Original Research Article

Insight into the knowledge, attitude and practices of hand hygiene with alcohol based hand rubs in a public sector tertiary care hospital of a developing country

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ABSTRACT

Background: Health care worker's hands are mostly responsible for transmission of healthcare associated infections (HCAI). In such instances, alcohol based hand rubs have been endorsed by WHO as the gold standard for hand hygiene for visibly clean hands; whereas, for visibly dirty hands soap and water is recommended. In developing countries (like Pakistan), affected people frequently exceed 25%. However, limited infrastructure in these countries hinders the performance of hand hygiene, but the use of alcohol-based hand rubs in such adverse situations is a practical solution to these constraints.

Methods: In January 2021, we initiated a 12 week cross-sectional study in a public sector tertiary care hospital of Karachi, Pakistan. All participants were given a self-designed questionnaire with a consent form thereby giving us permission to use the data. Data was analyzed using statistical package for the social sciences (SPSS version 23).

Results: 84.3% of the participants had received prior instructions on hand hygiene; however 71.7% respondents did not have access to alcohol based hand rubs. When questioned if they followed WHO's five moments of hand hygiene, only 50.5% use alcohol based hand rubs before patient contact; 88.6% used it after patient contact; 83.2% after body fluid exposure risk; 77% before an aseptic task and 78.6% after contact with patient's surroundings.

Conclusions: There is a dire need for concerned authorities to enforce proper hand hygiene in public hospitals of developing countries in order to curb health care associated infections and prolonged hospital stays.

Keywords: Healthcare associated infections, Hand hygiene, Developing country, Alcohol based hand rub, WHO, Tertiary care hospital

INTRODUCTION

Hand hygiene is a fundamental component of personal hygiene. Health care workers' hygiene ultimately has a direct or indirect impact on a patient's outcome; therefore, poor hand hygiene may not only result in self-harm but also poses a threat on patients' health.¹

Health care worker's hands are the most frequent agents for the transmission of HCAI to and from patients and hospital environments.² According to Magill et al on any day approximately 1 in 25 admitted patients will acquire at least one health care associated infection. Pneumonia and surgical site infection were seen as the most common acquired infection and *C. difficile* as the most common pathogen.³

Among the consequences of HCAI are prolonged hospital stays, long term disability, increased resistance of microorganisms to antibiotics, financial burden and excess deaths. In such instances, alcohol based hand rubs have been endorsed by WHO as the gold standard for hand hygiene for visibly clean hands; whereas, for visibly dirty hands soap and water is recommended in health care facilities.⁴ CDC authors have also shown preference for alcohol based hand rubs for hands which are not visibly soiled.⁵

Alcohol based hand rubs has an edge over soap and water in certain ways:⁶ more effectively kills harmful pathogens present on hands than soap and water; saves time; more easily available as compared to hand washing sinks; relatively reduced bacterial count on hands and less irritation and dryness than soap and water.

The WHO in order to curb the spread of hospital acquired infections introduced the evidence-based concept of my five moments for hand hygiene. The aim of this concept was to reinforce the practice of hand hygiene in five instances:⁷ before touching a patient; before performing aseptic and clean procedures; after being at risk of exposure to body fluids; after touching a patient, and after touching patient surroundings.

In developing countries (like Pakistan), the risk of developing healthcare associated infections was two to twenty times higher and the fraction of affected people frequently exceeds 25%. However, this data remained largely underestimated due to unreliable surveillance systems and irregularly collected data. Since, in developing countries there was inadequate access to soap and water and limited infrastructure, it hindered performance of hand hygiene, but the use of alcohol-based hand rubs was a practical solution to these constraints.⁸

A study done in a similar setting in Karachi, Pakistan highlighted that only 4.9% of the respondents practiced proper hand hygiene and only 17% were well informed about the WHO guidelines on hand hygiene.⁹

Keeping these aspects in consideration, we felt the need to carry out this study to determine the knowledge, attitude and practice of health care professionals towards usage of alcohol based rubs, to improve hand hygiene while interacting with patients in a healthcare facility.

