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A Study to Assess the Knowledge and Practice of Hand Hygiene among Healthcare Workers

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ABSTRACT

Universal precautions intend to prevent in the health care staff parenteral, mucus membrane, intact and nonintact skin exposure to pathogens by preventing their exposure to blood and body fluids from all patients as if they were all potentially infectious with blood-borne pathogens. The universal precautions practice applies the basic principle of infection control through hand washing, utilisation of appropriate protective barriers such as gloves, masks, gowns and eyewear to prevent contact with potentially infectious materials, and safe handling of sharps. Hands have been identified as the major source of germ transmission while providing health care. Every person involved in patient care, healthcare worker or otherwise, should be able to accurately perform hand hygiene and at the appropriate time. Keeping in view of this, the present study was conducted to assess the knowledge and practice of hand hygiene among healthcare workers This cross-sectional descriptive study was carried out on 50 healthcare workers in a healthcare setting. All participants had to complete a 25-item self-administered WHO hand hygiene questionnaire for health-care workers 31 for assessment of the knowledge and practice of hand hygiene. The level of hand hygiene knowledge was calculated by dividing the responses into three groups based on a score of more than 75% considered as good, 50-74% moderate, and less than 50% considered as low. Around 37% (n=18) of the respondents never received any formal training in hand hygiene. Only 14% (n=7) of the respondents had a good level of hand hygiene knowledge.

Key Words: *Healthcare associated infection (HCAI), hand washing, hand hygiene knowledge, universal safe precautions, pathogens*

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INTRODUCTION

Healthcare associated infection (HCAI) is a major problem for patient safety and its prevention must be a first priority for settings and Institutions committed to making health care safer. The impact of HCAI implies prolonged hospital stay, long term disability, increased resistance of microorganisms to antimicrobials, massive additional financial burdens, an excess of deaths, high costs for the health systems and emotional stress for patients and their families. Risk of acquiring HCAI depends on factors related to the infectious agent (e.g., virulence, capacity to survive in the environment, antimicrobial resistance), the host (e.g., advanced age, low birth weight, underlying diseases, state of debilitation, immunosuppression, malnutrition) and the environment (e.g., ICU admission, prolonged hospitalization, invasive devices and procedures, antimicrobial therapy).

Transmission of health care-associated pathogens takes place through direct and indirect contact, droplets, air and a common vehicle. Transmission through contaminated Healthcare workers' (HCW) hands is the most common pattern in most settings and require five sequential steps:

(i) Organisms are present on the patient's skin, or have been shed onto inanimate objects immediately surrounding the patient;
(ii) Organisms must be transferred to the hands of HCWs;
(iii) Organisms must be capable of surviving for at least several minutes on HCWs' hands;
(iv) Hand washing or hand antisepsis by the HCWs must be inadequate or omitted entirely, or the agent used for hand hygiene inappropriate; and
(v) The contaminated hand or hands of the caregiver must come into direct contact with another patient or with an inanimate object that will come into direct contact with the patient [1].

Health care-associated pathogens can be recovered not only from infected or draining wounds but also from frequently colonized areas of normal, intact patient skin [2, 3]. Many studies have documented that HCWs can contaminate their hands or gloves with pathogens such as Gram-negative bacilli, S. aureus, enterococci or C. difficile by performing "clean procedures" or touching intact areas of skin of hospitalized patients [4, 5]. Following contact with patients and/or a contaminated environment, microorganisms can survive on hands for differing lengths of time (2–60 minutes). HCWs' hands become progressively colonized with commensal flora as well as with potential pathogens during patient care [6]. In the absence of hand hygiene action, the longer the duration of care, the higher the degree of hand contamination. Hand hygiene is the primary measure proven to be effective in preventing HCAI and the spread of antimicrobial resistance. However, it has been shown that HCWs encounter difficulties in complying with hand hygiene indications at different levels. Insufficient or very low compliance rates have been reported from both developed and developing countries. Adherence of HCWs to recommended hand hygiene procedures has been reported as variable, with mean baseline rates ranging from 5% to 89% and an overall average of 38.7%. Hand hygiene performance varies according to work intensity and several other factors; in observational studies conducted in hospitals, HCWs cleaned their hands on average from 5 to as many as 42 times per shift and 1.7–15.2 times per hour. In addition, the duration of hand cleansing episodes ranged on average from as short as 6.6 seconds to 30 seconds. The main factors that may determine poor hand hygiene include risk factors for non-adherence observed in epidemiological studies as well as reasons given by HCWs themselves for lack of adherence to hand hygiene recommendations.

