

Awareness of Hand Hygiene in Hospital Set-up for Infection Control: Knowledge-based Questionnaire for Health Care Workers in a Teaching Hospital

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The notion of hygiene is built on the relationship between cleanliness and the maintenance of good health. Hand washing technique is the rubbing together of all parts of the hands, including all the clefts using soap and water. Hand hygiene is the first step in preventing cross-transmission of microorganisms, which can help in prevention of Hospital Acquired Infections (HAIs). The entire world is in fact, emphasizing the importance of hand wash for the prevention of the COVID-19 pandemic. The germs causing infection in a health care setting can be transmitted through contaminated hands. Health care-associated pathogens can be acquired from any source, mainly from infected or draining wounds, patients' skin, aprons they wear, mattresses they use, bedside furniture and other objects in the immediate environment of the patient. Organisms such as *S. aureus*, *Proteus mirabilis*, *Klebsiella* spp., *Acinetobacter* spp., *Enterococci*, play an important role in HAIs. Although hand hygiene procedures are relatively simple, several studies have mentioned that health care workers do not adhere to this properly. Poor hand hygiene compliance has been one of the leading contributory factors to Health Care Acquired Infections (HCAIs). Reasons for low hand hygiene adherence include location of sinks in an inconvenient place, tight work schedule, reluctance as well as lack of role models and not being aware of implementation guidelines. Aim: To analyze the awareness of hand hygiene among health care workers in a hospital set-up for infection control. The goal of the study is to get a better insight of and explore the knowledge and awareness on hand hygiene among health care workers in a tertiary care hospital. Objective: To find out the lacunae in hand hygiene and to formulate and take measures to prevent HAIs and multidrug-resistant pathogens. Methods: The study was done through a self-administered questionnaire. Results: A total of 134 people participated which included 75 doctors (56%), 38 nurses (28.4%), 11 lab technicians (8.2%) and others (7.4%). The overall response was good. Both the nurses and doctors had adequate knowledge about hand hygiene. However, the nurses had better knowledge regarding the steps of hand wash (78.9%) and the disposal of biomedical waste (94.7%). The knowledge about hand hygiene and biomedical waste management was better among nurses and lab technicians. Conclusion: Most health professionals had adequate knowledge about hand hygiene. However, they did not have adequate practice of hand washing which can be initiated with effective training. Antimicrobial soap should be available and should be easily accessible for routine hand wash in all patient care areas to improve hand hygiene and to prevent hospital acquired infections.

Keywords: Hand hygiene, hand washing practice, hospital acquired infection, knowledge.

The word hygiene is derived from the word Hygeia, which refers to the Greek Goddess of health and hygiene. Hand hygiene is defined by the World Health Organization (WHO) as “a general term referring to any action of hand cleansing”, i.e., it is the mode of cleaning one’s hands either with the help of soap and water or with the use of alcohol-based sanitizer in order to get rid of microorganisms, dirt, etc. Hand hygiene is recognized as the leading measure to prevent cross transmission of microorganisms and to reduce the incidence of health care-associated infections.

Hand hygiene, using either alcohol-based hand rub or with soap and water is the most effective method of preventing infections. The use of alcohol-based hand rub is a better way to get rid of transient microorganisms especially in developing countries where there is scarcity of water. If practiced properly, especially between each bed of the patient in a hospital, it can reduce the rate of infection with methicillin-resistant *Staphylococcus aureus*.¹

Holmes and Semmelweis proved that the contamination of the hands of Health Care Workers (HCWs) played a major role in puerperal sepsis.^[2] Transmission of microorganisms through contaminated HCWs’ hands is the most common source of infection in most places and consists of five sequential steps:

- (i) Organisms are present on the patient’s skin, or on inanimate objects in the patient’s environment
- (ii) Organisms transfer to the hands of HCWs
- (iii) Organisms survive for few minutes on HCWs’ hands
- (iv) Hand washing done by soap or sanitizer is inadequate or not done at all, which leads to persistence of the microorganisms in HCW’s hands
- (v) The contaminated hands come in direct contact with another patient or with inanimate objects which in turn will come in contact with the patient.³

