WHO

Figure 2: Adequate hand hygiene using hand rub

Figure 3: Adequate hand washing technique

RESULTS

Data was collected using three different data collection sheets. It was entered in Epi info software 7.2.5.0. Data were analyzed using SPSS version 23, IBM Inc, Illinois, USA. Independent t-test, descriptive statistics, and chi-square test were done for inter-group comparison.

It was shown that 160 HH opportunities were seen in both ICUs, 93% of HH opportunities were performed, and 7% of the time, they were skipped (figure 4). When we wanted to know the technique of HH, 69.4 % percent of opportunities were found to have adequate HH, whereas 30.6% were inadequate (Table 1). The chi-square value of 10.610 and the associated p-value of 0.001* indicate a statistically significant relationship between the hand hygiene technique and the professional category (resident doctor or nursing staff). This emphasizes the requirement for potential treatments or instruction to enhance healthcare professionals' hand hygiene practices (Table 1). This suggests a difference in hand hygiene techniques between resident doctors and nursing staff, and it is not merely due to chance.

Alcohol hand rub was observed to be used in 73.9% of cases, and soap was used for HH 26.1% of the time (Figure 5). In the HH Audit, 310 observations of HH opportunities were made, of which 131 were in PICU, 171 were in NICU, 113 were in resident doctors, and 191 were in nurses. 5 Moments of HH were observed: Moment 1 – before touching the patients, 98 (31.6%) opportunities;

before any procedure, 38 (12.3%) opportunities; after any procedure, 39 (12.6%) opportunities; after touching the patients, 79 (25.5%) opportunities; and after touching the patient's surroundings, 56 (18.1%) opportunities were observed (Figure 4). Only 27 observations of HH were not followed; in the remaining 294 observations, hand wash was done in 141 observations, and hand rub was used 153 times for hand hygiene.

The Knowledge attitude and practices analysis was done on 20 resident doctors and 24 nursing staff posted in the PICU and NICU. 97% received HH education in the last year. Among 20 resident doctors, six were male, and 14 were female. We could find only one male nurse staff and 23 female nursing staff.

Most of the resident doctors, 17 in all, were between 20 and 30. Ten nursing staff was between 20 and 30 years old, nine were between 30 and 40, three were between 40 and 50, and two were beyond 50 years old (Table 2). All doctors and nurses routinely used alcohol hand rub. 40% of resident doctors were neutral, and 30% of resident doctors feel that HH required some effort to perform, whereas 58.3 % and 12.5 % of nursing staff found it very easy and easy, respectively, to perform hand hygiene (Table 3).

50 % of resident doctors and 16.7% of nurses thought that healthcare-associated infection has a moderate effect on patient outcomes, whereas 40 % of resident doctors and 66.7% of nurses thought that healthcare-associated infection has a major effect on patient outcomes (Figure 7). 55% of doctors and 66.7 % of nurses felt that our institute emphasized hand hygiene.55 % of doctors and 62.5 % of nurses thought leaders supported and openly promoted HH moderately and greatly (Figure 8). 45% of doctors and 66.7 % of nurses thought they received individual hand hygiene education (Figure 9). 94.7 % of doctors and 78.3 % of nurses perform hand hygiene as recommended (Table 4).