In recent times, there has been a drastic surge in health care associated infections which poses a health hazard to admitted patients. Even though this was a global issue it had significantly increased in the public hospitals of developing countries, mostly due to lack of infrastructure facilities, poor compliance and lack of awareness of hand hygiene. The results of this research will also help provide data that can be used to develop interventions in public hospitals in order to decrease hospital acquired infections.

METHODS

In January 2021, we initiated a 12 week cross-sectional study in one of the largest public sector tertiary care hospitals in Karachi, Pakistan. With a confidence level of 95%, a sample size of 384 was calculated. Using convenient sampling we interviewed 384 candidates. Considering that, 9 (2.3%) out of 384 candidates refused to take part in the study and further 5 (1.3%) left the questionnaires incomplete which were ultimately discarded, the corporation rate came out to be 96.4%. All students, doctors and nurses posted in the hospital and present at the time of our data collection period were allowed to participate. All wards were visited only once to avoid repetition of data. A self-administered questionnaire was constructed unanimously by the authors keeping in mind WHO's guidelines. All participants were required to fill a consent form thereby giving us permission to use the data. Not only were the respondents thoroughly ensured of maintaining confidentiality, they could also opt out if they did not wish to participate.

The questionnaire consisted of 16 questions. The questionnaire focused on the knowledge of the participant. It included questions regarding prior instructions given on hand hygiene and awareness regarding usage of alcohol based hand rubs for unsoiled and soiled hands. The questionnaire also involved attitudes of participants regarding alcohol based hand rubs. They were given questions to assess their attitudes towards usage of alcohol based hand rubs while interacting with a patient without communicable disease, on a lunch break, after removing gloves and their response in a situation where there was non-availability of alcohol based hand rubs. The questions also dealt with practice related questions, pertaining to availability of alcohol-based hand rubs in the hospital, if the respondents carried their personal alcohol-based hand rubs and if they clinically complied to the five moments of hand hygiene of WHO.

Data was analyzed using statistical package for the social sciences (SPSS version 23). Chi squared test was applied to compare responses based on gender and designation, to find possible statistical correlations.

RESULTS

A total of 370 students, nurses and doctors, working in one of the largest public sector tertiary care hospitals in Karachi, filled the questionnaire out of which 106 (28.6%) were males and 264 (71.4%) were females. Among the 370 interviewees, the majority of them were doctors (N=150, 40.5%), followed by 140 (37.8%) medical students and 80 (21.6%) nurses. Demographics are shown in Table 1.

It was encouraging that most of the participants (N=312, 84.3%) had received prior instructions on hand hygiene

and were also aware (N=327, 88.4%) that for visibly dirty hands (hands smeared by blood, fluids) hand washing was preferred over the use of alcohol-based hand rub. However, only around two-thirds (N=225, 60.8%) knew that for apparently clean hands alcohol-based hand rub was preferably used in comparison to hand washing.

Table 1: Demographic of the study.

Basic characteristics	Variables	N (%)
Gender	Males	106 (28.6)
	Females	264 (71.4)
Designation	Medical students	140 (37.8)
	Nurses	80 (21.6)
	Doctors	150 (40.5)

Table 2: Adherence to WHO's five moments of hand hygiene at various outcomes.

Adherence to WHO's five moments of hand hygiene	Yes (%)	No (%)
Before patient contact	183 (49.5)	187 (50.5)
After patient contact	328 (88.6)	42 (11.4)
After body fluid exposure risk	308 (83.2)	62 (16.8)
Before aseptic task	285 (77)	85 (23)
After contact with patient's surroundings	292 (78.9)	78 (21.1)

Table 3: Response of the participants to the question asked in the questionnaire; characterized by gender.