Though the Centre for Disease Control (CDC) gradually increased the regulation of hand hygiene practices, particularly in healthcare settings, it was not until 2009 that an international standard for hand hygiene practices was established by the WHO, in the comprehensive Guidelines on Hand Hygiene. In order to reduce the problems related to hand washing, WHO introduced “My five moments for hand washing.” The five moments which have been instructed to health care workers

during patient care are: (1) use of hand wash before you touch the patient (2) before you perform any aseptic and clean procedure (3) after exposure to body fluids (4) after you touch a patient (5) after you leave the surroundings of the patient.⁴

The guidelines concerning hand hygiene focus on the aspects of hygiene as the act of cleaning, focusing on the reduction in bulk microbial load, rather than the reduction in transmission of infection.⁵ Moreover, hand hygiene not only reduces the incidence of nosocomial infections but also the burden associated with these infections (prolonged hospital stay, long-term disability, increased antimicrobial resistance, massive additional financial burden on patients and their family, and excess deaths).⁶

If we analyze the circumstances of handwash, we need to perform hand wash before we arrive at work, after arrival at work, before leaving from the work place, after reaching home, in between client contacts, when the hands are soiled, after the removal of gloves, before eating, after handling excretion of body fluids (urine and feces), after handling blood samples, before and after performing invasive procedures and after handling contaminated instruments.

The duration of time required for handwash depends on the circumstances. While using an alcohol-based hand rub, we require 10 to 15 seconds to remove transient flora from the hands. When we are using soap and water to wash soiled hands, 40 to 60 seconds are required. High risk areas, such as contact with infected patients or surgical hands may require even 2 minutes.⁷

Handwashing is the easiest and most effective method to prevent infection which the entire world is also stressing on now, to protect everyone from the COVID-19 pandemic. However, about 50% of HCAs occur mainly due to the hands of health care providers (HCPs).⁴ Though hand hygiene procedures are relatively simple, studies have shown that the compliance among healthcare workers is not very encouraging. HAIs due to poor hand hygiene are the prime reasons for increasing morbidity, mortality and healthcare costs which the current pandemic, COVID-19 is also facing.

Objective

To find out the lacunae in hand hygiene and aim to formulate and take preventive measures

that can prevent HAI and multi drug resistant pathogens.

Methods

The study was done in a tertiary care teaching hospital for a period of three months (February 2020 - April 2020). The study was done using a self-administered questionnaire. The questionnaire was given to all health care professionals working in the hospital, which included doctors, nurses, and lab technicians. Ethical clearance was obtained from the institution to carry out the study.

Study Design

A descriptive-based cross-sectional study to analyze the knowledge and practice of hand washing among health care workers at ACS Medical College and Hospital, Chennai, Tamil Nadu, India.

Study population

The population selected for this study consisted of all the health care workers at ACS Medical College and Hospital comprising nurses, doctors and laboratory technicians.

Inclusion Criteria

All health care workers who were interested and willing to participate in the study were included.

Exclusion Criteria

All health care workers who were not willing to participate in the study were excluded.

Statistical Methods

Statistical analysis was done with the response from the questions answered by the population. Descriptive and inferential statistical analysis was carried out in the study. Chi-square/Fisher Exact test was used to find the significance of the study parameters on a categorical scale between two or more groups. Non-parametric setting was done for Qualitative data analysis. Fisher Exact test was used when cell samples were small.

Statistical software

Statistical software SPSS 22.0 and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel was used to generate tables etc.

RESULTS

The analysis was done through a knowledge-based questionnaire. A total of 134 people participated, comprising 75 doctors (56%), 38 nurses (28.4%), 11 lab technicians (8.2%) and 10 others (7.4%). (**Table 1**)

This study was carried out to evaluate the awareness about hand washing techniques among health care workers. Most of them had adequate knowledge. However, there were variations in the steps of hand wash while washing their hands and the time required to wash hands using soap and water.

According to WHO guidelines, there are 6 steps in hand washing technique, and it takes 40-60 seconds for hand wash when you are using soap and water. While using alcohol-based hand rub, you require 20-30 seconds for hand wash to remove

Table 1. No. of participants

Profession	No. of subjects	%
Doctor	75	56.0
Lab Technician	11	8.2
Nurse	38	28.4
Others	10	7.5
Total	134	100.0

Table 2. Assessment of hand wash steps in health care workers

How many steps are there in the hand washing procedure as per WHO guidelines?	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• 5 steps	10(13.3%)	2(5.3%)	0(0%)	4(40%)	16(11.9%)	<0.001**
• 6 steps	31(41.3%)	30(78.9%)	5(45.5%)	3(30%)	69(51.5%)	
• 9 steps	14(18.7%)	6(15.8%)	2(18.2%)	3(30%)	25(18.7%)	
• 10 steps	20(26.7%)	0(0%)	4(36.4%)	0(0%)	24(17.9%)	

transient flora from hands. In our observation, the nurses were better in knowledge about hand washing steps (78.9%) than doctors (41.3%) and lab technicians (45.5%). This may be because hand hygiene training is imparted more among nurses than the doctors. (Table 2)

It is widely known that effective hand wash plays a role in preventing HAIs. As many as 80 per cent of individuals retain disease-causing bacteria even after effective hand wash. So, it is important to know the time taken to wash hands to prevent infection.