Indications for hand hygiene

1) Wash hands with soap and water when visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.
2) If exposure to potential spore-forming pathogens is strongly suspected or proven, including outbreaks of C. difficile, hand washing with soap and water is the preferred means.
3) Use an alcohol-based handrub as the preferred means for routine hand antisepsis in all other clinical situations if hands are not visibly soiled if alcohol-based handrub is not obtainable, wash hands with soap and water.
4) Perform hand hygiene:

a) Before and after touching the patient
b) Before handling an invasive device for patient care, regardless of whether or not gloves are used
c) After contact with body fluids or excretions, mucous membrane, non-intact skin, or wound dressings
d) If moving from a contaminated body site to another body site during care of the same patient
e) After contact with inanimate surfaces and objects (including medical equipment) in the immediate vicinity of the patient
f) After removing sterile or non-sterile gloves

5) E. Before handling medication or preparing food perform hand hygiene using an alcohol-based handrub or wash hands with either plain or antimicrobial soap and water
6) Soap and alcohol-based handrub should not be used concomitantly

Keeping in view the above data, this study was designed with the objectives of to assess the Healthcare workers' knowledge of and practice of hand hygiene. Such information would be useful in identifying the specific areas that may need further continuing education in relation to hand hygiene and give indications and provide feedback to HCWs about the areas that they need to concentrate in order to provide safer practices.The present study was conducted to assess the knowledge and practice of hand hygiene among healthcare workers.

METHOD AND MATERIALS

This cross-sectional descriptive study was carried out in a healthcare setting. The study was conducted after taking ethical clearance. A total of 50 healthcare workers were selected for the study by randomisation through the random number generator computer software. All participants were apprised of the study to be carried out on them and their informed consent was obtained. The study was conducted in time period of 6 months. All participants have been professionally active for one year or more, in direct patient care, hospital hygiene, processing of clothing and waste materials. All participants had to complete a 25-item self-administered WHO hand hygiene questionnaire for health-care workers [7] for assessment of the knowledge and practice of hand hygiene. The questionnaire was distributed to the participants during day time. The participants were required to fill the questionnaire and return it on the same day to avoid any response bias. Only questionnaires that were complete were included for the final analysis and incomplete ones were excluded from the final analysis. Data were analysed using percentages. Correct answers were given one point whereas incorrect answers scored zero. The maximum score achievable for knowledge was 25 points. The level of hand hygiene knowledge was calculated by dividing the responses into three groups based on a score of more than 75% considered as good, 50-74% moderate, and less than 50% considered as low. The primary data was compiled, analysed and based on the findings, necessary recommendations and conclusions were made.

RESULTS

Demographic characteristics of the participants:

The participants comprised of 50 healthcare workers in a healthcare setting. The demographic details of the study participants are shown below:

Table 1: Demographic details of the participants

Variables	Number	%
Age (years)		
20-35	13	26
36-50	26	52
>50	11	22
Gender		
Male	33	66
Female	17	34
Marital status		
Married	41	82
Unmarried	9	18

The data given in Table 1 shows that 26% HCWs were aged between 20-35 years, 52% were in 36-50 years age group and 22% were >50 years of age. Majority of the HCWs were aged between 36-50 years. Out of all HCWs, 66% were males and 34% were females. Majority of them i.e., 82% were married.

The responses of participants to the survey based on hand hygiene knowledge questionnaire for health-care workers are provided in Table 2:

Sr No	Question	Correct Answer	% Population Answered (Correctly)	% Population Answered (Incorrectly)
1.	Did you receive formal training in hand hygiene in the last three years?	-	64% Said Yes (n=32)	37% Said No (n=18)
2.	Do you routinely use an alcohol-based handrub for hand hygiene?	-	76% Said Yes (n=38)	24% Said No (n=12)
3.	Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?	Health-care workers' hands when not clean	56% (n=28)	44% (n=22)
4.	What is the most frequent source of germs responsible for health care-associated infections?	Germs already present on or within the patient	26% (n=13)	74% (n=37)
5.	Which of the following hand hygiene actions prevents transmission of germs to the patient?			
	Before touching a patient	Yes	94% (n=47)	6% (n=3)
	. Immediately after a risk of body fluid exposure	Yes	84% (n=42)	16% (n=8)
	After exposure to the immediate surroundings of the patient	No	30% (n=15)	70% (n=35)
	Immediately before a clean/aseptic procedure	Yes	92% (n=46)	8 (n=4)

