

## Original Research Article

# Hand hygiene knowledge among undergraduate medical students in Junagadh, Gujarat, India

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## ABSTRACT

**Background:** Hand hygiene is now regarded as one of the most important element of infection control activities. Medical students in their clinical training phase through the healthcare facilities and can potentially transmit infections besides being the healthcare providers of future when their pattern of training will reflect on their infection control practices. Therefore, this study was carried out to assess the knowledge of undergraduate medical students regarding hand hygiene practices.

**Methods:** A cross-sectional study was carried out and data was collected by using “WHO hand hygiene knowledge questionnaire for health care workers” among 2<sup>nd</sup> M.B.B.S medical students at Junagadh. Knowledge was graded as good, moderate or poor based on the total number of correct answers.

**Results:** Total 123 students participated in the study. There were 65 (53%) females and 58 (47%) were males. The mean hand hygiene knowledge score (out of 25) was 15.05 (SD:  $\pm 2.37$ , 95% CI: 14.63-15.48). Majority of the participants (76%) had moderate knowledge of hand hygiene practices.

**Conclusions:** In the present study majority of the students had not received formal training regarding hand hygiene practices. Majority of the students had moderate knowledge of hand hygiene. Incorporation of teaching and training of hand hygiene practice in the undergraduate teaching during the initial study years is the need of the hour to prevent further emergence of antimicrobial resistance and health care associated infections.

**Keywords:** Hand hygiene, Hand wash, Hand rub, Infection control, Knowledge

## INTRODUCTION

Proper hand hygiene is an important, the simplest and least expensive method for reducing the prevalence of health care associated infections and for preventing further emergence of antimicrobial resistance.<sup>1-3</sup>

Hand hygiene is considered as one of the most important element of infection control activities in the health care institutions.<sup>4-7</sup> As the burden of health care associated infections (HCAIs) is increasing and also the severity of illness is also increasing it makes the treatment more complex. Therefore, basics of infection prevention by simple measures like hand hygiene play very important

role in reversing the trend. There is enough scientific evidence that substantiates the fact that if properly implemented, hand hygiene alone can significantly reduce the risk of cross-transmission of infection in health care institutes.<sup>8,9</sup>

In most health care institutions, adherence to recommended hand-washing practices remains unacceptably low, rarely exceeding 40 per cent of situations in which hand hygiene is indicated.<sup>10,11</sup>

Today's students can become tomorrow's role models in infection prevention policies and measures. Students need to be oriented and they should be made aware by lectures,

seminars and workshops to this basic and essential preventive measure. The hand hygiene liaison group strongly advocates teaching of elementary hygiene practices at medical colleges.<sup>12</sup> In a study focusing on MBBS students, it was found out that assessing the knowledge, ascertaining the attitude and practices of MBBS students and providing adequate knowledge at undergraduate level is a good initiative.<sup>13</sup>

We need to ensure proper education of the trainee undergraduate medical students, and in this regard, few studies have been conducted to study the hand hygiene practices of medical students. Such studies are important, as the students during their clinical training phase through the hospitals and other health care centres and can potentially transmit infections in addition to being the healthcare providers of future when their training will reflect on their cross-infection control practices. Unfortunately, the medical students have a low overall rate of hand hygiene practice.<sup>14</sup>

Thus, this study was carried out to assess the knowledge of undergraduate medical students regarding hand hygiene practices.

## METHODS

A cross-sectional study was carried out among undergraduate medical students of GMERS Medical College, Junagadh. The study was conducted from July to December 2018.

Institutional ethics committee's approval was obtained before starting the study.

Convenient sampling method was used and all the students from Second M.B.B.S were invited to participate in the study.

Written informed consent was obtained from the students before their enrolment into the study. All the students who gave written consent were included in the study and the students who were consistently absent on the days of data collection were excluded from the study.

