



HAND HYGIENE- KNOWLEDGE, ATTITUDE AND PRACTICES IN A PEDIATRIC TERTIARY CARE HOSPITAL: A TIME SERIES ANALYSIS

Healthcare

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ABSTRACT

Introduction: Worldwide, healthcare associated infections (HCAI) constitute a serious problem. Healthcare professionals (HCW) need to be knowledgeable about HIPC (Hospital Infection Prevention & Control) procedures like hand hygiene (HH). The purpose of this study is to evaluate the baseline level of Knowledge, Attitude, and Practises [KAP] and the impact of intervention, which includes various Teaching Learning Activities [TLA] regarding HH among HCWs in a paediatric tertiary care hospital. **Methodology:** 95 HCWs, including physicians, nurses, and other healthcare professionals that assist in patient care, participated in a 16-month prospective interventional trial. An objective questionnaire was used to evaluate knowledge and attitude towards HH, and an android-based Speedy Audit app was used to evaluate HH practises. The intervention took the form of didactic lectures, role plays, one-on-one conversations, and teaching aids like posters and PPTs. Pre and Post intervention comparisons were made regarding KAP about HH. **Results:** In pre-intervention study, major lacunae were identified in areas related to KAP. Post-intervention significant improvement seen in these areas:

1. Knowledge- Hand washing and hand rubbing are recommended to be performed in sequence pre-TLA- (45.2%) post-TLA - (65.2%) & Minimal time needed for HH with soap & water- pre-TLA- (46.2%) post-TLA- (77.8%)
2. Attitude (Favourable)- Emergencies and other priorities make HH more difficult at times- pre-TLA- (15.7%) & post-TLA- (32.6%)
3. Practices- HH Duration- pre-TLA- 73.4% was improved to 82.3% post-TLA & Missed opportunities- pre-TLA- 45.5% reduced to 29.2% post-TLA.

Conclusion: TLAs have significant impact on HH for HCWs & these should be held regularly by Infection control team for HCWs.

KEYWORDS

Hand Hygiene, Knowledge, Attitude & Practices, Health Care Workers, Infection Control, Hospital Acquired infection

INTRODUCTION

The greatest concern today is the growth of antibiotic resistance and healthcare-associated infections (HAIs), particularly in low- and middle-income countries (LMIC) (Allegranzi et al., 2011) At least 10% of hospitalised patients in industrialised nations and at least 25% in underdeveloped countries, according to the literature currently in circulation, develop HAIs. Hospital stays, financial burden, morbidity, and death are all exacerbated by HAIs. Due to a lack of awareness, knowledge, unsanitary circumstances, inadequate HH practises, and inadequate training about infection prevention given to medical staff, HAIs are on the rise in underdeveloped countries (Kamunge, 1013; Alemayehu E, 2005; Curtis, Danquah, & Anguer, 2009; Yallew, Kumie, & Yehuala, 2017)

HAIs are not present at the time of admission; instead, patients acquire them while receiving care in a healthcare institution. Healthcare professionals (HCW) are at the forefront of HCAI transmission and acquisition. They need to be knowledgeable about HIPC Practises because doing so would cut down on infection spread and lower expenses, morbidity, and death associated with treatment (Kamunge, 1013; Rasslan et al., 2012; Rosenthal, Guzman, Migone, & Crnich, 2003; Rosenthal et al., 2015). HCWs contribute to the spread of these diseases by using contaminated hands. Hand hygiene (HH), whose K.A.P. [Knowledge, Attitude, Practises] are shared by all HCW across all cadres, is the best IPC strategy (Boyce, Pittet, Healthcare Infection Control Practices Advisory, & Force, 2002; Fouad & Eltaher, 2020; Priya, Krishnan, Jayalakshmi, & Vasanthi, 2015; Saito et al., 2017). By proving that washing hands with an antiseptic solution between patient encounters may prevent the spread of contagious diseases more effectively than simply wiping them with soap and water, Ignel Semmelweis pioneered the concept of hand

hygiene and antiseptics (Pittet, 2005).

