

## Knowledge, attitude, and practices regarding infection control measures among medical students

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### Abstract

**Objective:** To assess the knowledge, attitude and reported practices of medical students regarding infection control measures.

**Method:** The cross-sectional, questionnaire-based study was conducted at one public and one private medical university in Karachi from January to February 2016. The students enrolled were in their clinical years of the Bachelor of Medicine, Bachelor of Surgery course and their knowledge, attitude and practice were measured regarding infection control measures. SPSS 19 was used to analyse data.

**Results:** There were 413 medical students with a mean age of  $21.78 \pm 1.10$  years. Overall, 206(49.9%) students were from the private university and 207(50.1%) from the public institution. Students from the private institution had better knowledge compared to those from the public institution regarding hand hygiene ( $p < 0.001$ ), needlestick injuries ( $p < 0.001$ ) and surgical scrubbing ( $p = 0.007$ ), as well as better reported practices regarding hand hygiene ( $p < 0.001$ ) and surgical scrubbing ( $p = 0.001$ ).

**Conclusion:** Knowledge and practices of medical students regarding the method of surgical scrubbing and needlestick injury protocols in particular needed improvement.

**Keywords:** Infection control, Hand hygiene, Needlestick injuries, Universal precautions, Surgical scrubbing, Medical students. (JPMA 68: 1065; 2018)

### Introduction

Healthcare-associated infections (HAIs) are infections that a patient acquires during their stay at a healthcare facility. HAIs also include infections that appear after getting discharged and occupational infections among healthcare workers.<sup>1</sup> HAIs are a major cause of morbidity, mortality and economic burden.<sup>2,3</sup> The incidence of HAIs has been reported as 15.5 per 100 patients in developing countries as compared to 7 per 100 patients in developed countries.<sup>4</sup>

In tertiary care settings, patients come in contact with a wide range of healthcare professionals including medical students and the poor adherence of healthcare workers to Infection Control Measures (ICMs) contributes to HAIs.<sup>5</sup> Literature shows that hand hygiene, surgical scrubbing and adherence to Needle Stick Injury (NSI) protocols and universal precautions are key methods for controlling and reducing the spread of HAIs.<sup>1,6</sup>

Hand hygiene plays a vital role in controlling and reducing spread of HAIs, yet it has been observed that

practices of hand washing among healthcare personnel are poor.<sup>6</sup> Lack of awareness regarding World Health Organisation (WHO) guidelines on scrubbing practices has been noted amongst healthcare professionals, contributing to surgical site infections (SSIs).<sup>7</sup> Conversely, better knowledge regarding prevention of SSIs via proper scrubbing techniques has been implicated to reduce HAIs.<sup>8,9</sup> Similarly, a study from Pakistan showed that only 29.7% of NSIs that occurred among medical students were reported to the hospital authorities, lack of awareness being the main reason.<sup>10</sup> Another imperative component essential for reduction of HAIs is adherence to Universal Precautions (UP) which involve the use of personal protective equipment with the approach of treating all human blood and certain human body fluids as if they were known to be infectious.<sup>11</sup>

The current study was planned to assess knowledge, attitude and practices regarding four major components of ICMs among medical students in urban setting. Medical students were chosen as the study population in order to tackle this problem at the grassroots level as these students are in their formative years as future clinicians. These results can potentially contribute

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to shaping the curriculum regarding ICMs in medical colleges with the aim of reducing the burden of HAIs in the future.

