

## INFECTION PREVENTION AND CONTROL PRACTICES OBSERVED BY STUDENTS OF A MEDICAL COLLEGE

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### ABSTRACT

**Introduction:** Infection control is vital to ensure prevention of cross infection in the hospital. This study was conducted to determine the infection control measures practiced by medical students of a private medical college in Peshawar, Khyber Pakhtunkhwa.

**Materials & Methods:** A cross sectional descriptive study based on self-administered questionnaires was conducted from July-August 2016 at Jinnah Medical College, Peshawar, where 110 MBBS students of 3rd and 4th years were selected using convenient sampling technique. Data were analysed using SPSS version 20 for descriptive statistics.

**Results:** A total of 90(81.8% response rate) students participated in the study; 49(54.4%) were female and 41(44.6%) were male with ages ranging from 22-25 years. Regarding awareness, 87(96.7%) knew what the term 'infection' meant, and 77(85.6%) claimed knowledge of preventive measures for various infectious diseases. The main source of information 56(64.4%) was discussion in classrooms. Infection control practices were observed by 77(85.6%) students with handwashing considered as the core tool for infection control practices. Only 49(54.4%) students were aware that use of personal protective equipment (PPE) was considered as standard protocol for infection control. Similarly, 80(88.9%) felt that handling a patient without PPE can be a source of spreading infection. Majority of the students considered that raising awareness about infection prevention and control would be beneficial for the community.

**Conclusion:** Students of Jinnah Medical College were well informed about infections and most of them had acquired information from teachers and books for detailed understanding on this subject. Standard precautionary measures for Infection control were followed, however they only focused on handwashing and use of personal protective equipment (PPE) without understanding the details of infection control protocols.

**Keywords:** Hygiene; Hand Hygiene; Personal Protective Equipment; Cross Infection; Infection Control.

The authors declare no conflict of interest. All authors contributed substantially to the planning of research, questionnaire design, data collection, data analysis and write-up of the article and agreed to be accountable for all aspects of the work.

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### INTRODUCTION

Infection control is the discipline concerned with preventing nosocomial or healthcare-associated infection, a practical (rather than academic) sub-discipline of epidemiology.<sup>1</sup> It is an essential, though often under recognized and under supported, part of the infrastructure of health care.<sup>2</sup>

Healthcare-associated infections caused by drug-resistant micro-organisms especially gram-negative pathogens are a significant burden on the healthcare system.<sup>3,4</sup> Transmission of

Infection thus acts as a growing concern in all health care setups. Visitation to healthcare facilities is very common, though the potential role of visitors in the transmission of infection is unknown.<sup>3,4</sup> Infection control addresses factors related to the spread of infections within the healthcare setting (whether patient-to-patient, from patients to staff and from staff to patients, or among-staff members), including prevention (via hand hygiene / hand washing, cleaning / disinfection / sterilization, vaccination,

surveillance),<sup>5,6</sup> monitoring / investigation of demonstrated or suspected spread of infection within a particular health-care setting (surveillance and outbreak investigation), and management (interruption of outbreaks).<sup>6</sup>

Health care-associated infections (HCAIs) are important public health problems. They exert increased morbidity<sup>4</sup> and mortality<sup>5</sup>, and increase the health care cost, both in developed and developing countries.<sup>7,8</sup> It was stated by the International Nosocomial Infection Control Consortium that the pooled rate of central line-associated blood stream infections in the intensive care units in Asia, Africa, and Europe were 4.9 per 1,000 central line days, nearly fivefold higher than the rate reported from comparable US intensive care units. The overall rate of ventilator-associated pneumonia was also higher (16.8 vs 1.1 per 1,000 ventilator days), as was the rate of catheter-associated urinary tract infection (5.5 vs 1.3 per 1,000 catheter days). HCAIs are also associated with increased length of hospital stay and the emergence of multidrug-resistant bacteria.<sup>6,9</sup>

At least 5%-10% of patients admitted to acute care hospitals acquire an infection. It is estimated that one out of every 20 hospitalized patients will contract an HCAI. The risk is substantial not only for patients, but also for health care workers (HCWs), including medical students.<sup>10-12</sup> Hence, it is essential for medical students to have adequate knowledge about infection prevention and control (IPC) practices and to incorporate these in the professional training of medical students.<sup>13</sup>

Undergraduate medical education is the formative phase and appropriate moment for acquiring necessary knowledge and skills. There is lack of evidence regarding explicit infection control training in the curriculum of most medical undergraduate courses, which needs to be addressed if HCAI rates are to be reduced.<sup>14</sup> Although medical students consider IPC

practices, particularly hand hygiene, to be a relevant and important topic, they feel that learning about the topic may be compromised during their medical training due to the congested medical curriculum.<sup>15</sup> Thus the teaching and training requirements of undergraduate medical students regarding these practices needed to be assessed.