The incidence of HAIs can be significantly reduced by practising proper hand hygiene (HH), which has been identified as the single most important and affordable strategy of limiting these illnesses and regulating the emergence of antibiotic resistance. This is because HCAI transmission rates in hospitals can be significantly reduced by strict HH compliance, which lowers the rates of pathogen acquisition on hands. The World Health Organisation (WHO) recommends using the "Five Moments for Hand Hygiene" concept and the multimodal "Clean Care Is Safer Care" strategy: (1) before touching a patient; (2) before aseptic procedures; (3) after risk of body fluid exposure; (4) after touching a patient; and (5) after touching patients' surroundings. (WHO guidelines on hand hygiene in health care. 2009)

The current COVID-19 epidemic has caused a paradigm shift in IPC practises. After the COVID-19 pandemic, studies on HH compliance have not yet started in paediatric settings. The purpose of the current study is to ascertain the KAP of HCW at PGICH, NOIDA regarding HH. The results of this study will serve as the basis for establishing, sustaining, and expanding HIPC Practises to enhance healthcare.

Therefore, the purpose of the study was to determine how interventional practises during the COVID-19 Pandemic affected baseline knowledge, attitude, and HH practises at a Super Specialty Paediatric Healthcare Facility. The study's objectives were to evaluate the baseline level of KAP about HH among HCWs and to carry out an intervention arm with various types of Teaching Learning Activities (TLA) in the OPD, ICU, Emergency, and Wards. The study's assessment of area-specific HH KAP compliance was one of its secondary goals.



Fig 01: Moments of Hand Washing as Per WHO

(References: <https://www.who.int/> (accessed on 18th May 2023))



Fig 02: Steps of Hand Washing as Per WHO

(References: <https://www.who.int/> (accessed on 18th May 2023))

Methods

Ethical Approval

The Department of Microbiology at the Post Graduate Institute of Child Health in Noida, India, carried out the research after receiving the required ethical approval from the Institutional Ethics Committee and having it approved by the Central Drugs Standard Control Organisation (CDSCO), Government of India. According to the rules of CDSCO and ICMR, Government of India, informed written consent was obtained from the participant before undergoing any study-related procedures from May 2021 to October 2022. Patients who were being cared for by doctors (faculty and residents), staff nurses, technical personnel, attendants, and housekeeping staff were included in this study.

Participants who were unwilling to engage, those who would participate in either the pre- or post-evaluation phases but not both, those who were likely to discontinue the study, and administrative employees (MRD, lab staff) who were not directly involved in patient care were excluded from the study.

Sample Size Calculation

According to the existing literature, there will likely be a 20% change in HH practises between pre- and post-intervention. The Chi Square Test was used to estimate the sample size. The sample size comes out to be 94 when you take into account the baseline percentage of hospital staff members who can accurately show the Five Moments and Six Steps of hand hygiene and the ability to detect a 20% change in this with a power of 80% and confidence level of 95%. 95 HCW, rounded up, with an additional 20% dropout rate. The sample size was calculated as a percentage of the total population. Target population consisted of 13 doctors, 67 paramedics, and 15 ancillary employees, with a 5% dropout rate. Random selection had been used to choose the subjects from each grouping. The participants in both arms were the same. Two groups had been formed, not at random. It used a Time Series Design to compare the same group's pre- and post-intervention data.

Questionnaire Based Study To Assess Knowledge And Attitude On HH

KAP of HCWs towards HH Practises was evaluated using an objective (bilingual) questionnaire. Through a review of the literature and discussions with specialists in infection control, the questions were put together. Best practises from the CDC and NHSN as well as WHO recommendations for preventing hospital acquired infections were included in the questions' content (<https://www.cdc.gov/nhsn/pdfs/>

psmanual/psmanual_current.pdf; <https://www.who.int/teams/integrated-health-services/infection-prevention-control>). Daily Rounds were conducted before and after the intervention to evaluate HH Compliance in accordance with the Speedy Audit App.

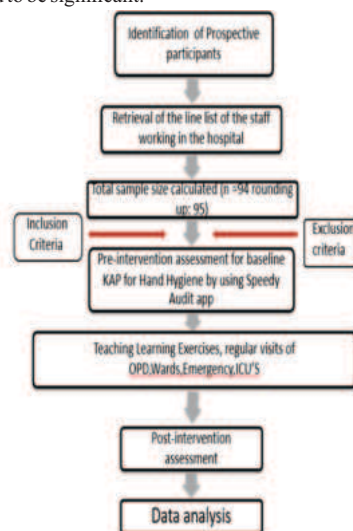
A topic-specific questionnaire was utilised to gauge participants' prior and post-intervention knowledge and attitudes on HH. All HCWs can use the questions because they were kept simple and fundamental. The answers were of an objective kind. Using a self-administered questionnaire, suggestions for hand hygiene from the CDC and experts were taken into consideration. Knowledge evaluation, attitude evaluation, and practise evaluation were its three subheadings. Twenty-five questions were used to gauge knowledge, including multiple-choice and "true" or "false" questions. Ten sentences that asked respondents to indicate whether they agreed or disagreed were used to gauge sentiments. Practise was assessed using the Speedy Audit app, an Android-based tool.

