

Original Research Article

Awareness of risk of infections to health care professionals and its preventive practices among medical students: a cross-sectional study

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ABSTRACT

Background: Occupational health is a neglected public health issue among healthcare workers in developing countries leading to health care associated infections both to patients and medical students unless infection prevention and control (IPC) measures followed. This study was conducted with an aim to assess the degree of knowledge regarding infection in health care professionals and infection control measures among medical students.

Methods: A cross-sectional study was conducted from June 1 to July 31, 2017 on 95 students in the MBBS final year Part I at Kurnool Medical College Kurnool by simple random sampling technique after taking informed consent. A semi structured questionnaire with information regarding their knowledge on risk of infection and infection prevention practices was used. Using SPSS ver. 20, data analysed in proportions and means.

Results: Mean age of the study participants was 20.29 ± 0.756 years, 83.2% (n=79) students expressed tuberculosis followed by Hepatitis B infection as the most common infection the medical students are exposed to. 97.9% definitely knew that they contact infections if standard precautions are not followed. Only 51.6% students were aware of all steps of hand wash. 83.2% were already vaccinated to hepatitis B and among vaccinated 73.4% had completed the course fully.

Conclusions: Effective infection prevention measures are pivotal in providing high quality health care for patients and a safe working environment for those that work in healthcare settings. Hence infection prevention and control guidelines particularly standard precautions should be incorporated into the curriculum before entering clinical postings.

Keywords: Infection control, Medical students, Knowledge

INTRODUCTION

Health care facility is not just any other workplace but a place for receiving and giving care to the sick. Health care facilities employ over 59 million workers globally. Health care professionals are exposed to intricate range of health and safety hazards in their day to day work which include biological hazards, such as HIV/AIDS, SARS, TB, hepatitis; chemical hazards, such as, xylene, glutaraldehyde; physical hazards, such as slippery floors,

electrical hazards, noise, radiation; ergonomic hazards, such as heavy lifting; psychosocial hazards, such as shiftwork, violence and stress; fire and explosion hazards. Exposure to these hazards are leading to a variety of air – borne, blood–borne infections, musculoskeletal disorders etc., Health-care workers (HCWs) slogging for the care of the sick and injured are always regarded as not vulnerable for injury or illness, though they are the one's who need utmost protection from these workplace hazards just as any other mining or construction workers.¹

A health care worker (HCW) contacts blood borne infection at work place on “occupational exposure” either through a percutaneous injury (e.g., needle stick or cut with a sharp instrument), or contact with the mucous membranes of the eye or mouth, non-intact or intact skin only when the duration of contact with blood or other potentially infectious body fluids is prolonged.² Thus occupational exposure poses significant risk of transmission of blood borne pathogens such as human immunodeficiency virus (HIV), Hepatitis B virus and Hepatitis C virus among HCWs especially medical students. WHO global burden of disease from sharps injuries to health-care workers showed that 37% of the hepatitis B among health workers was the result of occupational exposure to blood and bloody fluids. Though infection with the hepatitis B virus is 95% preventable with immunization, less than 20% of health worker in some regions of the world have received all three doses needed for immunity. Less than 10% of the HIV among health workers is the result of an exposure at work, mostly through needle stick injuries. The cause of 95% of the HIV occupational seroconversions, are preventable with practical, low-cost measures and have the co-benefit of preventing exposure to other blood borne viruses and bacteria.¹

Risk of exposure to blood-borne pathogens to HCWs can be effectively reduced through adherence to standard precautions by applying the basic principles of infection control through hand washing, utilization of appropriate personal protective equipment (PPE) such as gloves, masks, gowns, and eyewear, appropriate use of safety devices and efficacious needle disposal system at the work place.³ Prior vaccination of HCWs is one of the revolutionary step to protect patients attending health care centres from becoming infected to certain diseases especially hepatitis B through exposure to infected health care workers.