This study was undertaken to assess the awareness, and practice of the medical students toward basic infection control, such as standard precautions, hand hygiene, respiratory hygiene and cough etiquette, use of personal protective equipment, and the learning approaches that help improve their knowledge and practices.

## **MATERIALS & METHODS**

This was a cross-sectional survey conducted in Jinnah Medical College, Peshawar, Khyber Pakhtunkhwa during July to August 2016. All baccalaureate Medical Students from 3<sup>rd</sup> and 4<sup>th</sup> professional year were selected in the study. A sample of 103 out of 140 students was randomly selected assuming 50% anticipated population proportion, 0.05 level of absolute precision with a 95% confidence interval.

After approval of the synopsis, permission was taken from college authorities. A list of all students was obtained from student affair office. Every student was approached by the research team member and oral and written consent was taken. Data were collected from students on structured questionnaires in places convenient to them. A semi-structured pretested self-administrative tool was used for data collection. The questionnaire was developed by researchers covering key areas of Infection Prevention & Control measures (IPC) guidelines by W.H.O including hand hygiene, use of Personal Protective Equipment (PPE), knowledge about isolation precautions, cleansing and disinfection of medical equipment. Students were assisted by trained research team member in case of any

difficulty in understanding and filling the questionnaires.

Data were analyzed for descriptive statistics using SPSS version 20, and MS Excel was used for construction of graphs. For continuous data, mean and standard deviation was calculated, while categorical variables like gender, professional years, etc. were presented in terms of frequency and percentages.

## RESULTS

A total of 103 students were requested to participate in the study, out of whom 90 (response rate 87.3%) returned the filled questionnaire. Among respondents 49(54.4%) were female and 41(44.6%) were male. Regarding age group, majority of them were from 22 and 23 years of age (Figure 2).

## Awareness about Infectious disease among medical students

Almost all, 87(96.7%) reported that they knew what an ‘infection’ means, while 3(3.3%) replied that they still feel vague regarding the proper definition of ‘infection’. Similarly, 77(85.6%) claimed that they knew the preventives measures of infectious diseases, while 13(14.4%) were of the view that they were still not well versed with prevention of infectious disease. The main source of information was discussion in class rooms (college) as reported by 56(64.4%) students, while 20(23%) said that they had read about infection in textbooks. Similarly, 9(10.3%) students reported that acquisition of their knowledge was based on hospital rotations; only 2(2.3%) used internet for the said topic.

**Table 1: General awareness reported by students (n= 90).**

| #  | Awareness about infection                                | Frequency | Percent |
|----|--|-----------|---------|
| 1. | <b>Do you know what an infection is?</b>                 |           |         |
|    | Yes  | 87        | 96.7    |
|    | No   | 03        | 03.3    |
| 2. | <b>If yes, please specify where you heard this term?</b> |           |         |
|    | College  | 56        | 64.4    |
|    | Books  | 20        | 23.0    |
|    | Hospital   | 09        | 10.3    |
|    | Internet   | 02        | 02.3    |
| 3. | <b>Do you know what infection prevention is?</b>         |           |         |
|    | Yes  | 77        | 85.6    |
|    | No   | 13        | 14.4    |

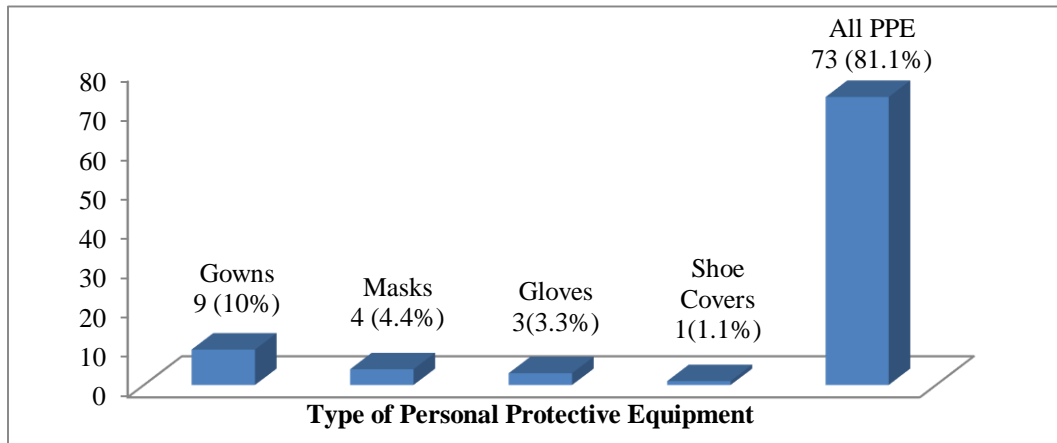
## Infection control practices among medical students