The Educational Programs Were Conducted:

Following the gathering of baseline KAP data, the following TLAs were carried out over a period of four months: Posters describing HH and HIPC procedures (Through the HICC), Self, ICO, and ICN; daily interventions in OPDs, wards, and ICUs; discussions about proper HH; WHO Hand Hygiene Day: Role Play and Skit (5 May 2022); and dissemination of teaching resources (Hospital Website and during Didactic Lectures). Other events include one-on-one conversations with people who did not attend TLAs.

Statistical Analysis

The statistical calculations will be performed using Epi Info. Before and after the intervention, the proportion of subjects properly showing each of the six hand hygiene steps was compared using the Chi Square Test. All tests were two-tailed, and a significance level of less than 0.05 was regarded to be significant.



Flow Diagram Of The Study

RESULT

The Study was conducted at PGICH, Noida which is a tertiary care paediatric hospital, between May 2021 to October 2022. The study included a total of 95 participants, including 13 doctors, 67 nurses, 15 ancillary staff. [FIG-03] 20 HCWs of Paediatric Medicine, 10 from Paediatric Surgery, 4 from Gastroenterology and 15 HCWs from Haemato-Oncology Department (PHO), 20 from PICU, 9 from NICU and 17 HCWs from Emergency/Triage had participated in our study. [FIG-04] Nearly 74 individuals out of 95, including 10/13 Doctors (76.9%), or 55/67 nurses (82%), or, and 9/15 ancillary staff (60%), had attended previous training formal instruction in HH. [FIG-05]

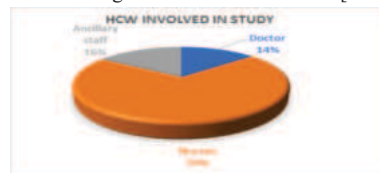


Fig 03: HCWs Involved in Study

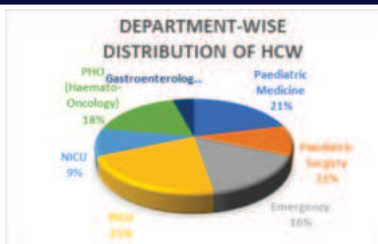


Fig 04: Department-wise Distribution of HCWs

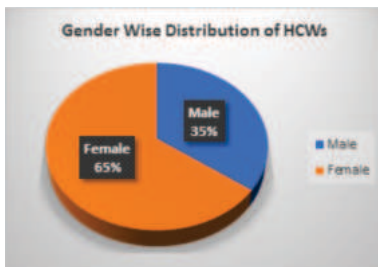


Fig 05: Gender Wise Distribution of HCWs

Baseline Knowledge of HCWs On Hand Hygiene:

Table- 01: Responses of HCWs about Knowledge & Major (<50%) and Minor Deficit Areas(>50-80%)

