



HAND HYGIENE KNOWLEDGE, ATTITUDES, AND SELF-REPORTED PRACTICES AMONG MEDICAL AND NURSING STAFF OF A TERTIARY-CARE COVID HOSPITAL

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ABSTRACT **Aim of the Study:** This study aims to evaluate the knowledge, attitude and practices regarding hand hygiene among medical and nursing staff. **Materials & Methods:** This Cross-sectional descriptive study was conducted at SMMCHRI over a period of 6 months. A self-administered questionnaire comprising a standardized World Health Organization Hand Hygiene Knowledge Questionnaire (WHO, revised August 2009) and Likert scales for attitude and practice was employed, using simple random sampling to collect data from healthcare workers in a tertiary-care teaching hospital. **Results:** Out of 592 participants, 469 have responded to the questionnaire who are included in this study. The response rate for this study (469/592) is 79.22%. Most of the respondents were female (66.95%) compared to male (33.05%). The present cross-sectional study recognized significant ($p < 0.05$) knowledge gap amongst the different cadres of health care workers, though greater than 50% of the study respondents, across cadres, demonstrated satisfactory or good knowledge, attitudes and practices. Majority of them agreed that time pressure is the deciding factor in attending hand hygiene training courses. This observation is significant finding in this study, as we recommend incorporation of HH practices in skill labs before handling the models/simulated patient. This practice would enhance their knowledge, attitude and practice of all cadres of HCWs. **Conclusions:** We observed good knowledge, attitude and practice in majority of the respondents but there are few domains in each aspect in which overwhelming percentage had low score, this implies the need for multifaceted and dedicated efforts to rectify this attitude and behavior from early on.

KEYWORDS : Hand Hygiene, KAP Study, Medical Staff, Nursing Staff, Infection Control

INTRODUCTION

Hand washing has received considerable attention during the coronavirus disease (COVID-19) pandemic. It is a simple, primary preventive measure that most people can do independently and is known to be the first line of defense against COVID-19 and its spread during the current pandemic. Therefore, hand hygiene (HH) is one of the most important parts of infection control practices and is the single most important activity that prevents the transmission of microorganisms.^[1]

Evidence from studies has shown that improved hand hygiene has substantially reduced nosocomial infections and cross-contamination of multi resistant infections in hospitals. It has also been shown to be associated with significant decrease in overall rates of HAIs and respiratory infections in particular.

Notable factors impacting compliance with HH are inadequate knowledge, poor attitude, scarcity of resources, lack of role models, high workload and behavioral perceptions, lack of training and feedback. The current pandemic has made handwashing the focus of attention. We must now ensure that this focus in promoting handwashing behaviors since the start of COVID-19 pandemic should continue well even after this outbreak.^[2]

Multiple reports from different countries have shown that hand hygiene compliance rate has been estimated at only 40% by Erasmus et al., 2010,^[3] while the rate of adherence in critical care units was only 46.25% by Bezerra et al., 2020.^[4]

Although this is a simple and lifesaving task, it is not, regrettably, always undertaken.^[5] While previous studies across the country reported the proportion of healthcare workers that reported to 'always' practice hand hygiene in the selected situations varied widely from 40–96% and lower proportions of healthcare providers showed good knowledge of hand hygiene and/or engaged in appropriate hand hygiene practices (46.7% of doctors and 39.5% of nurses).^[6]

Despite evidence and expert opinion that hand hygiene reduces

transmission of potential pathogens or antimicrobial-resistant organisms sustained improvements in adherence to hand hygiene recommendations and proper handwashing technique among health care workers are uncommon, even after educational efforts.

There are several research evidences relating to the issue, but data from our tertiary teaching care have not been evaluated so far. Therefore, it is essential to investigate the current status of our teaching tertiary care hospital to identify the gaps, if any, and promote additional efforts to improve the compliance. As a result, this study will describe a survey that will be undertaken in our local settings and intervention strategies planned based on the results would be more appropriate for us.