In developing countries, including India, the knowledge and understanding of the infection prevention and control measures and compliance to these among health professionals has been found to be inadequate, inspite of detailed and strict guidelines. Scenario in developed countries was no better than any developing country.^{4,6} Occupational hazards and the occupational safety of healthcare workers was always overlooked. Even the few literatures we have now regarding awareness of risk of infections and its control measures were either performed on professional healthcare workers or undergraduate dental students. Medical students as the vulnerable group who are at risk of acquiring blood – borne infections is always a neglected issue. Hence forth very few studies involved undergraduate medical students as research subjects. The studies done have addressed only the psychological issues (anxiety, stress, depression) the medical students are facing in this profession and rarely focused on the perilled situations during the professional training especially infection exposure, safety and control measures. The medical students during the course would

be regularly attending the in-patient and out-patient clinics along with operation theatres where they come in contact with the infected patients and are exposed to a variety of pathogens. Thus to protect themselves, though not from all hazards atleast from these dreadful infections, assessment of their knowledge, attitudes and practices for health care associated infections (HAI) is of crucial importance.

Aims and objectives

This study was conducted with an aim,

1. To assess the degree of knowledge regarding infection risk in health care professionals among medical students of Kurnool Medical College, Kurnool.
2. To evaluate the knowledge and practice of the infection control measures.

METHODS

This cross-sectional study was conducted from June 1 to July 31, 2017. The study participants included students in the MBBS final year Part I at Kurnool Medical College (KMC), Kurnool. These students were included in the study because the clinical postings for the medical students start from the 2nd year onwards only according to MCI guidelines. The sampled population consisted of students in the final year part I MBBS, which at any point in time includes 200 students. A sample size of 95 was calculated considering a power of 80%, an absolute precision of 10% and a confidence level of 95%, assuming the awareness levels for infection prevention practices to be 55% among medical students. The simple random sampling technique was used to select students for the study after taking informed consent. A semi structured questionnaire was used to collect information regarding their knowledge on risk of infection to them and information in relation to the awareness of participants about various domains of infection prevention practices such as hand hygiene, needle stick injury prevention and standard precautions (SPs). WHO’s concept of “My five moments for hand hygiene” has been utilized to evaluate hand hygiene practices.⁷ The questionnaire was pretested before the data collection, and necessary modifications were made in terms of content and language. The data obtained from the completely filled proformas was entered and analyzed using SPSS ver. 20. The analysis was performed in terms of descriptive statistics (proportions and means). Ethical clearance was obtained from the Institutional Ethics Committee (IEC) before the study was started.

RESULTS

In our cross-sectional study, 95 students of Final Year Part I participated whose mean age was 20.29±0.756 years. Of whom participated 52 (54.7%) and 43(45.3%) were male and female students respectively. On probing

for the most common infections the medical students are exposed to in wards, 83.2% (n=79) students expressed Tuberculosis followed by 78.9% (n=75) hepatitis B infection (Figure 1). On questioning medical students knowledge regarding the most common pathogens isolated in our hospital where the participants opined that *Mycobacterium tuberculosis* and *M. leprae* together contribute 83.2%, *Streptococcus pyogenes* 71.6% and *Staphylococcus aureus* 58.9%. Books, teachers, internet, mass media, friends and peers all together (91.6%) were source of the participants' information regarding infection risk in health care professionals and measures to be followed to protect from cross infections.

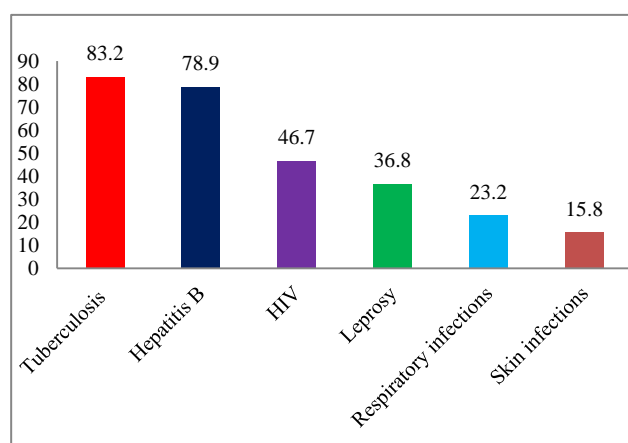


Figure 1: Knowledge of infectious diseases risk among medical students.

