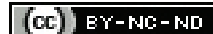


Comparison of Hand Hygiene Adherence Rate before and after Training in a Multispecialty Hospital, Gujarat, India

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ABSTRACT

Introduction: The most effective way to break the chain of transmission of infection in healthcare facility is Hand Hygiene (HH). However, the HH adherence rate/compliance is varying worldwide. Healthcare facilities should follow comprehensive, systematic approach for assessment of HH adherence rate. Periodic monitoring and necessary feedback is critical to improve HH adherence rate/compliance.

Aim: To know the impact of the HH training of Healthcare Workers (HCW) on HH adherence rate.

Materials and Methods: This prospective study was conducted at SMS Multispecialty Hospital, Ahmedabad, Gujarat, India. The study was conducted for the duration of six months (October 2019-March 2020). Total 416 opportunities were accessed in two sessions {203 pretraining and 213 post-training} among different HCWs of ICU and NICU. HH adherence rate was measured by direct observation methods by trained, non participating neutral person as per World Health Organisation (WHO) HH guidelines. HH

training was given to HCWs (doctors, nursing staff and attendant) of Intensive Care Unit (ICU) and Neonatal Intensive Care Unit (NICU). Pre and post-training HH adherence rate was calculated among HCWs of ICU and NICU in respect to WHO's five movement of HH. Chi-square test was used to do statistical analysis.

Results: Pre and post-training HH adherence rate of HCWs of ICU is 41% and 69% respectively. However, pre and post-training HH adherence rate of HCWs of NICU was 52% and 75%, respectively. Both ICU and NICU post-training HH adherence rate of HCWs was improved which was statistically significant (p -value <0.00001). Both pre and post-training, compared to doctors, nursing staff had better HH adherence rate (45%, 67% in ICU and 58% and 78% in NICU). Hand rub was preferred method of HH (93%).

Conclusion: The HH training improved the HH adherence rate of HCWs of ICU and NICU. Induction and periodic training of HCWs improves HH adherence rate of HCWs.

Keywords: Hand hygiene training, Healthcare workers, WHO five moment of hand hygiene

INTRODUCTION

Washing of hands with soap and water has been embedded in religious and cultural habits however it has a clinical significance to reduce the spread of the disease. Hospital Acquired Infection (HAI) is a major concern for patient safety which prolongs duration of hospital stay, increased resistance to antimicrobials, and higher healthcare costs. HCW can acquire healthcare associated pathogens from infected or draining wounds, colonised areas of normal, intact patient skin [1]. The most heavily colonised areas are perineal or inguinal areas however the axillae, trunk, and upper extremities (including the hands) are also frequently colonised [2,3]. At obstetric hospital of Viena in 1847, Semmelweis I demonstrated that the mortality rate among mothers was significantly lower when hospital staff cleaned their hands with an antiseptic agent than when they washed their hands with plain soap and water [4].

The WHO launched a global campaign "Save Lives: Clean Your Hands" in 2009 to improve HH adherence among HCW which ultimately improves the healthcare quality [5]. WHO introduced "My five moment for HH", A moment is when there is a probable or actual risk of transmission of pathogen from one surface or patient to another via the hands of HCW. Since a long time, low HH compliance has been found to be worldwide. HH compliance varies from 20-85.5% among various studies reported from India [6-10]. Various factors contribute to low HH adherence rate among HCWs like shortage of staff and heavy work load, difficult access points of hand rub or hand washing facilities, lack of knowledge of HH practice, lack of training, lack of administrative/infection control committee's support for improvement of HH [11].

This study was done to understand the effectiveness of HH training to improve HH adherence rate among HCWs.

MATERIALS AND METHODS

The present study was an observational prospective study which was conducted at SMS Multispecialty hospital, Ahmedabad, Gujarat, India for the six months duration October 2019-March 2020. The study was conducted after being approved by Institutional Ethics Committee (IEC) (date: 31/12/2018).