## Subjects and Method

The cross-sectional, questionnaire-based study was conducted at one public and one private medical university in Karachi from January to February 2016. The students enrolled were in the clinical years which are 3rd, 4th and 5th year of their Bachelor of Medicine, Bachelor of Surgery (MBBS) course. Ethical approval was obtained from the two institutions and written, informed consent was taken from the participants. An equal number of students were recruited from public and private universities through convenient sampling techniques after sample size calculation. Flyer containing information regarding ICMs was provided to each respondent following the completion of questionnaire for the purpose of debriefing. Data was collected through a self-administered questionnaire which had four sections to assess four specific components of ICMs — hand hygiene, UPs, NSIs and surgical scrubbing techniques. Questions for the hand hygiene section were taken from a questionnaire by WHO on the same topic. We obtained permission to use it via email before commencement of our study.<sup>12</sup> In each section, questions were asked regarding how much training the student received regarding each specific component of ICMs in the last year, if they felt a need for more training, questions to test their knowledge and self-reported practices regarding how and when to perform hand hygiene and surgical scrubbing, what to do in case of an NSI and which scenarios warranted the use of gloves, goggles and other aspects of UPs.

Data was entered and analysed using SPSS 19. Frequencies were generated of the responses of students to the various questions. Each section had a different total number of questions. The percentage of questions answered correctly about knowledge and practices of the students regarding each of the 4 sections was calculated separately for each section. Mean  $\pm$  standard deviation was calculated for the knowledge and practices separately. Independent Sample T Test was used to compare the means of public and private universities.

## Results

Of the 413 students, 177(42.9%) were males and 236 (57.1%) were females. The mean age of the students was  $21.78 \pm 1.10$  years. Of these, 206 (49.9%) were from the private institution and 207 (50.1%) from the public

**Table-1:** Training received on Four Major Aspects of Infection Control in last 12 months.

| Components of Infection Control Measures                         | Frequency (%) |
|------------------------------------------------------------------|---------------|
| <b>Hand hygiene training duration in last 12 months</b>          |               |
| None                                                             | 60 (14.5)     |
| <1 hour                                                          | 231 (55.9)    |
| 1 to 3 hours                                                     | 107 (25.9)    |
| >3 hours                                                         | 15 (3.6)      |
| <b>Universal precautions training duration in last 12 months</b> |               |
| None                                                             | 181 (43.8)    |
| <1 hour                                                          | 134 (32.4)    |
| 1 to 3 hours                                                     | 86 (20.8)     |
| >3 hours                                                         | 12 (2.9)      |
| <b>Needle stick injury training duration in last 12 months</b>   |               |
| None                                                             | 176 (42.6)    |
| <1 hour                                                          | 135 (32.7)    |
| 1 to 3 hours                                                     | 81 (19.6)     |
| >3 hours                                                         | 21 (5.1)      |
| <b>Surgical scrubbing training duration in last 12 months</b>    |               |
| None                                                             | 91 (22.0)     |
| <1 hour                                                          | 222 (53.8)    |
| 1 to 3 hours                                                     | 82 (19.9)     |
| >3 hours                                                         | 18 (4.4)      |

institution. Overall, 120 (29.1%) were from the 3rd year of the MBBS programme, 188 (45.5%) 4th and 105 (25.4%) were from the 5th year.

The least amount of training received was for UPs with 181 (43.8%) students receiving no training at all (Table-1). Students of private institutes reported having received greater training compared to their public counterparts in all the four aspects of infection control ( $p < 0.05$ ).

With regards to attitude, 343(83.0%) and 333(80.6%) students felt that they need more training regarding Needle Stick Injuries (NSI) protocols and UPs. Moreover, 199(48.2%) students felt that they don't feel free to report safety violations regarding ICMs (Table-2).

With regard to knowledge of hand hygiene, 202 (48.9%) students correctly defined hand rubbing and 226 (54.7%) knew the correct minimal time required for hand washing. However, 110 (26.6%) students knew the correct definition of a NSI and only 76(18.4%) knew what to do if hand comes in contact with something during the process of surgical scrubbing.

With regards to self-reported practices, 358(84.5%), 271(65.6%), 236(57.1%) and 167(40.4%) students reported use of gloves, mask, protective clothing and goggles as UPs, respectively. However, the reported use of a disposable outer garment 140 (34.1%) and eye shields 99(24.0%) was comparatively less (Table-3).