Questions		Males (%)	Females (%)	P value
Were you given any instructions on hand hygiene?	Yes	88 (83)	224 (84.8)	0.385
For unsoiled hands alcohol-based hand rubs are preferred	Yes	72 (67.9)	153 (57.9)	0.048
For soiled hands hand washing is preferred	Yes	99 (93.3)	228 (86.3)	0.037
Will you use an alcohol base hand rub while interacting with a patient having a non-communicable disease?	Yes	62 (58.4)	198 (75)	<0.001
How do you practice hand hygiene before a lunch break?	Use a hand rub	43 (40.5)	72 (27.2)	0.009
	Wash hands	63 (59.4)	192 (72.7)	
How do you practice hand hygiene after removing gloves?	Use a hand rub	62 (58.4)	127 (48.1)	0.100
	Wash Hands	30 (28.3)	93 (35.2)	
	None of them	12 (11.3)	27 (10.2)	
	All of them	02 (1.8)	18 (6.8)	
Are alcohol-based hand rubs available in your working area?	Yes	33 (31.1)	78 (29.5)	0.428
	No	73 (68.8)	186 (70.4)	
If no, do you carry one?	Yes	44 (60.3)	156 (83.9)	<0.001
Use alcohol-based hand rub before patient contact	Yes	61 (57.5)	122 (46.2)	0.032
Use alcohol-based hand rub after patient contact	Yes	92 (84.4)	236 (89.3)	0.293
Use alcohol-based hand rub after body fluid exposure	Yes	91 (85.8)	217 (82.1)	0.246
Use alcohol-based hand rub before an aseptic task	Yes	82 (77.3)	203 (76.8)	0.520
Use alcohol-based hand rubs after contact with patient's surroundings	Yes	84 (79.2)	208 (78.7)	0.522
What will you do if after interaction with a patient alcohol-based hand rubs aren't available?	Borrow it	27 (25.4)	65 (24.6)	0.049
	Wash hands	67 (63.2)	187 (70.8)	
	Work without it	12 (11.3)	12 (4.5)	

Table 4: Response of the participants to the question asked in the questionnaire; characterized by profession.

Questions		Medical students	Nurses	Doctors	P value
Were you given any instructions on hand hygiene?	Yes	119 (85)	66 (82.5)	127 (84.6)	0.877
For unsoiled hands alcohol-based hand rubs are preferred	Yes	90 (64.2)	58 (72.5)	77 (51.3)	0.004
For soiled hands hand washing is preferred	Yes	129 (92.1)	75 (93.7)	123 (82)	0.006
Will you use an alcohol base hand rub while interacting with a patient having a non-communicable disease?	Yes	102 (72.8)	37 (46.2)	121 (80.6)	<0.001

Continued.

Questions		Medical students	Nurses	Doctors	P value
How do you practice hand hygiene before a lunch break?	Use a hand rub	66 (47.1)	19 (23.7)	30 (20)	<0.001
	Wash hands	74 (52.8)	61 (76.2)	120 (80)	
How do you practice hand hygiene after removing gloves?	Use a hand rub	69 (49.2)	37 (46.2)	83 (55.3)	0.662
	Wash hands	48 (34.2)	31 (38.7)	44 (29.3)	
	None of them	13 (9.2)	08 (10)	17 (11.3)	
	All of them	10 (7.1)	04 (05)	06 (04)	
Are alcohol-based hand rubs available in your working area?	Yes	29 (20.7)	29 (36.2)	53 (35.3)	0.100
	No	111 (79.2)	51 (63.7)	97 (64.6)	
If no, do you carry one?	Yes	96 (86.5)	25 (49.1)	79 (81.4)	<0.001
Use alcohol-based hand rub before patient contact	Yes	60 (42.8)	44 (55)	79 (52.6)	0.133
Use alcohol-based hand rub after patient contact	Yes	130 (92.8)	67 (83.7)	131 (87.3)	0.099
Use alcohol-based hand rub after body fluid exposure	Yes	122 (87.1)	55 ((68.7)	131 (87.3)	<0.001
Use alcohol-based hand rubs before an aseptic task	Yes	113 (80.7)	62 (77.5)	110 (73.3)	0.326
Use alcohol-based hand rubs after contact with patient's surroundings	Yes	116 (82.8)	58 (72.5)	118 (78.6)	0.193
What will you do if after interaction with a patient alcohol-based hand rubs aren't available?	Borrow it	45 (32.1)	09 (11.2)	38 (25.3)	<0.001
	Wash hands	91 (65)	58 (72.5)	105 (70)	
	Work without it	04 (2.8)	13 (16.2)	07 (4.6)	