6.	Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?			
	After touching a patient	Yes	92% (n=46)	8% (n=4)
	Immediately after a risk of body fluid exposure	Yes	90% (n=45)	10% ((n=5)
	Immediately before a clean/aseptic procedure	No	28% (n=14)	72% (n=36)
	After exposure to immediate surroundings of the patient	Yes	84% (n=42)	16% (n=8)
7.	Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?			
	Handrubbing is more rapid for hand cleansing than handwashing	True	64% (n=32)	36% (n=18)
	Handrubbing causes skin dryness more than handwashing	False	58% (n=29)	42% (n=21)
	Handrubbing is more effective against germs than handwashing	False	74% (n=37)	26% (n=13)
	Handwashing and handrubbing are recommended to be performed in sequence	False	34% (n=17)	66% (n=33)
8.	What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?	20 seconds	36% (n=18)	64% (n=32)
9.	Which type of hand hygiene method is required in the following situations?			
	Before palpation of the abdomen	Rubbing	68% (n=34)	32% (n=16)
	Before giving an injection	Rubbing	52% (n=26)	48% (n=24)
	After emptying a bedpan	Washing	86% (n=43)	14% (n=7)
	After removing examination gloves	Washing	78% (n=39)	22% (n=11)
	After making a patient's bed	Rubbing	30% (n=15)	70% (n=37)
	After visible exposure to blood	Washing	86% (n=43)	14% (n=7)
10.	Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs?			3

	Wearing jewellery Damaged skin Artificial fingernails Regular use of a hand cream	Yes Yes Yes No	68% (n=34) 98% (n=49) 90% (n=45) 58% (n=29)	2% (n=16) 2% (n=1) 10% (n=5) 42% (n=21)

When asked about the main route of cross-transmission of potentially harmful germs between patients in a health-care facility, only 56% (n=28) agreed that it's the worker's hands were not clean. The rest answered that it's the patient's exposure to colonised surfaces (beds, chairs, tables, floor), air circulating in the hospital, sharing non-invasive objects between patients (stethoscope, pressure cuffs, etc) in a number of 22% (n=11), 14% (n=7), 8% (n=4), respectively. When asked about the most frequent source of germs responsible for health care-associated infections, only 26% (n=13) knew that it was the germs that are already present on or within the patient. More than half of them thought that the hospital environment was the main source. A few of them thought it was the hospital air that was the source of infection; 10% (n=5), and 6% (n=3) thought that the hospital's water system was the main source of infection. A majority of 58% (n=29) thinks that it is the hospital environment

Out of the five moments of hand hygiene, better awareness was observed regarding actions like hand hygiene before touching a patient (94%; n=47), immediately before a clean/aseptic procedure (92%; n=46), immediately after the risk of body fluid exposure (84%; n=42). Though only 30% (n=15) participants knew that hand hygiene after exposure to immediate surroundings of the patient does not prevent transmission of germs to the patient. Better awareness was recorded regarding actions like hand hygiene after touching a patient (92%; n=46), hand hygiene immediately after the risk of body fluid exposure (90%; n=45), and hand hygiene after exposure to immediate surroundings of the patient (84%; n=42). Only 28% (n=14) participants knew that hand hygiene before a clean/aseptic procedure does not prevent transmission of germs to the health care worker. When knowledge about handwashing with soap and water and hand rubbing with an alcohol-based hand rub was tested, 64% (n=32) people agreed that hand rubbing is more rapid for hand cleansing than hand washing. Nearly 58% (n=29) participants agreed that hand rubbing does not cause skin dryness more than hand washing and 74% (n=37) respondents knew that hand rubbing is not more effective against germs than hand washing. And only 34% (n=17) were aware that hand washing and hand rubbing are not recommended to be performed in that sequence. Only 36% (n=18) respondents knew that the minimum time required by alcohol-based hand rub to kill germs on hands is 20 seconds. And 64% (n=32) of the participants did not know the minimum time required by the alcohol-based hand rub to kill the germs on hands

When asked about the hygiene methods required in given situations, participants agreed that hand rubbing is required before palpation of the abdomen (68%; n=34), before giving an injection (52%; n=26) and after making a patient's bed (30%; n=15). Participants were also aware that hand washing was necessary after emptying a bedpan (86%; n=43), after removing examination gloves (78%; n=11) and after visible exposure to blood (86%; n=43). These HCWs agreed that wearing jewellery (68%; n=34), damaged skin (98%; n=49) and artificial fingernails (90%; n=10) are associated with increased risk of colonization of hands with harmful germs. And 58% (n=29) knew that regular use of a hand cream did not increase the risk of colonization of hands with germs.