Inclusion criteria: The HCWs (Nurses, Doctors, nursing assistants, and other Housekeeping staff) of the ICU and NICU were included in the study.

Exclusion criteria: Nursing and medical students were excluded from the study.

Methodology

The HH adherence rate/compliance was measured by direct observation method as per WHO HH guidelines [12]. Observations was done by trained, non participating and neutral person who was familiar with the concept of the WHO's five moment of HH. The observer observed the care activity and counted the HH opportunities generated and determined the proportion being met by appropriate HH actions like hand wash or hand rub. Each observation session lasted at least for 30 minutes. Total six sessions were done (3 pretraining and 3 post-training).

The HCWs of ICU and NICU were included (in ICU: four Doctors, six nursing staff and three housekeeping staff, in NICU: three doctors, six nursing staff and three housekeeping staff). HCWs are divided in three categories doctors, nursing staff and others which

include housekeeping staff. To prevent the Hawthorne effect study participant were not informed about the objectives of the study.

Detailed HH training was provided to the HCWs of ICU and NICU. Training includes importance of HH, WHO's five moment of HH, methods of HH and different products used to perform HH. Training was given in four batches (one for doctors, two for nursing staff and one for housekeeping staff). Nursing staff and housekeeping staff was trained in regional language. Each training session last for one hour.

Parameters used: Calculation of HH adherence rate/compliance [12],

$$\text{HH adherence rate/compliance} = \frac{\text{Number of times HH actions were performed}}{\text{Total number of times HH opportunities generated}} \times 100$$

Pretraining HH adherence rate was calculated for each movement under professional category. HH training is provided to the same staff and after training HH adherence rate was recalculated among the same staff.

STATISTICAL ANALYSIS

The observational data were entered into a Microsoft Excel. Analysis was performed with Excel. HH adherence rate was calculated for each HCWs as per above mentioned criteria. The Chi-square test was used for pre and post-training comparison of HH adherence rate and the differences were considered statistically significant if p-value is <0.05.

RESULTS

Total 416 opportunities were accessed in two sessions {203 pretraining and 213 post-training} among different HCWs of ICU and NICU. Overall HH adherence rate/compliance (pre and post-training) of staff of ICU and NICU is showed in [Table/Fig-1].

Parameters	ICU			NICU		
	Total opportunities	HH followed	HH adherence rate (%)	Total opportunities	HH followed	HH adherence rate (%)
Pretraining	103	42	41	100	52	52
Post training	111	77	69	102	77	75
Chi-square value	17.6935			12.0729		
p-value	0.000026			0.000512		

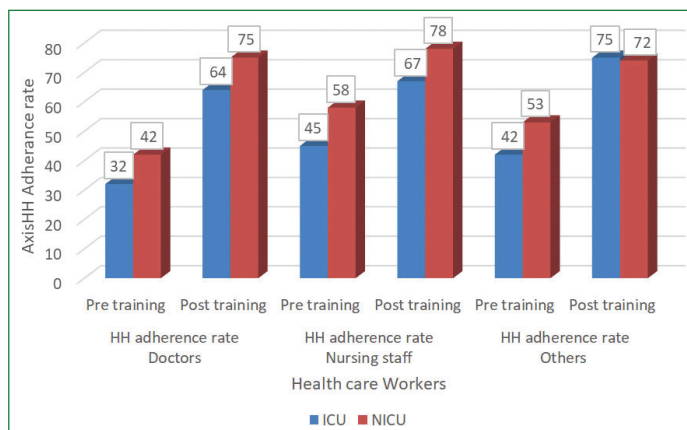
[Table/Fig-1]: Overall Hand Hygiene (HH) adherence rate of HCWs of ICU and NICU.