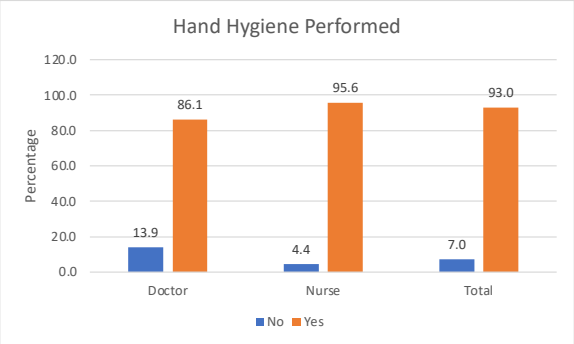

Figure 4: Hand hygiene compliance performance

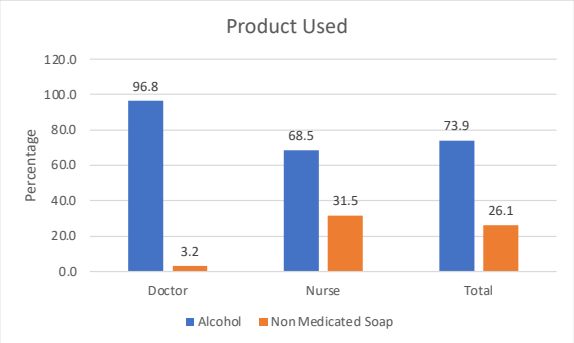

Figure 5: Product used for hand hygiene

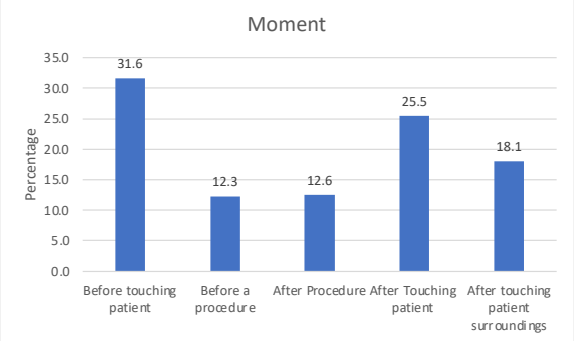

Figure 6: Hand hygiene moment

Table 1: Hand hygiene technique

Hand Hygiene Technique	Resident Doctor		Nursing staff		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Total Percent
Adequate	14	45.2	97	75.2	111	69.4
Inadequate	17	54.8	32	24.8	49	30.6
Total	31	100.0	129	100.0	160	100.0
Chi sq	10.610		P value		0.001*	

*Significant ($p<0.05$)

Table 2: Age-wise distribution of the study population

Age Group (Years)	Resident Doctor		Nursing staff		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
20-30	17	85.0	10	41.7	27	61.4
30-40	3	15.0	9	37.5	12	27.3
40 -50	0	0	3	12.5	3	6.8
> 50	0.0	0.0	2	8.3	2	4.5
Total	20.0	100.0	24	100.0	44	100.0

Table 3: Efforts required for hand hygiene

Effort for hand hygiene	Resident Doctor		Nursing staff		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Lots of Effort	3	15.0	0	0	3	6.8
Some Effort	6	30.0	2	8.3	8	18.2
Neutral	8	40.0	5	20.8	13	29.5
Easy	1	5.0	3	12.5	4	9.1
Very easy	2	10.0	14	58.3	16	36.4
Total	20	100.0	24	100.0	44	100.0

Table 4: Do you perform hand hygiene as recommended

Do you perform Hand Hygiene as recommended	Resident Doctor		Nursing staff		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Total
Almost Never	0.0	0.0	1	4.3	1	2.4
Occasionally	1	5.3	4	17.4	5	11.9
Almost every time	10	52.6	4	17.4	14	33.3
Every time	8	42.1	14	60.9	22	52.4
Total	19	100.0	23	100.0	42	100.0