This present study was planned to assess the knowledge, perceptions, and practices of healthcare workers (HCWs) regarding HH, and to study the knowledge-practice gap if any.

Aim & Objectives:

This study aims to evaluate the knowledge, attitude and practices regarding hand hygiene among medical and nursing staff.

The objective of the study is

1. To assess the knowledge, attitude and practices regarding hand hygiene among medical and nursing staff of a tertiary care COVID hospital.
2. To compare the knowledge, attitude, and practice between medical and nursing staff of a tertiary care COVID hospital.
3. To recommend appropriate HCW specific strategy based on the identified gaps in knowledge, attitude, and practice.

MATERIALS & METHODS

Study Design: Cross-sectional descriptive study

Study Population: The population selected for this study consist of all medical and nursing staff who are involved in direct patient care at Sri Muthukumaran Medical College Hospital and Research Institute.

Study Period: 6 months

Sampling: Convenience sampling technique

The sample size was calculated using the following equation:

$$n = (z^2 pq) / d^2;$$

$$n = \{1.96^2 \times 0.5 \times (1 - 0.5)\} / 0.05^2 = 384.16 \approx 384$$

where n = number of samples;

z = 1.96 (95% confidence level);

p = prevalence estimate (0.5);

q = (1 - p);

d = precision limit or proportion of sampling error (0.05).

Assuming a 10% non-response rate, a sample size of 423.5 $\approx$ 424 participants was estimated.

Study Group: The population selected for this study consist of all medical and nursing staffs who are involved in direct patient care and have been employed at SMMCHRI for more than one year. It included interns, junior residents, senior residents, nurses and doctors.

Inclusion: All medical and nursing staffs who are interested and willing to participate in the study were included.

Exclusion Criteria: All medical and nursing staffs who are not willing to participate in the study were excluded.

Participation in this study by health-care staff was on voluntary basis. A written informed consent was obtained from each participant and anonymity of the participants was maintained throughout the study.

Study Tools: A self-administered questionnaire comprising standardized WHO Hand Hygiene, Knowledge Questionnaire and attitude and practice questionnaire adopted from a previous study⁷.

WHO Hand Hygiene Knowledge Questionnaire

The scale is a 21-item tool to assess HH knowledge using questions with yes/no and multiple-choice answers regarding the route, source, and prevention of HCAI, along with the best-suited methods of HH in various situations. It includes a short glossary for definitions of terms like hand rubbing, handwashing, etc. for a better understanding of the respondents. Scores above 75% were considered good, 50–74% were considered moderate, and less than 50% were considered poor.

Scales for Attitude and Practice

Attitude toward HH practice, adherence, importance, and priorities, along with self-reported practices, were assessed using the scales adopted from a previous study. Attitude can be defined as a HCW's perception of the importance of HH and the psychological tendency expressed by evaluating HH with some degree of favor or disfavor. These tools employ a Likert scale with five possible responses ranging from 1 (strongly disagree) to 5 (strongly agree).

The attitude toward HH is a 10-item scale, and HH practice is a six-item self-reported scale with each item having a maximum score of 5 for expected response, making total possible scores of 50 and 30, respectively. Scores higher than 75% were considered good, 50–74% were considered moderate, and less than 50% were considered poor.

Method of Collection of Data and Analysis

Questionnaires were given to the participants after obtaining informed consent. Participants were requested to return the questionnaire with responses within a period of one week.

The participants who filled informed consent form were considered to be responders. Those responders who didn't return the questionnaire after two days' duration were considered lost to follow up.

Statistical Analysis

Statistical Methodology

Data were entered into Statistical Package for Social Sciences (SPSS Statistics for Windows Version 18, IBM V 19) for analysis. Data were analyzed using descriptive analysis (means, frequency, percentages, and standard deviation) and chi-square analysis. A P-value of <0.05 was considered significant.

The study was approved by the institutional ethics committee.