For the question regarding the time taken for handwash, doctors had a better knowledge than nurses and lab technicians. This might be because they are used to routine hand wash before surgery and before any procedures. Around 35(46.7%)

doctors suggested that it would take 40 to 60 seconds for hand wash when you are using soap and water whereas 15(39.5%) nurses and none of the lab technicians knew the answer. (Table 3)

When asked about the disposal of used gloves, only 31(41.3%) out of 75 doctors mentioned that the gloves should be discarded in a redbin. Meanwhile, 36(94.7%) out of 38 nurses answered that it should be discarded in a redbin, whereas all 11 (100%) lab technicians were clear in discarding gloves in red bins they wear gloves regularly in the lab. (Table 4)

When ungloved hands come in contact with fluids from a wound, it is mandatory to wash hands with soap and water instead of cleaning with an alcohol-based sanitizer. The lab technicians did not have any knowledge about this and there was

Table 3. Assessment of hand wash among health care workers

How long should you wash your hands while washing with soap?	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• 4-6 sec	0(0%)	4(10.5%)	0(0%)	2(20%)	6(4.5%)	<0.001**
• 8-10 sec	4(5.3%)	2(5.3%)	4(36.4%)	2(20%)	12(9%)	
• 10-15 sec	36(48%)	17(44.7%)	7(63.6%)	6(60%)	66(49.3%)	
• 40 – 60 sec	35(46.7%)	15(39.5%)	0(0%)	0(0%)	50(37.3%)	

Table 4. Assessment of biomedical waste management in health care workers

What should be done after using gloves?	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• Discard gloves in blue bin and then wash your hands	3(4%)	0(0%)	0(0%)	0(0%)	3(2.2%)	<0.001**
• Discard gloves in red bin and then wash your hands	31(41.3%)	36(94.7%)	11(100%)	5(50%)	83(61.9%)	
• Discard gloves in yellow bin and then wash wash your hands	41(54.7%)	2(5.3%)	0(0%)	5(50%)	48(35.8%)	

Table 5. Knowledge assessment of PPE (personal protective equipment)

It is absolutely necessary to wear a gown when working with a patient if	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• Blood or body fluids may get on your clothing from a task you plan to perform	68 (90.7%)	32 (84.2%)	11 (100%)	5 (50%)	116 (86.6%)	0.002**
• The patient has AIDS or hepatitis	7(9.3%)	3(7.9%)	0(0%)	3(30%)	13(9.7%)	
• The patient's hygiene is poor	0(0%)	3(7.9%)	0(0%)	0(0%)	3(2.2%)	
• You are assisting with medicine administration	0(0%)	0(0%)	0(0%)	2(20%)	2(1.5%)	

Table 6. Knowledge about cough etiquette

What should you do while coughing?	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• Cover your mouth	11(14.7%)	11(28.9%)	7(63.6%)	2(20%)	31(23.1%)	<0.001**
• Cover your mouth inside your elbow sleeves 62(82.7%)	22(57.9%)	2(18.2%)	8(80%)	94(70.1%)		
• Turn your head and cough 2(2.7%)	5(13.2%)	2(18.2%)	0(0%)	9(6.7%)		

Chi-Square/Fisher Exact Test

Table 7. Opinions about hand hygiene

How often do you practice hand-hygiene in a day?	Doctor (n=75)	Nurse (n=38)	Lab Technician (n=11)	Others (n=10)	Total (n=134)	
• Always	27(36%)	25(65.8%)	9(81.8%)	5(50%)	66(49.3%)	0.009**
• Most of the time	40(53.3%)	13(34.2%)	2(18.2%)	5(50%)	60(44.8%)	
• Sometimes	8(10.7%)	0(0%)	0(0%)	0(0%)	8(6%)	

no response from them (0%). Around 40 doctors (53.3%) and 19 nurses (50%) answered correctly.