83.2% (n=79) students expressed Tuberculosis followed by Hepatitis B infection by 78.9% (75) as the most common infections the medical students are exposed to in wards.

Knowledge of infection exposure risk and its preventive measures of medical students

Majority, 92.6% of participants knew the probable source of infection, 97.9% definitely knew that health care professionals contact infections if standard precautions

were not followed. Under standard precautions majority of participants were knowledgeable regarding importance of hand washing with disinfectant, wearing shoes, face mask, gloves, and aprons while examining patients and respiratory patients should be advised to wear face mask. 77.9% of participants were aware of the procedures during which they were at risk of acquiring needle stick injury while only 32.6% knew that they should not recap after using needle. Majority of the participants, 74.7% knew about bio-medical waste management as shown in Table 1.

Hand hygiene knowledge

Table 2 shows that 96.8% of participants recommend hand hygiene to protect themselves from contacting infection. Only 51.6% students were aware of the correct and all steps of hand wash. More than ninety percent recommend hand wash with alcohol or other disinfectant before abdominal examination of patient and after attending clinical postings. 78.9% of positive indications for hand hygiene outlined in the questionnaire were correctly identified. All positive indications of hand hygiene were aware only to 38.9% (37) of students.

Knowledge and practice of blood borne infections and prevention

Parenteral route like blood transfusion, needle stick injury or other ways of infected blood contact as the route of transmission of hepatitis B infection was known by 94.7% of participants while sexual and vertical route by 41.1% and 32.6% respectively. All the routes of transmission was known only to 21 (22%) of participants. 95.8% knew that hepatitis B infection can be prevented by vaccination. 83.2% were already vaccinated to hepatitis B and among vaccinated 73.4% had completed the course fully. ART centre should be contacted after accidental exposure of HIV reactive body fluids according to 51.6% participants and that too within 24 hours by 66.3% (Table 3).

Table 1: Knowledge of risk of infections and its preventive measures among study participants.

| S.no | Characteristics | Number (%) |
|------|---|------------|
| 1 | Source of occupational infections | 88 (92.6) |
| 2 | Absence of standard precautions as source of infection | 93 (97.9) |
| 3 | Hand washing minimizes risk of infectious disease | 88 (92.6) |
| 4 | We should wear gloves while handling medical waste, biological samples and doing procedures on patients | 93 (97.9) |
| 5 | Never to recap after using needle | 31 (32.6) |
| 6 | Procedures where needle prick injuries likely to occur | 74 (77.9) |
| 7 | To wear shoes while attending clinical | 85 (89.5) |
| 8 | To wash your aprons regularly | 92 (96.8) |
| 9 | To wear face mask while examining respiratory case | 91 (95.8) |
| 10 | To advice Patients with respiratory illness to wear face mask | 86 (90.5) |
| 11 | About bio-waste management | 71 (74.7) |

97.9% definitely knew that health care professionals contact infections if standard precautions were not followed. Majority of participants were knowledgeable regarding standard precautions. Only 32.6% knew that they should not recap after using needle. Majority of the participants, 74.7% knew about bio-medical waste management.