Pre and post-training HH adherence rate/compliance among different HCWs of ICU and NICU is explained in [Table/Fig-2,3]. Compared to doctors, both pre and post-training HH adherence rate was better in nursing staff {18/40 (45%), 28/42 (67%) in ICU and 18/31 (58%) and 28/36 (78%) in NICU}, respectively [Table/Fig-3]. However, pre and post-training HH adherence rate was nearly same among HCWs of others category {16/38 (42%), 33/44 (75%) in ICU and 23/43 (53%) and 28/39 (72%) in NICU}. Compared to ICU, HCWs of NICU showed improved HH adherence rate.

ICU	Doctors		Nursing staff		Others	
	Pretrain-ing (n=25)	Post-train-ing (n=25)	Pretrain-ing (n=40)	Post-train-ing (n=42)	Pretrain-ing (n=38)	Post-train-ing (n=44)
Before touching	3/7 (43)	5/8 (62)	6/10 (60)	8/12 (66)	4/10 (40)	9/11 (81)
Before procedure	1/3 (33)	2/2 (100)	2/5 (40)	3/5 (60)	1/5 (20)	4/6 (66)
After body fluid exposure	1/2 (50)	2/4 (50)	3/5 (60)	3/5 (60)	6/8 (75)	4/5 (80)
After touching	2/7 (28)	4/7 (57)	2/10 (20)	7/10 (70)	3/5 (60)	8/12 (66)
After touching surroundings	1/6 (16)	3/4 (75)	5/10 (50)	7/10 (70)	2/10 (20)	8/10 (80)
Total	8/25 (32)	16/25 (64)	18/40 (45)	28/42 (67)	16/38 (42)	33/44 (75)

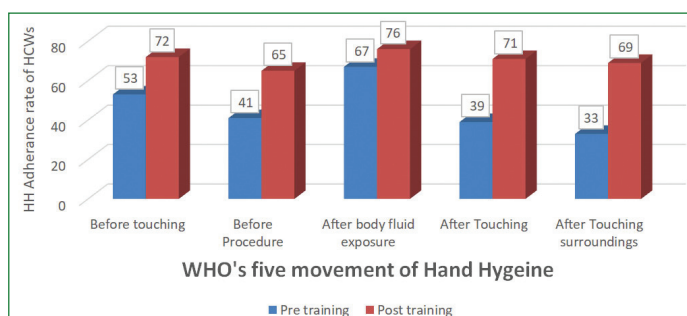
NICU	Doctors		Nursing staff		Others	
	Pretrain-ing (n=26)	Post-train-ing (n=28)	Pretrain-ing (n=31)	Post-train-ing (n=36)	Pretrain-ing (n=43)	Post-train-ing (n=39)
	Before touching	5/8 (62)	8/10 (80)	5/8 (62)	8/10 (80)	5/10 (50)
Before Procedure	2/5 (40)	4/6 (66)	2/5 (40)	3/5 (60)	4/6 (67)	5/5 (100)
After body fluid exposure	2/3 (66)	4/4 (100)	3/5 (60)	6/7 (86)	7/10 (70)	6/8 (75)
After touching	1/5 (20)	4/5 (80)	4/7 (57)	8/10 (80)	6/12 (50)	6/8 (75)
After touching surroundings	1/5 (20)	1/3 (33)	4/6 (66)	3/4 (75)	1/5 (20)	5/8 (62)
Total	11/26 (42)	21/28 (75)	18/31 (58)	28/36 (78)	23/43 (53)	28/39 (72)
Chi-square value	16.5118		9.8785		13.5419	
p-value	0.002		0.0425		0.009	

[Table/Fig-2]: Pre and post-training Hand Hygiene (HH) adherence rate among different HCWs of ICU and NICU in respect to WHO's five movement of Hand hygiene.



[Table/Fig-3]: Pre and post-training Hand Hygiene (HH) adherence rate among HCWs.