S.no	QUESTIONNAIRE REGARDING KNOWLEDGE	PRE-TLA		POST-TLA	
		Correct	Incorrect	Correct	Incorrect
1	Which is the main route of cross-transmission of potentially harmful germs between patients in a health care facility?	87	13	92	8
2	What is the most frequent source of germs responsible for healthcare-associated infections?	88	12	93	7
3	Which of the following is the Best HH actions that prevents transmission of germs to the patient?	91	9	95	5
4	Before touching a patient is a Moment for Hand Hygiene	91	9	95	5
5	Immediately after a body fluid exposure is a Moment for Hand Hygiene	88	12	93	7
6	After exposure to the immediate surroundings of a patient is a Moment for Hand Hygiene	88	12	93	7
7	Immediately before a clean/asceptic technique is a Moment for Hand Hygiene	92	8	96	4
8	How many moments for hand hygiene are defined by WHO	90	10	94	6
9	Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true / false?	88	12	93	7
10	Hand rubbing is more rapid for hand cleansing than hand washing	84	16	89	11
11	Hand washing and hand rubbing are recommended to be performed in sequence	84	16	89	11
12	Hand sanitizer is more effective against germs than hand washing	80	20	84	16
13	What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?	88	12	93	7
14	What is the minimal time needed for Soap and Water to kill most germs on your hands?	84	16	89	11
15	Which type of HH methods is required in the following situations?	88	12	93	7
16	Before Touching a patient	88	12	93	7
17	Before giving an injection	88	12	93	7
18	Before emptying a bedpan	85	15	90	10
19	After removing examination gloves	84	16	89	11
20	After making a patient's bed	84	16	89	11
21	After visible exposure to blood	81	19	86	14
22	Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?	92	8	96	4
23	Wearing a jewelry	92	8	96	4
24	Damaged skin	91	9	95	5
25	Artificial fingernails	82	18	86	14
26	Regular use of a hand cream	56	44	60	40
27	Wearing Gloves is a Good Method to Prevent Transmission of germs	88	12	93	7
28	Use of Mobile Phones While taking care of patients does not transmit germs in the hospital	82	18	86	14

Results of Questionnaire based assessments on baseline knowledge of HCWs on HH in our study are shown in Table- 01. In our study, Majority (>90%) of HCW's were aware about the basic knowledge of HH & moments for HH, defined by WHO. Majority were aware that either Hand washing or Hand rubbing should be done before touching patients (94.7%), administering an injection (90.5%), emptying a bedpan (89.4%), after taking off exam gloves (88.4%) and making the patient's bed (88.4%). Majority were aware that Hand washing with soap and water should be preferred as a method of HH after coming into contact with blood (95.7%). Majority knew that, they must avoid wearing jewellery (96.8%), must avoid working with damaged skin (95.7%), must avoid artificial fingernails (96.8%) during their work and wearing gloves is a good method to prevent transmission of germs (92.6%). However, 12.7% HCWs responded that use of mobile phones while taking care of patients, does not transmit germs in the hospital. [Table-01]

In our study, we found that, there were some major (<50%) and minor deficit areas (>50-80%) in knowledge of HCWs about HH:

Major deficit Areas in Baseline Knowledge about HH (<50% correct response) (Table 02): 1- Of all respondents, only 45.2% were aware that alcohol-based hand rub and soap and water should not be performed in sequence for HH. Only 53.8% doctors, 46.2% Nurses and 33.3% ancillary staff had knowledge in this area. 2- Only 46.3% of the HCWs were aware that minimal time needed for soap and water to kill most germs on their hands, is 40 seconds. Only 38.4% doctors, 52.2%

nurses and 26.6% ancillary staff were having knowledge in this area of major deficit ($p < 0.05$) [Table-02].

Minor Deficit Area (>50-80% correct response) in Knowledge about Hand Hygiene: Only 67.3% HCW's were aware of that, hand rubbing is more rapid for hand cleansing than hand washing. Doctors (84.4%) were aware of this fact, but only 59.7% nurses and 66.6% ancillary staff knew that. Only 58.9% HCW's were having knowledge, that minimal time needed for alcohol-based hand rub to kill most germs on hands is, 20 seconds. Again 76.9% of doctors were aware of this fact, but only 58.2% nurses and 46.6% ancillary staff knew about this. 58.9% of them, knew that they must avoid regular use of a hand cream during work. Only 53.8% of doctors, 61.1% nurses and 53.3% ancillary staff were aware about this deficit area. [Table-03]

Table-02: Major Deficit Areas in Baseline Knowledge about HH

KNOWLEDGE DEFICIT AREAS											
Hand washing and hand rubbing are recommended to be performed in sequence											
DOCTOR			NURSES			ANCILLARY STAFF			Total		
Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value
7(53.8%)	10(76.9%)	0.003	3(46.2%)	4(60.6%)	0.04	3(53.3%)	4(66.6%)	0.04	43(45.2)	62(65.2)	0.041
Q- What is the minimal time needed for Soap and Water to kill most germs on your hands?											
5(38.4%)	9(69.2%)	0.019	3(52.2%)	5(75.9%)	0.001	4(26.6%)	6(33.3%)	0.002	44(46.3)	74(77.8)	0.032

