

Correlation of Hand Hygiene Knowledge and Hand Decontamination Practices of Medical Students

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ABSTRACT

Objectives: To determine the knowledge of MBBS students of a public sector medical university regarding hand hygiene and to assess the practical implication of their knowledge regarding hand hygiene during the clinical postings.

Study Design and Setting: A cross sectional study was conducted in Sindh Medical College, Jinnah Sindh Medical University (SMC-JSMU) Karachi, from July to November 2018.

Methodology: A total of 316 M.B.B.S students from first year to final year were included in the study. Students were equally divided into preclinical and clinical groups. Hence, the knowledge of preclinical and clinical students were compared in the present study. Age range of participants was 18 to 24 years and both male and female participants were involved. Data was analyzed by SPSS 22.0. P value < 0.05 was considered as statistically significant.

Results: Approximately 249 (78.8%) students agreed that hands of health care workers are a source of nosocomial infections. Nearly 293 (92.7%) students admitted that hand decontamination and gloving is necessary before bedside procedures. Only 61 (38.6%) students performed it routinely. Chief restricting factor in performance of hand hygiene was inadequate supply of hand hygiene resources as reported by 122 (77.2%) students.

Conclusions: Majority of medical students in both preclinical and clinical groups were well aware of HH practices and its significant role in infection control. However, only a limited number of students routinely performed HH. The difference between knowledge and practice of students was mainly due to the inadequate facilities of hand washing in public sector hospitals.

Keywords: Hand hygiene (HH), Hand decontamination practices, Health care associated infections (HCI), Knowledge, Medical students.

INTRODUCTION:

According to World Health Organization (WHO), hand hygiene (HH) means cleansing of hands by any procedure of hand decontamination.¹ Practices of HH involve use of only water, soap, antimicrobial soap with water, antiseptic with water and an alcohol-based hand rub. Use of alcohol-based hand rub is more effective, consumes less time and depletes pathogens promptly than hand washing. Healthcare-

associated infections (HCAIs) contribute significantly to infectious disease (ID) burden worldwide. A considerable number of patients suffer from HCAIs annually. Particularly in developing countries proportion of HCAIs is significantly increasing.² According to WHO 1.4 million people globally are affected from HCAIs. Contaminated hands of health care workers (HCWs) are the main source for transmission of HCAIs.³ These constitute mainly skin, digestive system and respiratory system infections which become a source of major ID burden.⁴ Pathogenic organisms transmitted from contaminated hands includes *Staphylococcus aureus*, *Pseudomonas*, *Klebsilla* and *Rhinovirus*.⁵

HH is considered as one of the best methods in prevention of HCAIs. Although the recommended process of HH is relatively a simple method yet its compliance is reported to be 40% among HCWs.⁶ Globally hand washing practices were followed properly by minority of HCWs (2 to 10 %).⁷ Efforts are being made worldwide to design effective strategies for implementation of HH practices. One such strategy is the presentation of theory of "My five moments for hand hygiene" by WHO.⁸ According to this concept these are the critical moments when the intrusion in spreading of HCAIs may prove significant. These include the moment before touching a patient, before execution of aseptic and clean techniques, after contact with body fluids, after patient contact and after exposure to patient's surroundings. This theory has been used to promote knowledge and HH practices among HCWs.^{6,8}

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Common factors associated with poor hand decontamination practices include irritation of skin, inadequate provision of hand-washing materials and towels, heavy work load, decreased manpower, lack of basic knowledge and awareness of HH also account for poor compliance. A positive attitude towards HH practices may contribute as an influential factor towards the attitude development of the fellow medical practitioners.^{3,9}

Study conducted in Pakistan revealed that only 17% doctors were familiar to the WHO instructions on HH. The less provision of sink, soap, water and disposable towel are notable factors associated with poor hand decontamination practices locally. Generally, adherence to HH was 38.8% but it indicates variation in different health care units.^{3,10} Another study conducted in Ghana revealed that poor HH practices was due to inaccurate knowledge and insufficient facilities to perform HH.¹¹ A survey from Karnataka, India reported limited knowledge of HH among medical students.¹²

It is of utmost significance to identify the knowledge of HH and hand decontamination practices of medical students to develop a positive attitude of HH among them. It may also help the medical educationist to update the medical curriculum in light of the results of such studies. Therefore, the current study was designed to determine the knowledge and attitude of HH and hand decontamination practices in preclinical and clinical medical students of a public sector university of Karachi and to assess the practical implication of their knowledge regarding hand hygiene during their clinical postings.

METHODOLOGY:

A cross sectional study was conducted in Sindh Medical College, Jinnah Sindh Medical University (SMC-JSMU) Karachi, from July to November 2018. Our research protocol was approved by the Institutional Review Board of SMC, JSMU. A total of 316 M.B.B.S students from first year to final year were included in the study. Students were divided into preclinical and clinical groups. Although preclinical students have no patient interaction, however, they are being provided basic knowledge of HH during class lectures. Hence, the knowledge of preclinical and clinical students was compared in the present study. Age range of participants was 18 to 24 years and both male and female participants were involved. Students enrolled in non-medical faculties were excluded.