Pre and post-training HH adherence rate was highest in after body fluid exposure movement. However, least HH adherence rate pretraining was with movement 5 (after touching patients' surroundings) and post-training was with movement 2 (before procedure) [Table/Fig-4]. Preferred method for HH was hand rub. Pre and post-training it was used in {84/94 (89%) and 136/154 (88%)}, respectively.



[Table/Fig-4]: Hand Hygiene (HH) adherence rate of HCWs in respect to WHO's five movement of Hand hygiene.

DISCUSSION

In this study, authors have followed the gold standard direct observation method to measure the HH adherence rate. Direct observation method can assess all HH opportunities and HH technique. It also provides opportunity to give immediate feedback to HCWs. It also allows observers to identify other infection control opportunities and plan accordingly. Though observation method is considered as gold standard, still it has some disadvantages, like it requires lot of time and energy of the observer and captures only

a small proportion (<1-3%) of all HH opportunities. It frequently excludes night shifts and weekend duties of the HCWs.

Different methods are used in various studies like Shah R et al., used video surveillance to measure HH compliance [9]. Marra AR et al., compared 3 different methods, observational method, product use method, and electronic surveillance to calculate overall rate HH adherence rate [13]. Knowledge, attitude, and practice of HH among medical and nursing students were assessed by Nair SS et al., in a tertiary care centre of Raichur [14]. Pretraining low HH adherence rate 42/103 (41%) was observed in ICU. A systematic review done by Erasmus V reported low HH compliance (30-40%) among ICU from different countries [15].

This study observed a post-training significant improvement of HH compliance of HCWs of ICU {42/103 (41%), to 77/111 (69%)} and NICU {52/100 (52%) to 77/102 (75%)} (p-value:<0.05). A study conducted by Chavali S et al., observed a high HH compliance rate as a result of continuous training of HCW [6]. Similarly, over a period of three years, improvement of the HH compliance (from 48-66%) was observed by Pittet D et al., [16]. Compared to doctors nursing staff had better HH adherence rate. Similar finding was observed by Randle J et al., [17]. On the other hand, HH compliance was better with doctors in a study conducted by Sharma S et al., [7].

Nurses have the most frequent patient care interactions, and thus more opportunities to practice HH. It is important to identify and understand various factors which affect nurses' HH compliance. At Institutional level: Safety culture and familiarity with HH programme which includes periodic training and feedback. At the individual level, one's personal ability to manage stress, communication skills, and being confident in one's self as a nurse-leads to increased/improved HH adherence rate. Pre and post-training HH Adherence rate was noted highest for movement 3 (after body fluid exposure) and least for movement 5 (after touching patient's surroundings). A study by Chavali S et al., observed a very high HH compliance for moments 3 and 4 (93% and 91%, respectively) [6].

The HH is a great way to prevent infections. "The fight against antibiotic resistance is in your hands" is the slogan of World HH day 2017, led by the WHO. It focuses on importance of good infection prevention and control practices like HH and prevention of antibiotic resistance. Cleaning your hands takes 20 seconds, but developing new antibiotics takes years. WHO's key home message to IPC (Infection Prevention and control) leaders: "Implement WHO's Core Components for infection prevention, including HH, to combat antibiotic resistance". WHO also emphasised policy-makers: "Stop antibiotic resistance spread by making infection prevention and HH a national policy priority [18].

Limitation(s)

The systematic error occurs by variations in the observation method. To overcome this a single, trained, unbiased staff was appointed to follow observation method. Another limitation was observation bias: (Hawthorne effect), improvement in performance due to the awareness of being observed by someone. To prevent the Hawthorne effect study participant were not informed about

the objectives of the study. Introduction of systemic error due to selection of time and setting for which the observation occurs which was minimised by randomly choosing observation time of the day, and type of HCW to be observed.

CONCLUSION(S)

Index study concluded that HH training improved HH compliance of HCWs and sensitise the staff regarding the importance of best clinical practices. Infection control team initiatives like, periodic training, supervision and feedback of HCWs could be useful methods to improve HH compliance.

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