Regarding practices for infection control or standard precautions for prevention of infection, 77(85.6%) students reported that they came across this concept during their student life. All of them were of the view that hand hygiene / hand washing is one of the practices for infection control and standard precaution for prevention of infection, only 49(54.4%) of them added that use of

personal protective equipment (PPE) is also considered as standard protocol for infection control. Similarly, 80(88.9%) felt that handling a patient can be a source of infection. A similar proportion of students reported that they wear gloves when touching blood or secretion of an infected patient. All of them also agreed that everybody should use gown / plastic apron while attending surgical procedures; 73(81.1%) reported that they use gown, mask, gloves, and shoe covers during surgical

procedure, rest 19.9% indicated that 9(10.0%) use gown only and 4(4.4%) mask,

3(3.3%) used gloves only during surgical procedure as shown in Figure 1.



**Figure 1: Use of Personal Protective Equipment (PPE) by students**

Majority of students (77, 85.6%) had heard of infection control, while all (100%) believed that hand hygiene / hand washing could reduce the chances of getting infected. However only 49(54.4%) had heard of personal protective equipment (PPE), even though 80(88.9%) thought that handling patients could be a source of

infection. Regarding the practice of wearing PPE, all (100%) said that they wore gowns /plastic aprons while attending surgical procedures; however, 80(88.9%) wore gloves while touching blood or secretions of infected patients (Table 2).

**Table 1: Precautions and infection control practices by the students (n=90).**

| #  | Questions  | Frequency | Percent |
|----|--|-----------|---------|
| 1. | <b>Have you ever heard about infection control practices or standard precaution for prevention of infection?</b> |           |         |
|    | Yes  | 77        | 85.6    |
|    | No   | 13        | 14.4    |
| 2. | <b>Do you think hand hygiene / hand washing can reduce chances of getting infected?</b>                          |           |         |
|    | Yes  | 90        | 100.0   |
| 3. | <b>Do you know about PPE (personal protective equipment)?</b>  |           |         |
|    | Yes  | 49        | 54.4    |
|    | No   | 41        | 45.6    |
| 4. | <b>Do you think handling a patient can be a source of infection?</b>   |           |         |
|    | Yes  | 80        | 88.9    |
|    | No   | 10        | 11.1    |
| 5. | <b>Do you wear gloves when touching blood or secretion of an infected patient?</b>                               |           |         |
|    | Yes  | 80        | 88.9    |
|    | No   | 10        | 11.1    |
| 6. | <b>Do you wear gown / plastic apron while attending surgical procedure?</b>                                      |           |         |
|    | Yes  | 90        | 100.0   |

Apart from the hand washing and wearing of personal protective equipment (PPE) 42(46.7%) students observed additional measures or transmission based precautions while attending isolated high-risk patients (Table 3). When they were asked 'have you ever come across any information regarding infection control practices?', 35(38.9%) responded that they know about infection control, while 55(61.1%) were of

the view that they still need reading in this regard. Among those who have got information about infection control practices most of them, 17(48.6%) learnt it in college, 14(40.0%) got information from internet while 4(11.4%) developed awareness from hospitals. Similarly, 89(98.9%) considered that increase in awareness about infection prevention and control is beneficial for community.

**Table 2: Students' views about infectious disease transmission and its prevention (n=90).**

| #  | Questions  |          | Frequency | Percent |
|----|--|----------|-----------|---------|
| 1. | Have you ever observed any additional or transmission based precautions while attending isolated high-risk patients? | Yes      | 42        | 46.7    |
|    |  | No       | 48        | 53.3    |
| 2. | Have you ever come across any information regarding infection control practices?                                     | Yes      | 35        | 38.9    |
|    |  | No       | 55        | 61.1    |
| 3. | If yes, where did you learn?   | College  | 17        | 48.6    |
|    |  | Hospital | 04        | 11.4    |
|    |  | Internet | 14        | 40.0    |
| 4. | Spreading awareness about infection prevention and control is beneficial for community?                              | Yes      | 89        | 98.9    |
|    |  | No       | 01        | 01.1    |

## DISCUSSION

The concept of infection control is very old but is of paramount important as it is the core of medical practice ensuring the safety of patients and health care professionals including medical students. Awareness in this regard is very important; however, awareness alone is not enough for achieving safety goals without proper practice of the standards of infection control protocols.