It is necessary to wear gowns while working with a patient since blood or body fluids may get on your clothing from a procedure that you plan on performing. For this, 68 (90.7%) doctors, 68(90.7%) nurses and 11(100%) lab technicians answered correctly. Around seven (9.3%) doctors and seven technicians (9.3%) answered that they need to wear gowns only if the patient has AIDS or Hepatitis. Only three (7.9%) nurses mentioned that a gown is required only if the patient has HIV.

While coughing, we should cover our mouth inside the elbow sleeve. The answer was given by 62(82.7%) doctors, 22(57.9%) nurses and two (18.2%) lab technicians. Around 63.6% of lab technicians mentioned that they need to cover only the mouth while coughing. **(Table 6)** The current guidelines mention that its always better to cough inside your elbow sleeves.^[8]

Regarding the practice of hand wash in a day, it was practiced always by 36% of doctors, 65.8% of nurses and 81.8% of lab technicians. It was practiced most of the time by 53.3% of doctors, 34.2% of nurses and 18.2% of lab technicians. Around 10.7% of doctors agreed that they practice sometimes while there was no response (0%) from both nurses and lab

technicians. **(Table 7)** The excuses given by people for not giving importance about hand hygiene are laziness, forgetfulness, too many patients etc. Some of them emphasized that they will start practicing regularly.

DISCUSSIONS

The current study was done to analyse knowledge of hand hygiene and practice among health care professionals in a tertiary care teaching institution. The overall knowledge about hand hygiene was good at ACS Medical College and Hospital. Hand washing was complied with by (46.7%) doctors and 15(39.5%) nurses.

In an observational study conducted among health care providers in a Tertiary Hospital in Ghana, the compliance rate for hand washing was observed ranging from 9.2% to 57% among doctors and 9.6% to 54% among nurses.^[9] In a cross-sectional study by Maheshwari *et al.* in India, the level of knowledge on hand hygiene was observed among both residents and nurses. They found that the nurses were most positive toward hand hygiene than the residents.^[10]

The results of the current study indicated that most of the respondents followed hand hygiene that was not sufficient to prevent infection. The participants who were involved in the study also

mentioned that the main reasons for skipping handwashing in hospital is laziness, too many patients and forgetfulness among others. A similar observation had been made in a study by Pittet *et al.* [11]. They pointed out similar attitudes such as “not thinking about it at the moment”, “forgetting”, and “being busy”. In a study by Salmam *et al.*, [12] the majority (97.4%) of HCWs agreed that hand hygiene is an essential part of their role whereas 71.4% stated that they forget to follow hand hygiene most of the time. Moreover, 50.6% reported that the frequency of hand hygiene made it difficult for them to carry it out as often as necessary and 70.3% found it difficult to follow hand hygiene due to time-pressure.

Provisions to arrange for regular training of health workers when they join work is essential to emphasize the awareness of microbial transmission by hands, stressing the importance of hand hygiene and its indications and to demonstrate the correct procedures for hand rubbing and hand washing. All these can be achieved using regular presentations, e-learning modules, posters, group activities, videos, self-learning modules, practical demonstrations, feedback forms during assessment, pre and post assessment, arranging training sessions and other methods. The health care providers may improve through placing reminders and prompts (posters, stickers, voice prompts, leaflets, gadgets, etc.) related to the importance of hand hygiene and the appropriate indications and procedures for its performance. [13], [14]

Regarding biomedical waste management, the nurses and the lab technicians had better knowledge than doctors. The knowledge about the disposal of gloves in red bin was answered by 94.7% of nurses and all the lab technicians (100%) whereas the doctors were not clear about the disposal of gloves (41.3%).

It was similar to a study by Rao *et al.* where nurses had better knowledge than doctors regarding the disposal of biomedical waste management. [15] The nurses had a better knowledge as they have been given responsibility to handle this on a day to day basis. A study which was done in Shenen Gibe Hospital in Southwest Ethiopia showed that 68.8% doctors had adequate practice and 82.97% of nurses had more knowledge about hand washing. [16]

CONCLUSION

The conclusion of this study indicates that most of the study participants, though they had adequate knowledge about hand hygiene they did not have sufficient practice of hand washing techniques. The nosocomial infections can be controlled by improving hand hygiene which can be implemented with effective training like role models or practical demonstrations.

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Conflict of interest

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