Table-03: Minor Deficit Areas (>50-80%) in Knowledge about HH

Minor Deficit Area (>50-80%)											
DOCTOR		P-Value	NURSES		P-Value	ANCILLARY STAFF		P-Value	Total		P-Value
Pre-T	Post-T		Pre-T	Post-T		Pre-T	Post-T		Pre-T	%Post-T	%
Hand rubbing is more rapid for hand cleansing than hand washing											
11(84.4)	12(92.3)	0.04	40(59.7)	59(88)	0.01	10(66.6)	13(86.6)	0.03	54(57.3)	84(88.4)	0.001
What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?											
10(76.9)	12(92.3)	0.03	39(58.2)	50(83.5)	0.0018	7(46.6)	9(60)	0.04	54(58.9)	77(80.5)	0.003
Regular use of a hand cream											
7(53.8)	11(84.6)	0.004	41(61.1)	50(83.5)	0.03	8(53.3)	11(73.3)	0.04	59(58.9)	70(72.2)	0.01

Attitude of HCWs Towards Hand Hygiene:

In our study, most of the HCWs of our institute had a favourable attitude for HH. More than 80% of HCWs claimed that they adhere to correct HH practices at all times (89.4%), have sufficient knowledge about HH (86.3%), feel frustrated when others omit HH (81%), feel frustrated when they, themselves omit HH (84.2%) and adhering to HH practices is easy in the current set up (85.2%). However, only 15.8% HCWs agreed that even in emergency they are able to adhere to HH. 84.2% of the HCWs responded that emergencies and other priorities make HH more difficult for them at times. [Table-04]

Table-04: Responses of HCWs about Attitude & Major (<50%) and Minor Deficit Areas (>50-80%)

S.no	QUESTIONNAIRE REGARDING ATTITUDE	PRE-TLA		POST-TLA	
		Favourable	%	Favourable	%
1	Do You adhere to correct HH practices at all times	88	89.4	92	92.8
2	Do You have sufficient knowledge about HH	82	86.3	88	90.6
3	Do You have more important things to do than HH	60	63.1	65	66.7
4	Emergencies and other priorities make HH more difficult at times	15	15.7	30	30.6
5	Wearing gloves reduce the need for HH	88	89.4	92	92.8
6	I feel Frustrated when others omit HH	77	81	88	89.4
7	I am reluctant to ask others to engage to HH	49	50.5	55	56.3
8	Newly qualified staff has not been properly instructed in HH in their training	68	70.8	75	76.6
9	I feel Frustrated when I omit HH	80	84.2	88	90.6
10	Adhering to HH practices is easy in the current set up	81	84.2	84	87

Table-05: Major Deficit Areas (<50%)

ATTITUDE DEFICIT AREAS											
Emergencies and other priorities make HH more difficult at times											
DOCTOR			NURSES			ANCILLARY STAFF			Total		
Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T (%)	Post-T (%)	P-Value
7(53.8%)	9(69.2)	0.04	5(7.4)	17(25.3)	0.03	3(20)	5(33.3)	0.04	15(15.7)	31(32.6)	0.001

Table-06: Minor Deficit Areas (>50-80%)

Minor Deficit Area (>50-80%)											
DOCTOR			NURSES			ANCILLARY STAFF			Total		
Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value
Do You have more important things to do than HH											
9(69.2)	11(84.4)	0.03	43(64.1)	50(83.5)	0.001	8(53.3%)	9(60)	0.04	60(63.1)	80(84.2)	0.03
Wearing gloves reduce the need for HH											
10(76.9)	12(92.3)	0.001	49(73.1)	59(88)	0.03	7(46.6)	9(60)	0.03	66(69.4)	80(84.2)	0.04
I am reluctant to ask others to engage to HH											
11(84.4)	12(92.3)	0.04	50(74.6)	61(91)	0.04	8(53.3%)	10(66.6)	0.04	65(72.6)	83(87.3)	0.04
Newly qualified staff has not been properly instructed in HH in their training											
12(92.3)	12(92.3)	0.11	41(61.1)	61(91)	0.004	5(33.3)	8(53.3%)	0.04	58(61)	81(85.2)	0.002

Major Deficit Area (<80%) –

Out of total 189, 86 (45.5%) hand hygiene opportunities were totally missed the by HCWs. Out of total 189 opportunities, HH was

performed on only 103 (54.4%) opportunities, by HCWs. Out of 75 opportunities, 26.6% of HCWs, had washed their hands with soap and water, less than 40 Sec. Only 46.6% HCWs followed all steps of HH recommended by WHO. [Table-05]

Minor Deficit Area (>50-80%)-

Only 63.2 % HCWs responded that HH is more or equally important than other things, however 36.8% HCWs responded that they have more important things to do than HH. [Table-06]. 30.5% responded that wearing gloves reduce the need for HH. 27.3% responded that they are reluctant to ask others to engage to HH. 38.9% responded that newly qualified staff has not been properly instructed in HH in their training.