RESULT

Questionnaires were distributed to different categories of Health care workers (HCWs) who are in close contact with patients to provide health care. It included Senior residents, Junior residents, CRRI, Doctors and Nurses.

A total of 592 participants (HCWs) were given the questionnaire and enrolled for the study. Out of 592 HCWs, 100 were Junior residents and 100 were SR, 142 were CRRI, 98 were nurses and 152 were Doctors. Out of 592 questionnaires administered, 483 were retrieved and analyzed. Fourteen (14) of them were rejected due to missing responses in all sections. There were total of 469 responders included in our study. The response rate for this study (469/592) is 79.22%.

Demographic Details:

Out of 592 participants, 54 % of Junior residents, 69% of SR, 91.5% of CRRI, 81.58% of doctors and 93.85% of Nurses. Overall, the response rate for this study (469/592) was 79.22% (Table 1). Most of the respondents were female (66.95%) compared to male (33.05%) (Table 2).

Majority of the respondents, at the time of this study were found to be working in Internal medicine department (41.7%), followed by surgical ward (17.91%), pediatric ward (13.21%), OBG (10.02%) (Table 3).

Knowledge About the Main Route of HAI Transmission

89% of all participants identified that unhygienic hands of HCWs were the main route of transmission in HCF. Doctors and Nurses significantly identified properly unclean hands more than CRRI.

However, only 54% of CRRI and 20% of nurses were aware that the main source of germs was from patients. Residents and Doctors observed to have better knowledge in this aspect. There was a significant association (P<0.05) between knowledge of HAI transmission and the profession.

Knowledge About Actions Preventing Transmission of Pathogens to the Patient

In our study, majority of HCWs properly identified that HH before touching patients and immediately before a clean/aseptic procedure (92.7% and 89%, respectively) as actions preventing transmission of pathogens to the patient but poor knowledge (26.4% of HCWs) about the need for HH after exposure to immediate surroundings of a patient. Table 4: shows significant difference with respect to the item - immediately before a clean/aseptic procedure by profession. Overall, CRRI were the least group identifying these measures.

Knowledge About Actions Preventing Transmission of Pathogens to the Healthcare Worker

Similarly, the majority of HCWs immediately after a risk of body fluid exposure and after exposure to the immediate surroundings of a patient (respectively) as actions preventing transmission of pathogens to the HCWs. However, only 50% of them have identified that HH action after touching a patient prevents the transmission. Table 4 shows significant differences in these items by profession.

Alcohol Based Hand Rub and Hand Washing

In our study, 87% were aware that hand rubbing is more rapid for hand cleansing. Table 4 shows no significant differences by profession. Knowledge about handwashing as more effective method was found to be significantly better among the medical staff -doctors (78%) and CRRI (61%) compared to nursing staff (53%). 58% of HCWs properly identified hand rubbing does not cause skin dryness more than hand washing and this knowledge is significantly better among the medical staff (87.5%) than nursing staff (12.5%).

The Minimal Time Needed to Kill Most Pathogens on Hand

Only 65.6% of HCWs properly identified 20 s as the minimal time needed for alcohol-based hand rub to kill most germs on hands. Out of 309 correct responders, 23 were nurses which contributes to 25% of total 92 nursing staffs. Hence nurses were the least group identifying the correct minimal time for HH. Significant differences by profession was found.

Hand Hygiene Method

Majority of HCWs identified the appropriate HH method prior to palpation of the abdomen (81%), before giving injections (55%) and after emptying a bedpan (68%). There was a significant association (P<0.05) between knowledge of appropriate use of HH method and the profession. However, only 42% and 40% of HCWs have identified correct method after removing examination gloves (washing) and after making a patient's bed (rubbing) respectively.