WHO Hand hygiene knowledge questionnaire for health care workers was used to assess students' knowledge

regarding hand hygiene practices.<sup>15</sup> This questionnaire of 25 questions included multiple choice questions; "yes" or "no" questions; and "true" or "false" questions. The questions were related to hand hygiene training, the main route of cross-transmission of potentially harmful pathogens between patients in a health-care facility, the most frequent source of germs responsible for HCAs, and hygiene actions preventing transmission of germs to the patient, and to the health-care worker, minimal time needed for alcohol-based hand rub to kill most germs on hands, and what should be avoided, as associated with a likelihood of colonization of hand with harmful pathogens.<sup>15</sup> The questionnaire which was given in a printed form was self-administered by the students. Correct response for the questionnaire was obtained from WHO document for the same.<sup>16</sup> One point was given for each correct answer so that maximum score for knowledge was 25. A score of more than 75% was considered good, 50–74% moderate, and less than 50% was taken as poor.

Data entry was done in MS excel sheet and data was analysed using SPSS 16.0 software. Mean and median were used for to ascertain the central tendency and standard deviation was used to describe the dispersion. Descriptive statistics were derived in the form of frequencies and percentages. Inferential statistics were expressed by using t-test and chi-square as statistical tests of significance.  $P < 0.05$  was considered statistically significant.

## RESULTS

Total 123 students participated in the study. There were 65 (53%) females and 58 (47%) were males. The mean age of study participants was 19 years (SD:  $\pm 0.78$ ). The median age was also 19 years (inter-quartile range: 1). Eighty nine percent (110) participants mentioned that they had not received formal training in hand hygiene in last three years. Around 53% (65) participants mentioned that they routinely use an alcohol based hand rub for hand hygiene. About 36 (55%) females and 29 (50%) males routinely use an alcohol based hand rub for hand hygiene. The difference between males and females was not statistically significant (Chi-square: 0.357, df: 1,  $p = 0.550$ ).

**Table 1: Knowledge of participants regarding route and source for transmission of harmful germs to the patients in a health care facility.**

Main route for cross-transmission of germs	No. (%)
a) Health-care workers' hands when not clean	38 (30.9)
b) Air circulating in the hospital	27 (22)
c) Patients' exposure to colonised surfaces (i.e., beds, chairs, tables, floors)	47 (38.2)
d) Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients	11 (8.9)
Most frequent source of germs for health care associated infection	No. (%)
a) The hospital's water system	1 (0.8)
b) The hospital air	32 (26)
c) Germs already present on or within the patient	40 (32.5)
d) The hospital environment (surfaces)	50 (40.7)

**Table 2: Knowledge of participants about hand hygiene actions.**

Knowledge about	Yes	No
	N (%)	N (%)
<b>Hand hygiene actions that prevent transmission of germs to the patient</b>		
a) Before touching a patient	105 (85.4)	18 (14.6)
b) Immediately after a risk of body fluid exposure	76 (61.8)	47 (38.2)
c) After exposure to the immediate surroundings of a patient	89 (72.4)	34 (27.6)
d) Immediately before a clean/aseptic procedure	92 (74.8)	31 (25.2)
<b>Hand hygiene actions that prevent transmission of germs to the health-care worker</b>		
a) After touching a patient	112 (91.1)	11 (8.9)
b) Immediately after a risk of body fluid exposure	98 (79.7)	25 (20.3)
c) After exposure to the immediate surroundings of a patient	96 (78.0)	27 (22.0)
d) Immediately before a clean/aseptic procedure	73 (59.3)	50 (40.7)
<b>Action/behaviour/condition associated with increased likelihood of colonization of hands with harmful germs</b>		
a) Wearing jewellery	77 (62.6)	46 (37.4)
b) Damaged skin	106 (86.2)	17 (13.8)
c) Artificial fingernails	110 (89.4)	13 (10.6)
d) Regular use of a hand cream	33 (26.8)	90 (73.2)

(Numbers expressed in bold font are the correct responses).

**Table 3: Participants beliefs about alcohol-based handrub and handwashing with soap and water.**

Statement	True	False
	N (%)	N (%)
<b>Handrubbing is more rapid for hand cleansing than handwashing</b>	113 (91.9)	10 (8.1)
<b>Handrubbing causes skin dryness more than handwashing</b>	76 (61.8)	47 (38.2)
<b>Handrubbing is more effective against germs than handwashing</b>	88 (71.5)	35 (28.5)
<b>Handwashing and handrubbing are recommended to be performed in sequence</b>	57 (46.3)	66 (53.7)

(Numbers expressed in bold font are the correct responses).