Surprisingly almost 30% of the participants declined the use of an alcohol-based hand rub after contact with a patient with a non-communicable disease. While the majority of people (N=255, 68.9%) washed their hands before their lunch break, around one-third (N=115, 31.1%) used an alcohol based hand rub. After removing gloves, it was observed that half (N=189, 51.1%) of the participants used an alcohol based hand rub, while few preferred to wash their hands (N=123, 33.2%), some did both (N=20, 5.4%) and some (N=38, 10.3%) neither washed their hands nor used an alcohol based hand rub. In instances of non-availability of alcohol based hand rubs, more than two-thirds (N=254, 68.6%) responded they will wash their hands, one-fourth said they will ask around for one (N=92, 24.9%) and a few (N=24, 6.5%) replied they will continue working without it.

A major concern was highlighted in our study, an overwhelming majority (N=259, 71.1%) of medical students, nurses and doctors working in Jinnah postgraduate medical center, Karachi; did not have access to alcohol based hand rubs in their working area (wards). However, when further asked if they carried their own

86.4% replied affirmatively. Participants were then asked if they followed WHO's five moments of hand hygiene; it was observed that half of them (N=187, 50.5%) didn't use alcohol based hand rub before patient contact, but most of them did use it after patient contact (N=328, 88.6%); (N=308, 83.2%) after body fluid exposure risk; (N=285, 77%) before an aseptic task, like secretions aspiration, wound dressing, catheter insertion, preparation of food, medications and N=292, 78.6% after contact with patient's surroundings (Table 2).

Chi-square tests were conducted and the results were compared between the genders and based on the designation of the participants, medical students, nurses, doctors.

It was observed that almost equal percentages of males and females had received prior instructions regarding hand hygiene ($p=0.385$), but males comparatively had more knowledge than their female counterparts. However, the majority of the females practiced hand hygiene after contact with a patient with a non-communicable disease ($p\leq 0.001$) and washed their hands

before their lunch breaks ($p=0.009$). Females were more likely to carry their own alcohol based hand rubs in situations of non-availability in their wards ($p\leq 0.001$). However, during our study we observed comparatively better compliance of WHO's five moments of hand hygiene by the male participants (Table 3).

It was observed that although the majority of students followed by doctors and nurses had received prior instructions regarding hand hygiene ($p=0.877$), nurses comparatively had more knowledge than others. However, the majority of the doctors practiced hand hygiene after contact with a patient with a non-communicable disease ($p\leq 0.001$) and washed hands before their lunch breaks ($p\leq 0.001$). Students were more likely to carry their own alcohol based hand rubs in situations of non-availability in their wards whereas nurses were the least likely ($p\leq 0.001$). However, during our study we observed variable compliance of WHO's five moments of hand hygiene by the participants. Medical students followed by doctors and then nurses were more likely to practice it. To elaborate, medical students were slightly more likely to practice hand hygiene after patient contact ($p=0.099$) before an aseptic task ($p=0.326$) and after contact with the patient's surroundings ($p=0.193$). Even though more nurses used alcohol based hand rub before patient contact ($p=0.133$), they were less likely to comply with the remaining four moments. The comparative results with their significant differences have been shown in Table 4.

DISCUSSION

Paramount knowledge and consequent practice of hand hygiene according to the standards set forth by the WHO was the foremost step in curbing health care associated infections. WHO had recommended the use of alcohol-based hand rubs as a hand disinfectant based on its superlative qualities of fast acting and broad spectrum microbicidal activity thereby improving compliance by making the process quicker.¹⁰ However, keeping in mind the lack of infrastructure in public sector hospitals of developing countries, its availability and the consequent practice of better hand hygiene became a major challenge.

Globally, it was a prerequisite for medical practitioners to gain sufficient knowledge about hand hygiene. In light of this, respondents were asked if they had received prior instructions on hand hygiene, 84.3% replied positively. This was higher than the studies carried out in Jeddah, Saudi Arabia (64.2%) and Raichur, India (79%); however, it was slightly lower in comparison to a study carried out in Nigeria (86.7%).^{1,11,12} More focus should be put in ensuring that all future and current health practitioners are given prior instructions because in order to practice safely, prior knowledge was absolutely necessary.