Non probability convenient sampling technique was used. Sample size was calculated using open EPI software. Considering population size = 1750, anticipated % frequency = 50 (assuming 50% as no specific similar study could be found), Confidence level = 95 %, confidence level as +/- percent of 100 = 5, design effect = 1. The sample size obtained was 316. Medical students were divided into two equal groups, preclinical students of first year and second year M.B.B.S (n= 158), clinical students of third year, fourth

year and final year M.B.B.S. (n=158). The participants were selected based on their consent to be included in the study.

A structured questionnaire was designed after going through extensive literature review to be filled by participants. The content areas of questionnaire included socio-demographic characteristics, knowledge and attitude of medical students regarding HH and hand decontamination practices. Data was collected by investigators. After obtaining written informed consent and detailed rationale of the study; the questionnaire was filled by the participants within university premises in their free time.

Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics were expressed as mean and standard deviation for numerical variables. Categorical variables were expressed in frequency and percentages. Chi-square test was applied to assess the difference between the knowledge of HH and practical application of this knowledge during the clinical rotations among the clinical group. P value of < 0.05 was considered significant.

RESULTS:

From total of 316 medical students who were interviewed in this study, 241 (76.3%) were females and 75 (23.7%) were males. Distribution of medical students in preclinical and clinical years was equal i.e. 50% in each group. Medical students included in the study were 108 from first year, 50 from second year, 74 from third year, 41 from fourth year, and 43 from final year.

Majority of the participants 293 (92.7%) were well aware that hand decontamination and gloving is necessary before any bedside procedure (Table 1). My five-moment concept of HH was known by 171 (44.9%) of medical students. Variables of my five-moment concept were answered accurately by most of the student as displayed in table 1. Methods of HH were known unsatisfactorily. Lack of accurate knowledge with respect to hand washing and rubbing methods is illustrated in table 1.

As recommended by WHO, alcohol-based hand rubbing is the gold standard method of HH.¹ Awareness among participants about WHO recommendations regarding preparations of HH was very low. In contrast to alcohol-based hand rubs, most of the participants (30%) 95/316 preferred water and antimicrobial soap as a hand hygiene preparation tool.

Approximately 190/316 (60.1%) students received information on HH from class lectures and 39/316 (12.3%) from clinical rotations. (Table 1)

Difference in knowledge and practical implementation of HH in clinical group is demonstrated in table 2. Significant number of clinical students 155/158 (98.1%) agreed that HH and gloving is necessary before any bedside procedure. However, 61/158 (38.6%) clinical students performed HH

Table 1: Frequency distribution of Knowledge of HH among preclinical and clinical medical students. (n=316)

Knowledge of hand hygiene	Preclinical students n (%)	Clinical students n (%)	Total n (%)
HH is practiced to prevent HCAs of patients, HCWs and microbial contamination of health care environment	109 (34.49%)	129 (40.82%)	238 (75.3%)
Hands of HCWs are source of nosocomial infections	124 (39.24%)	125 (39.55%)	249 (78.8%)
Hand decontamination and gloving is necessary before any bedside procedure	143 (45.25%)	150 (47.46%)	293 (92.7%)
Hand rubbing is more effective against germs than hand washing	32 (10.2%)	100 (31.6%)	132 (41.8%)
Time needed to apply alcohol-based hand rubs	30 (9.53%)	35 (11.07%)	65 (20.6%)
Steps are in proper hand washing technique	137 (43.35%)	140 (44.30%)	277 (87.7%)
Washing hand with soap and water is recommended when soiled with blood, body fluids and visibly dirty	124 (39.24%)	124 (39.24%)	248 (78.5%)
Five moments concept			
Do you know about my five moments concept of hand hygiene?	81 (25.63%)	90 (19.27%)	171 (44.9%)
Hand washing prevents transmission of germs before touching patients	260 (82.3%)	130 (41.13%)	390 (41.13%)
Hand washing prevents transmission of germs after touching patients	145 (45.88%)	146 (46.20%)	291 (92.1%)
Hand washing prevents transmission of germs after exposure to surroundings of patients	113 (35.7%)	158 (50.0%)	271 (85.8%)
Hand washing prevents transmission of germs after exposure to body fluids patients	142 (44.93%)	142 (44.93%)	284 (89.9%)
Hand hygiene techniques			
Method of HH is required before palpation of abdomen	9 (2.84%)	150 (47.46%)	159 (50.3%)
Method of HH is required before giving injections	64 (20.34%)	65 (20.56%)	129 (40.9%)
Method of HH is required after removing examination gloves	53 (16.77%)	60 (18.98%)	113 (35.8%)
Method of HH is required after visible exposure to blood	9 (2.84%)	89 (28.16%)	98 (31%)
Hand hygiene preparations			
Which preparation of HH product is most preferable?			
Alcohol based hand rubs	42 (13.29%)	43 (13.61%)	85 (26.9%)
Water and antimicrobial soap	15 (4.69%)	80 (25.31%)	95 (30%)
Water and plain soap	35 (11.07%)	30 (9.49%)	65 (20.6%)
Water and antiseptics	38 (12.02%)	15 (4.69%)	53 (16.8%)
Only water	9 (2.84%)	9 (2.84%)	18 (5.7%)
Source of HH information and training			
Class lectures	100 (31.6%)	90 (28.5%)	190 (60.1%)
Clinical rotations	0 (0.0%)	39 (12.3%)	39 (12.3%)