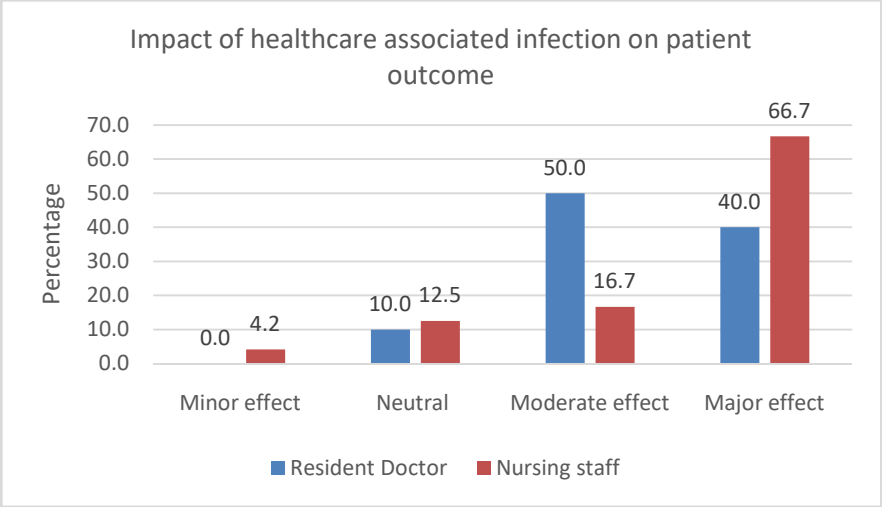

Figure 7: Impact of healthcare-associated infection on patient outcome

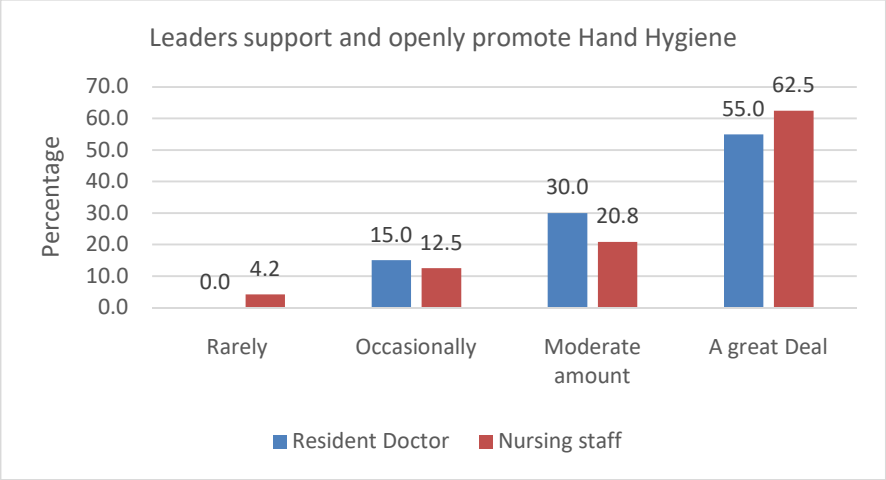

Figure 8: Leaders support and openly promote hand hygiene

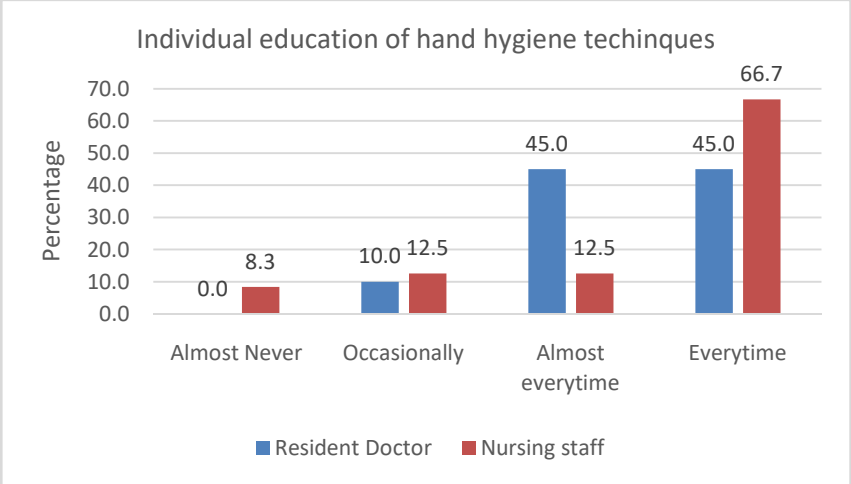

Figure 9: Individual education of hand hygiene techniques

DISCUSSION

Research by Helena Ojanperä et al on HH Compliance (HHC) and incidents of HCAI in Finland found that, between 2013 and 2018, the link nurses conducted 52 115 hand-hygiene observations. Annual hand hygiene compliance improved from 76.4% (2762/3617) in 2013 to 88.5% (9034/10 211) in 2018 (P 0.0001). During the same period, the number of health-care-associated infections reduced from 2012 to 1831, and their incidence per 1000 patient days decreased from 14.0 to 11.7 (P 0.0001). The monthly incidence of healthcare-associated infections and hand-hygiene compliance had a modest but statistically significant negative connection (r = 0.48; P 0.001)(10). Though our study was for a short duration, we had similar results. It was shown that 160 HH opportunities were seen in both ICUs, 93% of observations of HH were performed, and 7% of times it was skipped.