Table-07: Major Deficit Areas (<80%) of Practices:

	PRACTICE DEFICIT AREAS (<80%)									
	DOCTOR			NURSES			ANCILLARY STAFF			Total
	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	Pre-T	Post-T	P-Value	
Total Opportunities	26	26		134	133		29	29		189
Missed HH	10(38.5)	9(34.6)	0.003	5(37.3)	5(37.6)	0.04	1(3.4)	1(3.4)	0.03	15(7.9)
Total HH	16(61.5)	17(65.4)	0.03	129(96.7)	128(96.4)	0.002	28(96.6)	28(96.6)	0.002	174(92.1)
Washed less than 40 sec	10(38.5)	11(42.3)	0.03	10(7.5)	11(8.3)	0.04	7(24.1)	6(20.7)	0.04	23(12.1)
Followed all steps of HH	11(42.3)	13(50.0)	0.04	10(7.5)	11(8.3)	0.02	11(37.9)	11(37.9)	0.04	32(16.8)

Post-Intervention:

Post-intervention, we found in our study, there was significant improvement in major and minor deficit areas related to Knowledge, Attitude and Practices of HCWs as depicted in [Table-2-6,7].

Table-08: Knowledge of HCWs (Area-Wise) in Deficit Areas (<80%)

AREA WISE KNOWLEDGE	Pre-Intervention		Post-Intervention		P-Value		Total	
	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention
Handwashing is an essential part of infection control	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water is recommended for all healthcare workers	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done for at least 20 seconds	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after patient contact	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after touching surfaces	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after eating and drinking	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after using the toilet	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after touching your face	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after touching your clothes	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water should be done before and after touching your hair	100%	100%	100%	100%	100%	100%	100%	100%

Table-09: Attitude of HCWs (Area-Wise) in Deficit Areas (<80%)

AREA WISE ATTITUDE	Pre-Intervention		Post-Intervention		P-Value		Total	
	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention
Do you think hand hygiene is important for infection control?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for patient safety?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for healthcare workers' health?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the community?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the environment?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the economy?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the culture?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the society?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the world?	100%	100%	100%	100%	100%	100%	100%	100%
Do you think hand hygiene is important for the universe?	100%	100%	100%	100%	100%	100%	100%	100%

Table-10: Practices HH by HCWs (Area-Wise) in Deficit Areas (<80%)

AREA WISE PRACTICES	Pre-Intervention		Post-Intervention		P-Value		Total	
	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention
Handwashing with soap and water	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with alcohol-based hand rub	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water for at least 20 seconds	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after patient contact	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after touching surfaces	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after eating and drinking	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after using the toilet	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after touching your face	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after touching your clothes	100%	100%	100%	100%	100%	100%	100%	100%
Handwashing with soap and water before and after touching your hair	100%	100%	100%	100%	100%	100%	100%	100%

DISCUSSION

Since HCWs hands are the main way by which pathogens are passed from them to patients, HH is essential for preventing the spread of infections linked to healthcare. Poor HH compliance is caused by a number of issues, including limited access to sinks, the time required to perform regular hand washing, irritating contact dermatitis connected to frequent exposure to soap and water, heavy workloads, and knowledge gaps among HCWs.

HH compliance is not optimal in clinical settings, and maintaining and boosting HH compliance continue to be significant challenges. The easiest way to determine whether HH policies are being followed is through a first-hand audit (Mathur, 2011). We observed two aspects in our study: the HCWs' complete compliance with the hand hygiene processes and the HCWs' inconsistent compliance with the steps. Following every stage of the WHO-recommended hand rub or hand wash was considered full compliance; executing fewer steps was considered partial compliance (Arthi E 2016). In order to identify the traps, assess the KAP of HCWs on HH practise, and include HH into everyday tasks, we devised and conducted an analysis of a questionnaire. It is necessary to change views and beliefs in order to improve the efficacy of HH practises.