The overall scores for the level of hand hygiene knowledge are provided in Table 3

Level of hand hygiene knowledge	Low	Moderate	Good
Percentage	4%	82%	14%
Number of respondents	2	41	7

DISCUSSION

HCAI is a major problem for patient safety and its surveillance and prevention must be a first priority for settings and institutions committed to making health care safer. The impact of HCAI implies prolonged hospital stay, long-term disability, increased resistance of microorganisms to antimicrobials, massive additional financial burden, high costs for patients and their families, and excess deaths. Although the risk of acquiring HCAI is universal and pervades every health-care facility and system around the world. Contaminated hands could be vehicles for the spread of certain viruses and bacteria. HCWs' hands become progressively colonized with commensal flora as well as with potential pathogens during patient care. Cross-transmission of organisms occurs through contaminated hands.

Hands can be cleaned by two methods, namely handwashing [8] (Figure 1) and hand rubbing [9] (Figure 2). Hand washing is carried out with soap and water whereas hand rubbing is completed with an alcohol-based hand rub. Hands should be washed for at least 15 seconds in order to kill the germs while making sure that all areas of the hands are cleaned properly. In a healthcare setting, hand rubbing is the preferred method for cleaning hands. It takes less time, it

kills the potentially deadly germs more effectively than a soap does, it does not dry or irritate the skin unlike soap and is more accessible than a hand washing sink.

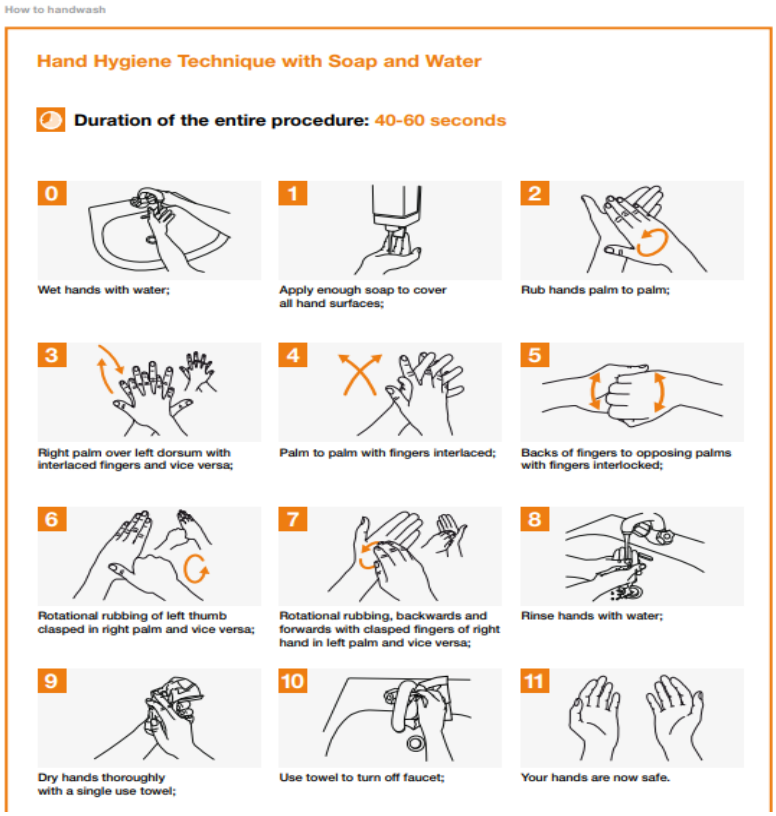

Figure 1: How to Hand wash by WHO

Figure 2: How to Hand rub by WHO

While cleaning hands with a hand rub, care should be taken that areas between fingers, thumb, and fingertips are not missed. Also, it should be noted that hand cleaning is required even after removing gloves. The effectiveness of a hand

rub depends on the quantity of the alcohol-based sanitizer used for cleaning. The more the quantity, the better the cleaning. Clostridium difficile is a very common infection in a healthcare setting that causes severe diarrhoea. Its spores cannot be killed by an alcohol-based sanitizer. So, this infection can only be prevented by wearing gloves before examining a patient that is infected and washing hands with soap and water after the examination is done.