What Should be Avoided to Minimize Colonization

The majority of HCWs properly identified wearing jewelry, damaged skin and artificial fingernails (88%, 88%, and 94 %, respectively) as associated with a likelihood of colonization of hand with harmful germs. There was a significant association (P<0.05) between this knowledge and the profession. Only 27% of Nurses, aware that there is no harm in using hand cream regularly. There was a significant association (P<0.05) between this knowledge and the profession.

Attitude Towards Handhygiene Among the HCWs -Medical and Nursing Staff

Majority of Doctors (75%) and Nurses (71%) thought they had sufficient knowledge about hand hygiene compared to JRs and SRs. The best attitudes were displayed by the nurses as only 21% and 38% of them felt that adhering to HH is difficult due to other important things and emergency situations. More than 50% of HCWs in each category believed that wearing gloves could replace hand hygiene. It was concerning that the lacuna in this domain need to be addressed immediately. Favorable attitude was shown by most of the study respondents towards HH practices.

Practices Towards Handhygiene Among the HCWs -Medical and Nursing Staff

In the practice section, more than 90% of the participants agreed that Infection prevention team have a positive influence on their hand hygiene practices. Missing out HH practice due to forgetfulness is more among the medical staff (60%) compared to the nursing staff (21%). Majority of the respondents in all cadres of HCWs (>90%) agreed that due to time pressure it is difficult to attend HH training

Demographic Profile of HCW

Table 1: Profession Distribution of the Respondent HCW

S.No	Profession	Total	Number of Respondents (n)	Percentage %
1.	Junior Resident	100	54	54%
2.	Senior Resident	100	69	69%
3.	CRRI	142	130	91.5%
4.	NURSES	98	92	93.85%
5.	DOCTORS	152	124	81.58%
TOTAL		592	469	79.22%

Table 2: Gender Distribution of the Respondent HCW

S.No	Gender	Total (n=469)	Percentage (%)
1.	Female	314	66.95%
2.	Male	155	33.05%

Table 3 : Service Distribution of the Respondent HCW

	Department	n=469	Percentage (%)
1.	Internal medicine	196	41.7%
2.	Surgery	84	17.91%
3.	OBG	47	10.02%
4.	ICU	21	4.48%
5.	Emergency	31	6.6%
6.	Pediatrics	62	13.21%
7.	OP Clinic	28	5.9%

Table 4: Comparison of Responses on WHO Knowledge Question-naire Among Medical and Nursing Staff

S.No	Questions (Answers)	JR	SR	CRRI	Doctors	Nurses	P value
Transmission of HAI							
1.	Which of the following is the main route of transmission of potentially harmful germs between patients? (Health care workers hands when not clean)	88%	91%	74%	98%	98%	<0.05-S
2.	What is the most frequent source of germs responsible for health care associated infections? (Germs already present on or within the patient)	70%	79%	54%	84%	20%	<0.05-S
Hand hygiene actions prevents transmission of germs to the patient							
3.	Before touching a patient (yes)	87%	92.7%	93.8%	93.5%	93.4%	NS
4.	Immediately after risk of body fluid exposure(yes)	83%	84%	85%	82%	83%	NS
5.	After exposure to immediate surroundings of a patient (no)	25%	26%	27%	27%	26%	NS
6.	Immediately before a clean/aseptic procedure(yes)	99%	95%	72%	96%	96%	<0.05-S
Hand hygiene actions prevents transmission of germs to the health care worker							
7.	After touching a patient (yes)	44%	60%	64%	70%	71%	<0.05-S
8.	Immediately after a risk of body fluid exposure (yes)	33%	62%	60%	90%	79%	<0.05-S
9.	Immediately before a clean/aseptic procedure (no)	69%	57%	80%	75%	75%	<0.05-S
10.	After exposure to the immediate surroundings of a patient (yes)	80%	84%	95%	90%	79%	<0.05-S
Alcohol-based hand rub and hand washing with soap and water							
11.	Hand rubbing is more rapid for hand cleansing than hand washing (true)	85%	81%	93%	90%	84%	NS
12.	Hand rubbing causes skin dryness more than hand washing (false)	44%	57%	68%	69%	37%	<0.05-S
13.	Hand rubbing is more effective against germs than hand washing (false)	52%	61%	61%	78%	53%	<0.05-S
14.	Hand washing and hand rubbing are recommended to be performed in sequence (false)	29%	40%	62%	70%	36%	<0.05-S
15.	Minimal time needed for alcohol-based hand rub to kill most germs on your hands? (20 seconds)	43%	45%	84%	99%	25%	<0.05-S
Hand hygiene method							
16.	Before palpation of the abdomen (rubbing)	54%	64%	83%	94%	91%	<0.05-S
17.	Before giving an injection (rubbing)	33%	42%	57%	73%	53%	<0.05-S
18.	After emptying a bed pan (washing)	54%	78%	71%	83%	53%	<0.05-S
19.	After removing examination gloves (washing)	54%	43%	45%	51%	17%	<0.05-S
20.	After making a patient's bed (rubbing)	39%	35%	41%	49%	35%	NS
21.	After visible exposure to blood (washing)	76%	74%	66%	86%	51%	<0.05-S
Associated with increased likelihood of colonization of hands with harmful germs							
22.	Wearing jewelry (yes)	90%	82%	94%	92%	75%	0.05-S
23.	Damaged skin (yes)	38%	34%	40%	49%	34%	NS
24.	Artificial fingernails (yes)	96%	85%	93%	99%	93%	0.05-S
25.	Regular use of a hand cream (no)	87%	91%	91%	95%	72%	0.05-S