Our baseline study revealed significant knowledge gaps regarding the proper sequence for using hand rub and hand washing, as well as the length of time needed to thoroughly wash hands with soap and water. Minor knowledge gaps included the fact that hand rubbing is a quicker method of hand cleansing than hand washing, that alcohol-based hand rub requires very little time to effectively kill the majority of germs on HCWs' hands, and the necessity of using hand cream on a regular basis. The majority of the ancillary workers showed knowledge gaps. Because the majority of the ancillary personnel work under contracts, it might be. Thus, they have a high attrition rate. Additionally, the

majority of the housekeeping personnel are ignorant. The majority of teaching and learning resources for infection control are in English. In order to increase the ancillary staff's understanding of HH and its significance in reducing the occurrence of HCAs, we must organise more of these lectures and training sessions for them in the local language. Training sessions for HH should be held more regularly and on a greater scale.

The majority of HCWs stated that they adhere to HH practises less due to emergencies. In this area, nurses had the most relaxed attitudes. They have more important things to do than HH, wearing gloves reduces the need for HH, they are reluctant to ask others to engage in HH, and newly qualified personnel have not had adequate training in HH. These are minor attitude deficits. It might be related to heavy workloads on nurses. Focused training sessions should be set up for HCWs in order to enhance their attitude, and the finest healthcare workers should get incentives, certificates, or awards.

In a cross-sectional study conducted in South India by Arthi E. et al. (Arthi E 2016) to evaluate the baseline knowledge of HH in HCWs, it was discovered that the majority of the 140 participants (medical 85%, nursing 76%) had moderate understanding of HH. Only a small number of respondents (medical 3%, nursing 5%) showed good HH behaviours, while most respondents had an unfavourable attitude towards HH (positive attitude - medical 9%, nursing 14%) (Arthi E 2016). However, our study revealed that while the majority of physicians had sufficient understanding of HH, they were less obedient in putting that information into practise. This is comparable to the study by Bukhari SZ et al (2009–2010) [Saudi Arabia] (Bukhari et al., 2011), which found that doctors generally adhere to infection control standards to a lesser extent. This can be due to a physician's lack of time or other administrative tasks. Therefore, we must concentrate on modifying physicians' attitude towards HH compliance through audits using the Speedy Audit App HH or other techniques. Frequent auditing with the free quick audit software can be done to enhance practises. Due to a lack of time, many senior physicians and nursing personnel are also heavily involved in administrative tasks, which may be a hindrance to their drive to always practise HH. It is suggested that in order to ameliorate the situation, training for trainers might be conducted, and Nodal officers could be designated at each level (doctors, nurses, housekeepers, ancillary personnel, or patient care areas) to coordinate the effort. It is possible to locate devoted training personnel. Each department may have its own team made up entirely of HCWs.

Post-Intervention

After TLA, HCWs' knowledge, attitude, and practises significantly improved in both major & minor deficit areas. Imed Harrabi et al. (2015) in Saudi Arabia reported similar results after conducting a pre-post interventional study on 21 nurses and 15 doctors. They discovered that the pilot intervention programme had a positive effect on knowledge, attitude, and compliance with HH. In the male and female wards, respectively, compliance increased by 7.56% and 6.44% as a result of the intervention (Imed Harrabi et al., 2017).

Our study's findings are in line with those of a study by Abdul Mannan Laskar et al. (2016), who conducted a Tri-phasic study on healthcare professionals in two intensive care units at JIPMER in Pondicherry, India. The results for the HH complete adherence rate (HHCAR), HH partial adherence rate (HHPAR), and HH adherence rate (HHAR) of the 6350 opportunities for HH documented were 34.7%, 35%, and 69.7%, respectively. The KAP of the study group significantly improved after the intervention. They came to the conclusion that a coordinated, comprehensive approach involving all types of HCWs can greatly raise HH compliance Anand B Janagond et al. 2019).