Table 2: Comparative analysis of knowledge of HH and hand decontamination practices among clinical students. (n=158)

Knowledge of hand hygiene:	N (%)	Practice of hand hygiene protocols:	N (%)	P value
Do you agree that Hand hygiene and gloving is necessary before any bedside procedures?	155 (98.1%)	Do you routinely perform hand hygiene before any bedside procedure?	61 (38.6%)	0.007
Correct knowledge of steps of proper hand washing technique?	147 (93%)	Do you perform all steps of hand washing during clinical postings?	34 (21.5%)	0.109

Table 3: Frequency of distribution of Restricting factors in performance of HH in health care units as reported by clinical students. (n=158)

Restriction factors in performance of HH among clinical group	Frequency n (%)
Shortage of hand washing resources	122 (77.2%)
Inadequate provision of gloves	120 (75.9%)
Forgetfulness to perform HH	90 (56.9%)
Lack of knowledge on HH	59 (37.3%)
Irritation of skin by hand rubs and antiseptics	39 (24.6%)

during clinical rotations ($P=0.007$). Similarly, knowledge of students regarding steps of hand washing technique was better 147/158 (93%) as compared to its practical implication 34/158 (21.5%). ($P=0.107$).

DISCUSSION:

Contaminated hands of HCWs are the main source for transmission of nosocomial infections. Nosocomial infections are effectively decreased by complying with HH. In the recent years there is a mushroom growth of medical institutes across Pakistan. These institutes are producing a good number of medical graduates each year. HH practices of undergraduate medical students have not been studied comprehensively in Pakistan. The Current study was aimed to assess knowledge and practical implications of HH among medical students.

In the present study 249 (78.8%) medical students agreed that hands of HCWs are source of nosocomial infections. In comparison, addressing the similar question, a figure of 46.4% was reported by a study conducted in Mumbai, India.¹³ This low frequency in their study probably reflects lack of involvement of students in primary patient care and deficiency of class room teaching regarding significance of HH in undergraduate curricula.¹³

Hand rubbing is more effective method of HH in accordance with WHO recommendations. However, in the current study only 132 (41.8%) students responded that hand rubbing is most effective method of hand cleansing than hand washing. In the current study medical students had less satisfactory knowledge regarding effectiveness of hand rubbing method. Our finding was in contrast with a study conducted by Ariyaratne *et al.* which reported a much higher 72.9% frequency.^{1,2,14} Time duration required by alcohol-based hand rubs to kill most of germs on hands was known correctly by only 65 (20.6%) of participants in the present study. This finding was consistent with a study conducted in India which reported a frequency of 28%.¹⁵

Importance of alcohol-based hand rubs was mentioned in previous studies.^{2,16} However, only 85 (26.9%) participants in present study preferred to use alcohol-based hand rubs

over various other products of HH. Study conducted by Immanuel *et al.* is in agreement with our findings as they reported 22.9% of HCWs who used alcohol-based hand rubs. This infrequent practice was probably due to lack of appropriate knowledge among HCWs, inadequate supply of alcohol-based hand rubs as well as work overload in government sector hospitals. Another important finding of the current study was that 129 (40.9%) of participants were aware of hand hygiene method needed before giving injections. Immanuel *et al.* reported a similar result in which 39.4% participants were aware of similar variable. This slight difference in results was may be due to inclusion of all HCWs in their study. This also signifies that professional status of HCWs is significantly associated with HH knowledge.¹⁷

In the current study 190 (60.1%) participants believed to obtain effective knowledge of HH from class room lectures. Similarly, Thea *et al.* in a 2010 survey recorded that 57.1% students considered class lectures as a highly effective method of learning HH.¹⁸ Study conducted by Ali *et al.* reported that only 31.6% students were found to follow all steps of hand washing technique. This finding is consistent with a low frequency 21.5% of medical students in our study who reported to perform hand washing techniques accurately. ($P=0.109$). This reduction in practice was may be due to poor compliance and increase work load.¹⁹

Curriculum of undergraduate medical students should emphasize on HH. We suggest that HH practices of students should be evaluated during hospitals postings and exams. It will be helpful in training best medical practitioners who will not become a source of HCAs.

The limitations-single centered study and cross sectional nature of the study. Moreover, HH practices of participants were purely self-reported and reporting bias may be encountered in this study. Due to the single centered study: the result of this study cannot be generalized for the entire public sector healthcare facilities for hand hygiene.

CONCLUSION:

Majority of medical students in both preclinical and clinical groups were well aware of HH practices and its significant role in infection control. However, only a limited number of students routinely performed HH. The difference between knowledge and practice of students was mainly due to the inadequate facilities of hand washing in public sector hospital.

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