Table 1 describes the knowledge of participants regarding route and source for transmission of harmful germs to the patients in a health care facility. Approximately 31% participants could give the correct answer that unclean hands of health care workers is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility. An equal number of participants (32%) could give the correct answer that germs already present on or within the patient is the most frequent source for health care-associated infections.

Table 2 describes the knowledge of participants about hand hygiene actions. In order to prevent transmission of germs to the patient, hand hygiene actions are recommended before touching the patient and/or before performing any aseptic procedure. This was correctly answered by 85.4% and 74.8% of the participants respectively. In order to prevent transmission of germs to the health-care workers, hand hygiene actions are recommended after touching the patient or exposure to their immediate surroundings or after a risk of body fluid exposure. This was correctly answered by 91.1%, 78.0% and 79.7% of the respondents respectively. There is increased likelihood of colonization of hands with harmful germs in case of wearing of jewellery, damaged skin or artificial fingernails. This was correctly responded by 62.6%, 86.2% and 89.4% of the participants

respectively. However over one fourth (26.8%) of the respondents had myths that use of hand creams increases colonization of hands with harmful germs.

Table 3 describes the beliefs of the participants about alcohol based hand rub as compared to hand washing. Over 90% of the participants believed that handrubbing was rapid as compared to hand washing. However 61% of the participants had the myth that hand rub may cause dryness of hands. Over two third (71%) of the participants opined that hand rubbing was more effective disinfectant than hand washing. Little less than half of the participants (46%) believed that handwashing and handrubbing are to be performed in sequence. Only 31 (25%) participants could give the correct answer that the minimal time needed for alcohol-based hand-rub to kill most germs on your hands is 20 seconds.

Table 4 describes participants knowledge about the type of hand hygiene method required in different situations. For majority of the situations such as before palpation, before giving injection, after emptying bedpan, after removing examination gloves, after making a patient's bed the hand hygiene method recommended is handrubbing. This was correctly answered by 68%, 47%, 25%, 35% & 34% of the participants respectively. Over three-fourth of the participants (78%) correctly answered

that handwashing is recommended if there is visible exposure to blood.

Table 5 describes the mean of Hand hygiene knowledge score obtained by participants. The mean score of participants was 15.05±2.37, (95%CI: 14.63-15.48). There was no statistically significant difference between

mean scores of male & female participants (p=0.68). The mean knowledge score of participants who had received training on hand hygiene was higher (16.23, Sd: ±1.58) compared to those who had not received formal training (14.91, Sd:±2.42). However, the difference between mean score was not statistically significant (t: 1.901, df: 121, p=0.06).

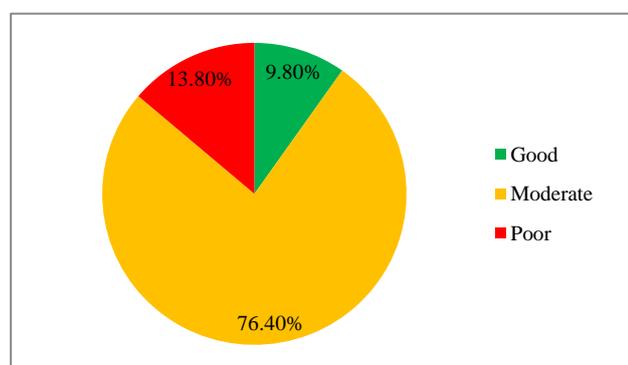
**Table 4: Participants knowledge about the type of hand hygiene method required in different situations.**

Situation	Rubbing	Washing	None
	N (%)	N (%)	N (%)
<b>Before palpation of the abdomen</b>	84 (68.3)	29 (23.6)	10 (8.1)
<b>Before giving an injection</b>	58 (47.2)	56 (45.5)	9 (7.3)
<b>After emptying a bedpan</b>	31 (25.2)	89 (72.4)	3 (2.4)
<b>After removing examination gloves</b>	44 (35.8)	71 (57.7)	8 (6.5)
<b>After making a patient's bed</b>	42 (34.1)	71 (57.7)	10 (8.1)
<b>After visible exposure to blood</b>	21 (17.1)	97 (78.9)	5 (4.1)

(Numbers expressed in bold font are the correct responses).