A study by Vikke et al. on HHC in emergency medical services, an international observational study, found that sixty hours of observation were performed for 87 patient interactions in each nation. There were 1344 HH indicators in all. Before patient contact, 3% used hand rub or hand wash; before clean/aseptic procedures, 2%; after the danger of bodily fluids, 8%; after patient contact, 29%; and after contact with patient-related surroundings, 38%. Gloves were used in 54% of all HH cases.[15] We had 310 observations of HH opportunities made, of which 131 were in PICU, 171 were in NICU, 113 were in resident doctors, and 191 were in nurses. 5 Moments of HH were observed: Moment 1 – before touching the patients (31.6%) opportunities; before any procedure, (12.3%) opportunities; after any procedure (12.6%) opportunities; after touching the patients, (25.5%) opportunities; and after touching the patient's surroundings, (18.1%) opportunities were observed.

Research by Biswas et al. in the NICU of India found that 1308 chances for hand hygiene were noted. Hand-washing (707 [58.6%]), hand massage (442 [36%]), and missing hand hygiene (78 [6.4%]) episodes were reported among 1227 scheduled patient interactions. During resuscitation, the rate of missing hand hygiene was 20%.[16] In our study, a total of 294 observations, 141(48%) times they have used hand wash and 153 (52%) times they have used alcohol-based hand rub.

Research in Southwestern Nigeria by Agbana et al found that the average age of respondents was 35.29.3 years, with the majority (33.6%) falling between the ages of 36 and 45. The male-to-female ratio was 1.6 to one. Most respondents (41.5%) were nurses, and 370 (98.95%) were knowledgeable with hand hygiene. Hand washing before and after patient interaction was 44.65% and 56.2%, respectively. The majority (53.4%) have had hand cleaning training in the previous three years, and 222 (62.7%) use alcohol-based hand rubs regularly.[17] In our study, Among 44 participants, 20 were resident doctors, and 24 were nursing staff working in the pediatric and neonatal intensive care unit. Amongst 20 resident doctors, six were male, and 14 were female. We could find only one male nurse staff and 23 female nursing staff. In age-wise distribution, the maximum, i.e. 17 residents were between 20 and 30. Amongst the nursing staff, ten were in the age group of 20-30 years, nine were in the age group of 30-40 years, three were in the age group of 40-50 years, and 2 participants were more than 50 years of age. All 20 resident doctors have received hand hygiene training in our institute. 23 nursing staff received training, and only one nurse still needs hand hygiene training. All resident doctors (20) and nursing staff (24) routinely use alcohol hand rub.

In this study by Mohanty et al, 171 healthcare workers (HCWs) were evaluated for knowledge and perception of HH. The overall response rate was 87.8%. The majority of those who took part were staff nurses. Approximately 55% have undergone formal hand hygiene instruction in the previous three years. Participants' overall accurate knowledge was 66.4% and 27.5%. Hand hygiene was seen to be conducted roughly 70%-80% of the time in settings demanding it. Alcohol-based hand massages were not accessible at all points of care, and single-use towels were unavailable at all sinks. Compliance was seen in just 32% of the total when it was tracked whether or not the HCW began hand hygiene activity;[18] our compliance was much more with our observations. We found that alcohol-based hand rub was readily available at the entrance of both ICUSs, but single towels were not available in our ICUs.

CONCLUSIONS

This observational study provides valuable insights into hand hygiene practices among resident doctors and nursing staff working in a pediatric and neonatal ICU. While the overall compliance rate was satisfactory, certain areas require attention and improvement. Implementing effective hand hygiene protocols, providing continuous education and training programs, and fostering a culture of hand hygiene can minimize healthcare-associated infections, ultimately leading to improved patient safety and outcomes in these critical care units.

Limitations

This study's small number of participants may limit the results' adaptability to a broader range of populations. The cross-sectional design of our study provides a snapshot of hand hygiene practices at a specific time without considering potential changes or trends. It may need to capture hand hygiene interventions' long-term effectiveness or sustainability. Other variables or factors influencing hand hygiene practices, such as cultural norms, workload, or individual attitudes, must be adequately addressed or controlled for in our study.

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