General awareness about Infectious disease among medical students indicated that 87(96.7%) knew about infection. The study result is in consistence with other literature; a study conducted at University of Namibia<sup>28</sup> indicated that medical students had overall 73% scores of knowledge regarding infection control. It was also observed in this study that there was no significant difference in scores between sexes or location of the high school being either in rural

or urban setting. Another study from Taif University<sup>29</sup> conducted on Postgraduate medical students indicates that the overall awareness was 64.6%, though expected to be higher because they were the main cadres who dealt with patients daily.

Infection control practices were reported by 77(85.6%) medical students in the current study. Hand washing was considered as core tool for infection control practice. Jain et al<sup>30</sup> conducted a study on doctors and nurses to see the infection control practices in a tertiary care hospital. They found that there was lack of knowledge and practices regarding basic infection control, and recommended that protocols should be improved by way of educational intervention in the form of formal training of doctors and nurses with reinforcement. It has been shown that though

increasing knowledge should enhance competence, strategies to improve adherence to recommended use of PPE should focus on ready availability of equipment, training and fit testing and good communication practices.<sup>31</sup> In the present study, only 49(54.4%) subjects stated that use of personal protective equipment (PPE) was also considered as a standard protocol for infection control. There is also evidence that though knowledge among students is good, there is lack of adherence and compliance to safe practices.<sup>32</sup>

There is also not much information about the outcome of training medical students on PPE use. In the year 2009, a pilot study<sup>33</sup> was conducted on the use and awareness about PPE devices amongst semester 8 (year 4) medical students (Group A) during their Accident and Emergency (A&E) posting. The students were observed on their use of these protective devices when dealing with patients. It was found that though the students fared quite well in their questionnaire, they did not do so well when they faced patients and situations in the A&E.

The present study indicates that 77(85.6%) students claimed knowledge of preventive measures for infectious diseases, where the main source of information 56(64.4%) was discussion in class room (college) while 20(23%) said that they had read about infection in books, 9(10.3%) got information from hospital during rotations and only 2(2.3%) got awareness from internet. This indicates that inclusion of infection control topics in the curriculum may play a crucial role to increase awareness among medical students. The same have been reported by other researches.<sup>34</sup> A study in Tokyo Medical and Dental University reported that education on Nosocomial Infection Control (NIC) for pre-clinical practice in the clinic, so-called inclusive clinical practice phase I, for students in the Faculty of Dentistry was found to be an effective tool. It is therefore suggested that class room

discussion about NIC could be a useful tool for increasing the comprehension of students on the theme. Since students at lower grades will attend clinical practice in the university hospital, it is thought that students should be given NIC training early in the clinical course, and the current curriculum should be improved to increase the opportunity for students to study this important issue.<sup>34</sup>

Similarly, 80(88.9%) students felt that handling a patient can be a source of infection, and 42(46.7%) students observed additional or transmission based precautions while attending isolated high-risk patients. Rise in awareness about infection prevention and control was considered beneficial for community as reported by 89(98.9%) students. These findings were similar to studies by Jeffe et al,<sup>35</sup> where they reported that there was crucial improvement in knowledge, attitude and practices after students were given training on infection control precautions. Improving practice among students is good but the challenge is to ensure that there is long term effectiveness in terms of knowledge, since fulfilling of universal standards of infection control precautions has been documented as lacking.<sup>36</sup>

## **CONCLUSION**

Awareness of infection control and practice of precautionary measures were observed in most students; however, inadequacies were observed about the comprehensive meaning of infection control as indicated by emphasis given to only hand washing as core tool for infection control.

## **RECOMMENDATIONS**

Improving infection control practice among students along with proper documentation of compliance and adherence to recommended universal precautions may be required to increase knowledge, skills and practices of infection control among medical students.



## LIMITATIONS OF THE STUDY

The major limitation of this study was that it was a single-center study of a private medical college and may not reflect the majority of medical

students and / or colleges of Khyber Pakhtunkhwa or Pakistan. Moreover, the sample size was limited and could be a cause of biases in generalizing results.

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