To get rid of the infections caused by lack of hand hygiene, the WHO designed the 'My Five moments of hand hygiene' in a very simplified manner that helped the health care workers to understand, train, monitor and report hand hygiene more effectively in day-to-day practice. As per this design (Figure 3), the health-care workers should clean their hands before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient and after touching patient surroundings [10].

Figure3: 5 moments of Hand hygiene by WHO

Another initiative taken by Centre for Disease Control and Prevention (CDC) was called "My Clean Hands". May 5th is celebrated as "World Hand Hygiene Day", and they also commenced a campaign called "Clean Hands Count" that will offer a new training course for healthcare providers. The "Clean Hands Count" campaign aims to improve health care provider adherence to CDC hand hygiene, address the myths and misperceptions about hand hygiene and empower patients to play a role in their care by asking or reminding healthcare providers to clean their hands [11]. CDC also has a health-care providers fact sheet to address these myths and misconceptions about hand hygiene:

- Alcohol-based hand sanitizer is more effective and less drying than using soap and water
- Using alcohol-based hand sanitizer does NOT cause antibiotic resistance
- Alcohol-based hand sanitizer does not kill Clostridium difficile, but it is still the overall recommended method for hand hygiene practice
- Some healthcare providers miss certain areas when cleaning their hands
- The amount of product you use matters
- Glove use is not a substitute for cleaning your hands. Dirty gloves can soil your hand
- On average, healthcare providers perform hand hygiene less than half of the times they should

The WHO Multimodal Hand Hygiene Improvement Strategy and a wide range of tools were developed in parallel to the Guidelines to translate recommendations into practice at the bedside. The implementation strategy was informed by the literature on implementation science, behavioural change, spread methodology, diffusion of innovation and impact evaluation. The five essential elements are mentioned in Figure 4:

Especially in a facility where a hand hygiene improvement programme has to be initiated from scratch, the following are essential steps:
Step 1: Facility preparedness – readiness for action
Step 2: Baseline evaluation – establishing the current situation
Step 3: Implementation – introducing the improvement activities
Step 4: Follow-up evaluation – evaluating the implementation impact
Step 5: Action planning and review cycle – developing a plan for the next 5 years (minimum

All these measures that are taken to improve hand hygiene awareness and thus prevent the spread of infections, will only be helpful if the compliance of the health care workers to these hand hygiene practices is ensured. This can be done by setting some performance indicators to check the health care workers' compliance and improvement in hand hygiene. The indicators include periodically checking the number of hand hygiene episodes performed by the health care worker, monitoring the volume of alcohol-based hand rub being used, monitoring the compliance of not using artificial fingernails or jewellery that may provide space for colonization of germs. To encourage the practices of hand hygiene, some rewarding policies for the health care workers should be introduced.

CONCLUSION

There is a lack of attention given to the teaching of hand hygiene practices in the Indian medical training curriculum and in healthcare sector. Around 37% (n=18) of the respondents never received any formal training in hand hygiene. Only 14% (n=7) of the respondents had a good level of hand hygiene knowledge. To prevent the spread of infections in healthcare settings, HCWs should be given proper training in hand hygiene practices right from the initial years of joining. This could be done by running workshops, holding annual seminars and making it a requisite for skill assessment. However, one of the limitations of this study is that the data is skewed to respondents from a single healthcare setting does not truly represent the entire nation. Thus, further studies are required to be carried out in more healthcare institutions located in different areas of the country where hand hygiene compliance could be a major concern.

Recommendations

Hand hygiene will prevent health care workers from risk of infections. The knowledge and practice of hand hygiene will not only prevent them from infections but it is also beneficial for the organisation and community as well. This study gave insight to healthcare workers to adhere strictly to hand hygiene and give indications to them about the areas that they need to concentrate in order to provide safer practices.Therefore, supporting quantity and/or quality of public health education programs, development of hand-hygiene promotion programs for the HCWsalong with general public and use of the findings from this study is recommended.

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