**Table-2:** Attitude regarding Infection Control Measures.

| Attitude Questions                                                              | Frequency (%)  |            |            |                   |                |
|---------------------------------------------------------------------------------|----------------|------------|------------|-------------------|----------------|
|                                                                                 | Strongly Agree | Agree      | Disagree   | Strongly Disagree | Not Applicable |
| I cannot follow hand hygiene because patients' care is more important           | 37 (9.0)       | 128 (31.0) | 143 (34.6) | 97 (23.5)         | 8 (1.9)        |
| I cannot always follow universal precautions because patients' needs come first | 25 (6.1)       | 121 (29.3) | 171 (41.4) | 69 (16.7)         | 27 (6.5)       |
| I feel free to report safety violations regarding universal precautions         | 40 (9.7)       | 159 (38.5) | 129 (31.2) | 53 (12.8)         | 32 (7.7)       |
| I need more training regarding universal precautions                            | 154 (37.3)     | 179 (43.3) | 41 (9.9)   | 12 (2.9)          | 27 (6.5)       |
| I need more training regarding needle stick injury protocols                    | 172 (41.6)     | 171 (41.4) | 46 (11.1)  | 9 (2.2)           | 15 (3.6)       |
| I think there are adequate facilities in my institution for surgical scrubbing  | 147 (35.6)     | 162 (39.2) | 25 (6.1)   | 15 (3.6)          | 64 (15.5)      |

**Table-3:** Percentage of questions answered correctly about knowledge and practices.

| Variable                                                 | Total (N=413)       | % Questions Answered Correctly Mean $\pm$ SD |                           | P Value* |
|----------------------------------------------------------|---------------------|----------------------------------------------|---------------------------|----------|
|                                                          |                     | Public Institute (N=207)                     | Private Institute (N=206) |          |
| Knowledge regarding Hand Hygiene                         | 72.58 $\pm$ 15.91   | 67.47 $\pm$ 16.70                            | 77.60 $\pm$ 13.34         | <0.001   |
| Knowledge regarding Universal Precautions                | 70.39 $\pm$ 25.31   | 68.68 $\pm$ 24.43                            | 71.98 $\pm$ 26.06         | 0.197    |
| Knowledge regarding Needle stick injuries                | 72.25 $\pm$ 16.49   | 68.44 $\pm$ 14.79                            | 75.97 $\pm$ 17.23         | <0.001   |
| Knowledge regarding Surgical scrubbing                   | 49.51 $\pm$ 25.88   | 46.00 $\pm$ 28.07                            | 52.94 $\pm$ 23.09         | 0.007    |
| Practices regarding Hand Hygiene                         | 82.68 $\pm$ 23.30   | 74.27 $\pm$ 25.89                            | 91.18 $\pm$ 16.52         | <0.001   |
| Practices regarding Universal Precautions median (range) | 33.33 (0.0 - 100.0) | 33.33 (0.0 - 100.0)                          | 33.33 (0.0 - 100.0)       | NA       |
| Practices regarding Needle stick injuries                | 62.04 $\pm$ 27.36   | 57.41 $\pm$ 26.69                            | 66.67 $\pm$ 27.74         | 0.217    |
| Practices regarding Surgical scrubbing                   | 72.88 $\pm$ 22.24   | 68.84 $\pm$ 24.04                            | 76.57 $\pm$ 19.80         | 0.001    |

\* Independent Samples T Test.

Altogether, 77(18.64%) students had a history of NSI, but 40(51.94%) of them did not report it to their superiors.

Knowledge of students from the private institution was better compared to those from public regarding hand hygiene ( $p < 0.001$ ), NSIs ( $p < 0.001$ ) and surgical scrubbing ( $p = 0.007$ ). Similarly, practices of students from the private institution were better compared to those from public regarding hand hygiene ( $p < 0.001$ ) and surgical scrubbing ( $p = 0.001$ ).