Table 2: Hand hygiene knowledge.

| S. no. | Characteristics | Number (%) |
|--------|--|------------|
| 1 | Is hand hygiene recommended to prevent infections | 92 (96.8) |
| 2 | Is hand hygiene (washing with antiseptic soap/alcohol hand rub) recommended? | |
| A | Before abdominal examination | 86 (90.5) |
| B | Before blood sample extraction with gloved hands. | 64 (67.4) |
| C | After dressing the wound with gloved hands | 70 (73.7) |
| D | After shaking hands with patients at the end of detailed history taking session | 83 (87.4) |
| E | After touching apparently clean linen bedding or food package in the patient's room. | 72 (75.8) |
| F | After attending clinical postings | 89 (93.7) |
| 3 | Steps of surgical hand wash | 49 (51.6) |

96.8% of participants recommend hand hygiene to protect themselves from contacting infection. Only 51.6% students were aware of the correct and all steps of hand wash.

Table 3: Knowledge and practice of blood borne infections and prevention.

| S.no | Characteristics | Number (%) |
|------|---|------------|
| 1 | Routes of hepatitis B transmission | |
| | a. Blood borne | 90 (94.7) |
| | b. Sexual | 39 (41.1) |
| | c. Vertical | 31 (32.6) |
| 2 | Hepatitis B infection prevented by vaccination (Yes) | 91 (95.8) |
| 3 | Hepatitis C infection prevented by vaccination (No) | 69 (72.6) |
| 4 | Vaccinated for hepatitis B | 79 (83.2) |
| 5 | No. of doses of hepatitis B vaccine taken n=79 | |
| | a. 1 dose | 05 (6.3) |
| | b. 2 doses | 16 (20.2) |
| | c. 3 doses | 58 (73.4) |
| | d. Booster (n=58) | 17 (29.3) |
| 6 | First to contact after accidental exposure of HIV | |
| | a. Casualty medical officer | 25 (26.3) |
| | b. ART centre | 49 (51.6) |
| | c. Others | 03 (3.3) |
| 7 | Initiation time for post exposure prophylaxis after accidental exposure to HIV? | |
| | a. As soon as possible | 7 (7.4) |
| | b. Within 24 hrs | 63(66.3) |
| | c. Don't know | 25 (26.3) |
| 8 | When do you use gloves? | |
| | a. When you have skin cut | 10 (10.5) |
| | b. Attending HIV reactive patients | 6 (6.3) |
| | c. Every time you examine the patient | 8 (8.4) |
| | d. All the above | 80 (84.2) |

Parenteral route like blood transfusion, needle stick injury or other ways of infected blood contact as the route of transmission of Hepatitis B infection was known by 94.7% of participants while sexual and vertical route by 41.1% and 32.6% respectively. 95.8% knew that Hepatitis B infection can be prevented by vaccination. 83.2% were already vaccinated to Hepatitis B and among vaccinated 73.4% had completed the course fully. ART centre should be contacted after accidental exposure of HIV reactive body fluids according to 51.6% participants and that too within 24 hours by 66.3%.

Overall scoring for knowledge on standard precautions, personal protective equipments, hand washing had been done. Mean scoring was 20.89 ± 2.443 . Poor knowledge scoring of <19 was seen in 17.9%, satisfactory knowledge in 53.7% and good knowledge in 28.4% of the medical students. Statistically significant association of knowledge levels was not seen with gender.

DISCUSSION

This study was carried out to assess the knowledge levels of final year MBBS part I students regarding their risk of acquiring infections and infection prevention practices. Majority of medical students (95.83%) in a study done by Pavani et al, opined that medical profession put health

care professionals at risk of hepatitis B infection while 78.9% knew so in our study.⁸

Only 68-73% of the medical students from a college in Hyderabad knew bio-medical waste management rules which says that all infective materials should be discarded in yellow colour bags and waste sharps and needles in white color bags; similarly 74.7% knew about bio-medical waste management in our study.⁸ Hand washing reduces the incidence of health care associated infections was known to 71.3% of medical students in a study done by Tarek et al in Saudi Arabia while in our study most of the students (92%) were aware of it.⁹ Even 82.1% of the medical students knew that used needles should not be recapped which was far more than our study result where only 32.6% knew it.⁹ Patients with illnesses spread by droplets or spray must wear the facemask was known to 92% of medical interns in a study done in Saudi Arabia which was similar to our respondents knowledge.¹⁰