Following the implementation of the interventional HH training programme, Mohammed Fouad et al. discovered that compliance with HH increased dramatically, from 30.7% to 45.5% (Fouad M et al 2020) (26). Pre- and post-intervention compliance rates in our study were greater than the total compliance rate of 50.3% previously reported in trials conducted by Bukhari SZ et al (2009–2010), which was 54.4% and 70.7%, respectively (Bukhari et al., 2011). A higher incidence of HCW compliance may be attributable to increased public understanding of IPC procedures during the COVID-19 epidemic.

Area Wise Distribution

In our study, HCWs working in emergency/triage had the most knowledge in these areas, whereas PICU staff had the least. HCWs in

the emergency/triage and PICU units had inadequate attitudes, whereas those in the PHO and NICU units had the best attitudes. NICU HCWs had completed the most HH opportunities in terms of practise, as opposed to Emergency/Triage HCWs, who had missed the most HH opportunities.

The least effective HH practise is found in Emergency/Triage & PICU, which may be a result of the heavy burden that HCWs are under. In a similar manner, 3422 newborns hospitalised to the neonatal Intensive care unit (NICU) in three phases participated in a Pre-Post intervention observational study of the Hand Hygiene programme done by Amit Mukerji et al. from 2009 to 2012. They discovered that HH compliance rates initially decreased in phase II, but improved in phase III after the addition of a long-term sustainability programme (76%, 67%, and 76% in particular, stages I, II, and III ($p=0.01$)). Infection rates were 4%, 6%, and 4%, and 11%, 21%, and 16% over the three periods, respectively, in the general population and in babies weighing less than 1500 g (Mukerji et al., 2013). In a comprehensive evaluation of 96 research, Vicki Erasmus et al. (2009) discovered that there is a reduced compliance rate in areas with high activity levels. Emergency departments have this kind of setting (Erasmus et al., 2010).

The emergency department had a 32% compliance rate with handwashing, according to a previous study by Michelle R. Meengs et al. (Meengs, Giles, Chisholm, Cordell, & Nelson, 1994). It is noteworthy to note that whereas Di Martini et al. reported a baseline compliance of 14% (di Martino et al., 2011), Venkatesh et al. reported a compliance rate of 89% (Venkatesh, Pallin, Kayden, & Schuur, 2011). Due to the fact that both studies included handwashing and hand rubbing as HH practises, a meaningful comparison is however limited (di Martino et al., 2011; Venkatesh et al., 2011). Poor compliance may be caused by the emergency departments' high patient acuity, simultaneous management of several patients, high patient contact rate, and strong time constraints.

In a tertiary care teaching hospital in Delhi, India, Nandwani et al. conducted a three-year prospective interventional study on Bio Medical Waste (BMW) from 2012 to 2014. They discovered that training and interventions—which should be carried out continuously and regularly, followed by periodic review—play a crucial role in improving BMW management (Nandwani, 2010). Similar to this, a significant influence on KAP of HCWs in all departments, wards, and ICUs was observed in our study post-intervention. Our research indicates that we should concentrate on ancillary staff for knowledge enhancement, nurses for attitude, and doctors for HH practise.

The educational intervention in our study was associated with a significant increase (from 54.4% to 70.7%) in the compliance rate of HH practises among HCWs. This result is in line with other studies by A. M. Laskar et al. and Mu et al., which show that educational campaigns boost HH compliance (Laskar et al., 2018; Mu et al., 2016).

The current study has certain limitations. This study had a small sample size ($n=95$). A future investigation on a greater scale could be undertaken, which would strengthen the study's findings. Only HCWs that are directly involved in patient care were included in the current study. In the future, we can expand the population of this study to include other hospital personnel that aren't directly involved in patient care, like laboratory staff, record-keeping (MRD) workers, security personnel, etc. In our study, there was no patient involvement. For better assessment, feedback from patients regarding the HCWs' adherence to HH can be added. Less personal engagement between trainers and HCWs resulted from most TLAs being online or maintaining social distance as a result of the ongoing COVID-19 outbreak. The outcomes of this study, which was conducted in a tertiary care superspeciality paediatric hospital, might not be applicable to a sizable general adult hospital.

CONCLUSION

Our study shown that all types of HCWs in a hospital environment may dramatically increase HH knowledge, attitude, and compliance through a complete, multidimensional interventional approach that includes periodical trainings, questionnaires, and audits. Intervention strategies like the ones we utilised greatly increased knowledge, attitude, and compliance with HH in our institute, and these benefits were seen almost universally across all HCW groups.

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