## Discussion

Our study found that 51.94 % of students who had a needlestick injury did not report it. A study carried out in India showed similar results.<sup>13</sup> This shows that there is a problem of underreporting of NSIs. This could be because students do not know what course of action to follow after NSI. An evidence of this lack of knowledge about NSI is the finding that 83% of the students felt that they need more training regarding NSIs. Similarly, in a study conducted in Brazil, 96.40% of medical students were dissatisfied with previously received instructions on exposure prevention.<sup>14</sup> Keeping in mind the significant role of NSIs in infection spread, steps should be taken to encourage students to report NSIs and to familiarize them with guidelines about what to

do in case of an NSI. These guidelines should be displayed in key areas in the hospital setting in the form of posters or distributed as flyers or manuals.

We found that students had poorest knowledge on surgical scrubbing with a mean percentage of only 49.51% questions answered correctly. Very few studies have been conducted so far on knowledge, attitude and practice (KAP) of medical students regarding surgical scrubbing. However, a study conducted on doctors and nurses revealed that they were unaware of the appropriate allotted duration of surgical scrubbing.<sup>15</sup> This was similar to what we observed in our study; 75.8% and 45.4% students did not know the appropriate duration of the first scrub of the day and subsequent scrubs, respectively. Thus we found that knowledge regarding surgical scrubbing needs to be improved. Medical colleges should place more emphasis on this in their curriculum and should display the WHO guidelines with pictorial guidance in areas designated for scrubbing.

The highest level of knowledge observed in our study was in the hand hygiene section. Two studies carried out in India, one in Pune and another in Karnataka, showed similar results, with a high level of knowledge regarding hand hygiene in medical students, 85.00%

and 79.25% respectively.<sup>16,17</sup> However, an important finding in our study was that 54.7% of students do not wash their hands after removing gloves. A similar study carried out in Raichur, India, found that 25.80% of medical students felt that wearing gloves reduces the need for hand hygiene.<sup>18</sup> These practices are not in line with the WHO guidelines which state that hand hygiene is required before and after wearing gloves.<sup>19</sup> Therefore, we found that one of the gaps in knowledge of hand hygiene is that students do not know that they need to wash their hands after removing gloves and this misconception should be addressed in future training sessions for students. With regards to UPs, we found that 84.10% of students regarded all body fluids as infectious. Similarly, a study in Kuwait revealed that 77.30% of students assumed that all body fluids are infectious.<sup>20</sup> This study in Kuwait also showed poor practices with regards to UP (27.70%) which was similar to our study results which revealed that 33.33% of students reporting correct practices of UPs. Thus we found that the knowledge of our study participants regarding UP was not in line with their self-reported practices. Emphasis needs to be placed on translating this knowledge into action.

Students in private medical schools possessed significantly better knowledge on all 4 aspects of ICMs. This was also the case with practices of hand hygiene and surgical scrubbing respectively, showing that practices amongst medical students in private universities were better. The curricula of public universities are standardized, so we would expect similar findings among them, however as the curriculum of private medical universities varies, it is difficult to presume that all private universities will have similar results.

We assessed knowledge and practices on all the four components of infection control. Furthermore the study had representation from both public and private institutions. However we enrolled participants through convenient sampling and the questionnaire was self-administered.

Guidelines regarding NSI protocols and surgical scrubbing should be emphasised in medical colleges and should be prominently displayed in hospital areas as reminders for the students. Students should be made aware of who to contact in case of an NSI. Furthermore, the curriculum of public universities needs to place greater emphasis on ICM with follow-up studies done to assess student satisfaction and success of their training methods.

## Conclusion

Medical students exhibited a positive attitude towards gaining knowledge and improving their practices with regards to ICMs as they reported a need for more training. Our study has identified that the weak areas in knowledge and practices of medical students regarding ICMs are mainly about NSI protocols and the method of surgical scrubbing. Additionally, we found comparatively better knowledge and practices in a private compared to a public institution. These findings can potentially direct the shaping of curricula to reduce the incidence of HAIs in the future.

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