Cleaning the hands at the right time is the most crucial practice not only to save life but also to reduce the spread of antimicrobial resistance. Across all settings from advanced health care facilities to primary healthcare centers "Hand hygiene" is the single most cost-effective and practical measure to reduce the incidence of healthcare-associated infections.¹¹⁻¹³ To address the problem of lack of compliance with hand hygiene, continuous efforts are being made to identify effective and sustainable strategies. One of such efforts is the introduction of an evidence-based concept of "My five moments for hand hygiene" by World Health Organization. These five moments that call for the use of hand hygiene include the moment 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. This concept has been aptly used to improve understanding, training, monitoring, and reporting hand hygiene among healthcare workers.⁷

In our study all positive indications of hand hygiene were aware only to 38.9% (37) of students and near similar results were seen in other studies too.^{14,15} In a study done by Kumaril, only 58% of medical students had the knowledge of all the steps of hand washing techniques which was similar to our study result.¹⁶

Only very few, 22% of our medical students knew various modes of transmission of hepatitis B contrary to which 85.42% of the respondents were aware of it in other similar study.⁸ Blood transfusion, needle stick injury or other ways of infected blood contact as the route of transmission of hepatitis B infection was known by 94.7% of participants while sexual and vertical route by 41.1% and 32.6% respectively and similar results were seen in other studies.^{8,17} Compared to ours, knowledge of sexual and vertical transmission was more than 70% in studies done by Singh at Ahmedabad and Al – Hazim.^{18,19}

Knowledge about transmission of hepatitis B were well below expected levels in study done by Paul at Chennai.¹⁷ Though 93.5% of the students believed that hepatitis B is preventable, only 84 - 86% were aware of a vaccine for hepatitis B prevention in other studies which was similar to the response we noticed in our study wherein 95.8% respondents were aware of this preventive fact.^{8,17-19} However, only 73.4% of the participants were completely vaccinated against hepatitis B infection similar to other studies.^{16,17} But very poor vaccination coverage of 36.46% and 52.2% was observed in another studies done in similar setting.^{8,19} 66.3% students expressed that anti-retroviral therapy should be started within 24 hours of accidental exposure to needle stick injury while attending HIV patient, similar to which 89% of third year students felt the same in another study.⁴ The World Health Organization (WHO) contributing to the patient safety program through "Clean Care is Safer Care" (CCISC), launched in 2005 and Save lives: Clean your hands campaigns launched in 2009 dedicated to the prevention of HCAI. World Hand Hygiene Day is celebrated every year on 5th May with this year's theme being "It's in your hands to prevent sepsis in health care" with a forethought of a simple procedure of cleaning hands can save life from HCAI.^{16,20}

Limitations

This study was conducted in only one institute setup. It was a cross-sectional survey done using self-reporting questionnaire for assessment of awareness and practice, on a limited sample size and thus, likely to be affected by bias. As the first and in regular contact of the patients are health workers, nurses, residents and doctors, we could have got more informative data on including them in the study regarding HCAI.

CONCLUSION

Knowledge of the medical students regarding infection source is adequate but infection prevention practices was relatively less particularly needle stick injury prevention, hand hygiene techniques, blood borne infection control. In spite of this, majority of them were vaccinated against Hepatitis B infection which substantiates the awareness against infection protection. Insufficient and ineffective instructions to medical students through the curriculum pose them vulnerable to health facilities related infections. Proper curricular reform and training protects students and their patients. Finally to reinforce the knowledge of universal precaution continually Information Education Communication (IEC) campaign should be strengthened by placing and maintaining IEC material at every work place. We recommend performing infection control education programs at the college level before starting the clinical practice years along with seminars and feedback, highlighting importance of IPC guidelines to increase safety of our graduates and patients. Education should be enhanced by peers, seniors, and HCWs by acting as role models of infection control.

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