Fig 1: Good attitude towards handhygiene among the HCW

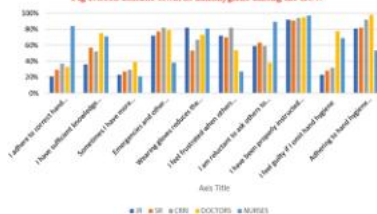


Fig 2: comparison of Good attitude towards HIE among the HCW

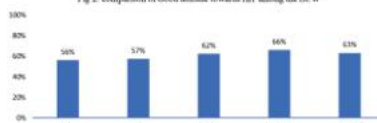


Fig 3: Good Practice of hand-hygiene among HCW

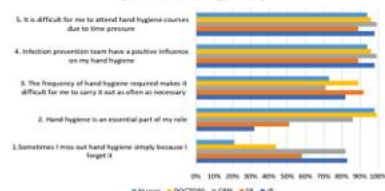


Fig 4: Comparison of good practices among the HCWs



DISCUSSION

HAI, a serious disease burden and has a significant impact on patients and healthcare systems throughout the world. HAIs are among the most common preventable medical complications among patients. Hand hygiene is a single most cost-effective measure to reduce the incidence and spread of HAIs. In spite of being very simple and effective, compliance of health care team members with the recommended handwashing practice remains low. To address this issue, assessment of our hospital healthcare team with reference to their current knowledge attitude and practice towards HH is essential.

In this study, majority of them were females, this could be due to the fact that 92 nurses enrolled for the study were females whereas in other cadres of HCWs there was almost an equal distribution. In spite of that male contributed only 33% of the respondents as majority of them have not returned the questionnaire.

The present cross-sectional study recognized knowledge gap amongst the different cadres of health care workers, though greater than 50% of the study respondents, across cadres, demonstrated satisfactory or good knowledge, attitudes and practices. This satisfying score is consistent with similar study by Subbalakshmi et al., among HCWs in teaching hospital in Chennai, which reported good knowledge among medical staff and nursing staff.^[7] This observation is reassuring, as knowledge has been identified as an important factor influencing HH compliance in another study.^[8]

This study also identified the gaps in their knowledge which is significantly associated with the profession. 89% of all participants identified that unhygienic hands of HCWs were the main route of transmission in HCF. However, only 54% of CRRI and 20% of nurses were aware that the main source of germs was from patients. This finding is in accordance with a study which observed only 45% of doctors and 27% of nurses significantly identified the correct response.^[9,10]