As stated earlier, for unsoiled hands alcohol based hand rubs are preferred but only 60.8% of our participants were

aware of this fact. This finding, even though unsatisfactory, was comparably more than a study carried out previously in which only 38% people were aware of the fact.¹³

In developing countries, various factors played a vital role in preventing health professionals from practicing hand hygiene, these included inadequate running water at sinks, unavailability of alcohol hand rub or liquid soap, increased workload, negligence/poor attitude, lack of knowledge, insufficient funding or bad structural design of ward.¹⁴ In our study one major focus was the availability of alcohol based hand rubs. Surprisingly, an underwhelming minority (30%) of our participants had access to them. Even though this figure had almost doubled (16.7%) in the last 10 years, previously highlighted in a study carried out in the same setting but still remained remarkably low.⁹ This might be the reason for the low adherence of health care workers to the set standards. Hence, provision of better facilities may aid in better care for all.

Although the majority of the participants somewhat followed the latter four moments of hand hygiene set down by WHO, a huge deficit was seen when questioned regarding practicing hand hygiene before patient contact. Over half of the participants did not clean their hands before patient contact. This was very alarming and places the patients at extreme risk. It highlighted the fact that health care workers were aware of the possible risks and were focused in ensuring their well-being and self-care. As somewhat this behavior might also be the reason for low compliance, more awareness programs should be launched focused on the impeccable danger imposed on the patient's health as a result of the attitudes of health professionals towards hospital acquired infections. Previous study done in the same setting reported that 27.5% respondents never practiced hand hygiene before patient contact, this had significantly increased over the years, as in our study a staggering 50.5% did not clean their hands before patient contact.⁹

Medical students were the most likely to follow the five moments of hand hygiene as compared to doctors and nurses, this demonstrated that clinical experience had no link to hygienic practice. Our finding was also mirrored in a recent study where the younger age group was more likely to comply, as the recent surge in hospital acquired infections had led to more emphasis on certain preventive measures.¹⁵ Our study found out that even though nurses had more knowledge regarding hand hygiene, they were the least likely to adhere to WHO's standards of hand hygiene. A similar study done in Pakistan also endorsed our findings stating that nurses were less likely to practice hand hygiene, which was quite the opposite in various other international studies.^{12,16,17}

According to our study, males had more knowledge and were more likely to practice hand hygiene. This gender disparity, though endorsed by a similar study in our

setting, was quite the reverse otherwise.¹⁵ Previous studies in Saudi Arabia stated that females had more knowledge and a better attitude towards hand hygiene.^{11,18} On the other hand, a Nigerian study did not notice any gender disparity.¹

In order to improve this situation, certain measures should be taken. Firstly, an obligation should be made to incorporate hand hygiene under public health teaching as a separate entity into the undergraduate medical curriculum, not only in formal teaching but also clinical assessments.¹⁹ Secondly, organizing promotional campaigns focused on hand hygiene would also help spread awareness.²⁰ Other than that an induction course for all new doctors on hand hygiene should be included, which was already a prerequisite for annual practicing license registration in most countries, availability of posters on hand washing at strategic locations, and the availability of alcohol-based hand rubs had also shown to result in better practice of hand hygiene.^{21,22}

Most of the studies done pertaining to this issue were either outdated or on a relatively smaller scale. Therefore, we believed that more comprehensive studies should be done, comparing multiple setups from public as well as private sector healthcare facilities.

Our study had certain limitations. Firstly, different results would have been obtained in a different time period. Also, this study only included data from a public sector hospital, the results might differ if a similar study was carried out in a private setup.

CONCLUSION

In conclusion, in order to successfully tackle the rise of healthcare associated infections there is a dire need to pay focus on hand hygiene. As a huge deficit of the availability of alcohol based hand rubs was highlighted in the public hospitals of this setting, this research also encourages concerned authorities to give special attention to the installation of alcohol based hand rubs which is currently an urgent need in order to increase efficiency, save time which in turn would increase compliance.

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