**Table 5: Participants hand hygiene knowledge score.**

Characteristics	Mean score	Standard deviation	“t” value (df)	P value
<b>Females</b>	15.13	2.39	0.401 (121)	0.689
<b>Males</b>	14.96	2.38		
<b>Received training on hand hygiene</b>	16.23	1.58	1.901 (121)	0.06
<b>Not trained in hand hygiene</b>	14.91	2.42		
<b>Overall</b>	15.05	2.37		



**Figure 1: Pie chart describing grades of overall knowledge of participants on hand hygiene.**

Figure 1 describes the grades achieved by participants for their overall knowledge about hand hygiene. Only about one tenth (9.8%) of the participants had scored more than 75% (good category) for the WHO hand hygiene questionnaire. Over three fourth of the participants had scored between 50 to 74% while around 13% of them had performed extremely poor with less than 50% scores.

## DISCUSSION

In the present study eleven percent participants mentioned that they had not received formal training in hand hygiene in last three years. While in a study carried out in Gulbarga, Karnataka around 15% participants had

not received formal training in hand hygiene.<sup>17</sup> We need to inculcate the culture of training undergraduate medical students in hand hygiene practice during the initial phase of their studies.

Around 53% participants mentioned that they routinely use an alcohol based hand rub for hand hygiene. Similar findings were reported from a study done in South India where 58% medical students mentioned that they routinely use alcohol based hand rub for hand hygiene.<sup>17</sup>

In the present study, approximately 31% participants could give the correct answer that unclean hands of health care workers is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility. This was very low compared to the findings of a study carried out in Kolkata where 74% medical students could give the correct answer.<sup>18</sup> In the current study, thirty two percent participants could give the correct answer that germs already present on or within the patient is the most frequent source of germs responsible for health care-associated infections. While in a study carried out in Raichur, Karnataka 41.5% students could mention the correct answer (Table 1).<sup>19</sup>

In the present study, around 85% participants knew that hand hygiene action before touching a patient can prevent the transmission of germs to the patient. A study that was carried out in Navi Mumbai reported that 77% medical

students gave the correct answer to this question.<sup>20</sup> Seventy five percent participants in the present study knew that hand hygiene action before aseptic procedure can prevent the transmission of germs to the patient. In a study carried out in Farukhabad reported that 88% students gave the correct answer to this question (Table 2).<sup>21</sup>

Table 3 highlights various beliefs of the participants about alcohol based hand rub as compared to hand washing. In the present study 25% participants could give the correct answer that the minimal time needed for alcohol-based handrub to kill most germs on your hands is about 20 seconds. In a study carried out in Karnataka 38% students could give the correct answer (Table 3).<sup>19</sup>

The mean knowledge score of participants was  $15.05 \pm 2.37$ . There was no statistically significant difference between mean scores of male & female participants ( $p=0.68$ ) or participants trained in hand hygiene & those untrained ( $p=0.06$ ). However the participants trained in hand hygiene had a higher score for the given questionnaire indicating the need for training (Table 5).

Around 76% participants had moderate knowledge and approximately 10% participants had good knowledge of hand hygiene practices in the present study. These findings were similar to the study carried out in Karnataka (Figure 1).<sup>17</sup>

Overall, undergraduate medical students need to be taught the hand hygiene practices during the early period of their studies so that the problems of health care associated infections and anti-microbial resistance can be tackled effectively.

### Strengths

The study used The WHO hand hygiene knowledge questionnaire for health care workers which is a standardized and validated questionnaire to assess the knowledge of health care workers. The hand hygiene knowledge score was calculated and total score was graded as good, moderate or poor.

### Limitations

As the study participants belonged to single institute & all being undergraduate students, the results of the study can't be generalized to all health care workers.

### CONCLUSION

Proper hand hygiene is a proven effective method for reducing the prevalence of health care associated infections and for preventing further emergence of antimicrobial resistance. Participants had several myths about hand hygiene practices & alcohol based hand rubs. Over one tenth of the participants had poor overall scores

on the self administered WHO questionnaire. Majority of the students had not received formal training regarding hand hygiene practices. Incorporation of teaching and training of hand hygiene practice in the undergraduate teaching during the initial study years is the need of the hour to prevent further emergence of antimicrobial resistance and health care associated infections.

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