In this study, medical and nursing staff significantly revealed good compliance with correct intention for "WHO five moments of Hand hygiene" with reference to HH actions that prevents transmission to HCWs. This is a concerning finding which implies self-protection rather than patient protection. Supporting this observation, self-protection as the primary reason for performing HH has been reported by Jang T-Het al.,^[11] in his similar study. In contrast Nair et al., observed positive findings over "WHO five moments of Hand hygiene" among medical and nursing staffs which implied self-protection and patient safety.^[12]

Notably, high percentage of nurses wrongly associated handrub with skin dryness (63%) and assumed HH actions are always performed in a sequence (64%). This observation is in concordance with a study conducted in Raichur, India.^[12] In comparison with medical staffs, an overwhelming percentage of nurses (83%) were unable to identify the appropriate method of HH "after removing examination gloves" ($p < 0.05$). Most of nurse's work involve direct contact with the patient for significant duration, it is imperative to have an optimal level of knowledge regarding the use of gloves. Our study finding is alarming as HH compliance was poor when gloves are worn as they believed gloves would provide protection.

Favorable attitude (50%) was shown by most of the study respondents towards HH practices. The best attitudes were displayed by the nurses as only 21% and 38% of them felt that adhering to HH is difficult due to other important things and emergency situations. White et al., and Ghezjelhet al., also reported nurses' positive approach to hand hygiene. However, majority of the residents reported negative attitude towards HH.^[13] This poor attitude in spite of moderate knowledge may be due to lack of experiential training to improve their compliance. This is imperative as another study identified novel methods like germ simulation to illustrate the transmission of bacteria and reported that after these training sessions there was increased compliance to hand hygiene among the students.

In the practice section, more than 90% of the participants agreed that Infection prevention team have a positive influence on their hand hygiene practices. similar findings have been reported have been reported by Feather et al.,^[14] However, majority of them agreed that time pressure is the deciding factor in attending hand hygiene training courses. This observation is significant finding in this study, as we recommend incorporation of HH practices in skill labs before handling

the models/simulated patient^[15]. This practice would enhance their knowledge, attitude and practice of all cadres of HCWs attending skills lab for teaching (SR,Doctors) or learning purposes (JR,CRRI,Nurses).

CONCLUSION

Hand hygiene is the most effective method of preventing transmission of infections. The improved understanding of infection control and hand hygiene among HCWs is expected to play a major role in curbing HAI transmission.

We observed good knowledge, moderate attitude and good practice in majority of the respondents but there are few domains in each aspect in which overwhelming percentage had low score, this implies the need for multifaceted and dedicated efforts to rectify this attitude and behavior from early on.

We have already incorporated HH training for UG and PG as per medical school curriculum, we identified skill lab would be the ideal place where trainees posed to several real-life scenarios shall be instructed to be compliant with HH practices (before handling the models/simulated patient).

This practice would enhance their knowledge, attitude and practice of all cadres of HCWs attending skills lab for teaching (SR,Doctors) or learning purposes(JR,CRRI,Nurses).

Recommendation: Incorporation of HH practices in skill labs before handling the models/simulated patient . This practice would enhance their knowledge, attitude and practice of all cadres of HCWs attending skills lab for teaching (SR,Doctors) or learning purposes(JR,CRRI,Nurses).

Limitations: Self-reported data is a limitation in this study. Also, the study signifies data from one hospital, thus reducing the generalization of results. The study has not evaluated the factors impacting the HH practice in our settings, such as the availability of resources and appropriate infrastructure for recommended HH practice.

Declaration by Authors

Ethical Approval: This study was reviewed and approved by the institutional ethical committee-R.NO-40/Est/2024/Pro.no.34/24th IEC/SMMCHRI/2024.

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Conflict of Interest: The authors declare no conflict of interest.

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