

The practice of PPE amongst fourth year medical students at A&E. Where are we?

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Background: This cross sectional study was done to identify the areas of lack of knowledge, practice and awareness of students about the effective use of personal protective equipment (PPE).

Methods: A total of 40 students were selected when they were posted to the accident and emergency unit (A&E) in Seremban Hospital; all of them answered a questionnaire and were observed unaware on the effective use of PPE in the A&E.

Results: We found that 17.5% of students were unaware of the right technique of removing the gloves after a procedure and 25% of students were unaware of safety of hand washing. During invasive procedures, 12.5 % of students did not wash their hands before invasive procedures, 65% did not wear aprons and 57.5% did not wear masks. During non- invasive procedures more than 25% of students did not wash hands before or after the procedures.

Conclusion: There is still significant lack of knowledge in students about the effective use of PPE that needs to be addressed.

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Introduction

During their entry into the clinical semester, all students are briefed and taught about the use and importance of personal protective equipment (PPE). The use of PPE has become standard practice in all hospitals and a lot of emphasis is made about the appropriate use of these equipment. The students are taught about the importance of the practice as they will be exposed to all kinds of situations during their clinical years which may jeopardize their health as well as affect patient safety. This project was undertaken to determine if the students actually practice what had been taught about the use

of PPE during clinical practice when posted to various department and also to test the depth of knowledge of the students on the same subject using questionnaires.

Methodology

This is a cross-sectional study carried out over a period of three months involving students of Semester 8 (Year Four) posted to A&E in Seremban Hospital, Negeri Sembilan. All the students had been exposed to the use of PPE during their earlier postings. The students were observed unaware on the effective use of PPE. The practices observed were: hand washing, effective use of gloves, mask, apron and cleansing solutions by the students while attending to patients.

This is a single blinded study as the students had no knowledge of the observations made by the clinical skills unit (CSU) staff assigned to supervise the students during their rotation there. At the end of the two weeks posting, each student was given a questionnaire to test his or her knowledge on the use of PPE. This study continued until the end of the semester. We looked at questions where more than 10 % of students answered incorrectly and considered them as areas that needed reinforcement or remedy.

Results

There were 40 students involved in the study. The questions where more than 10% of students answered incorrectly are listed in Table 1.

Table 1: Questions where more than 10% students answered incorrectly

No.	Question	%
1	Hand washing is the single most important precaution for preventing the spread of infection	25
2	Stethoscopes are a vehicle for transmission of infections.	10
3	If you have an accidental exposure immediately wash exposed skin with soap and water or flush exposed mucus membranes with water and then report the incident to your supervisor	15

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No.	Question	%
4	You must wear a special mask when you enter the room of a patient on airborne precautions.	10
5	The proper way to take off your gloves is to pull at the fingers until the gloves slide off.	17.5
6	The Facility where you are attached to has a protocol called "hand hygiene".	12.5

Table 2: Percentage of students performing invasive procedures effectively or non-effectively (venipuncture, setting IV lines, administering drugs, intubation, and defibrillation and suctioning).

	Practice	Effective	Non - Effective
1	Wash hands before task with alcohol rubs	35 (87.5%)	5 (12.5%)
2	Wear plastic apron	14 (35%)	26 (65%)
3	Wear mask	17 (42.5%)	23 (57.5%)
4	Wear gloves	40 (100%)	0 (0%)
5	Discard sharps into the sharp bin	37 (92.5%)	3 (7.5%)
6	Remove gloves	40 (100%)	0 (0%)
7	Remove mask	17 (42.5%)	23 (57.5%)
8	Wash hands with alcohol rubs after the task	40 (100%)	0 (0%)

Table 2 summarises the percentage of the students that performed the various invasive procedures either effectively or non-effectively. It was noted that 92.5% of students discarded the sharps into the bin while the rest in fact dropped them into the kidney tray. Only 42.5% wore masks during the invasive procedures. All the students washed their hands after the procedures while only 87.5% did so before a procedure.

Table 3: Percentage of students performing non-invasive procedures effectively (assisting with patient's personal needs, performing ECG, preparing equipment, placing O2 mask on patients and administering nebulizers).

	Practice	Effective
1	Wash hands before task	12 (30%)
2	Wash hands after task	10 (25%)

When performing non- invasive procedures, 70% of students did not wash hands before a task and 75% of them did not wash after the task (Table 3).

Discussion

The use of personal protective equipment (PPE) has increased among the medical personnel over the years as a result of increased awareness of infections amongst health workers and the need for personal and patient safety. Posters and the media have been used to propagate the information. Recent epidemics like SARS and H1N1, have made a lot of difference in terms of increased awareness amongst health care personnel and medical students about the importance of PPE use.¹ In fact, there is a poster showing the correct method of hand washing close by to every wash basin in our teaching hospitals. The importance and technique of use is initiated in the medical school with the hope that students carry this into their medical career as they progress on. Use of PPE has been emphasized to the students time and again beginning at the preclinical phase and reinforced during orientation at start of the clinical phase. At present, topics on standard precautions like hand washing are introduced in the early semesters (1 to 3) but they are done as a single lecture or during clinical skills sessions. While introducing these topics in the early semester is a good move, there must be however, some consistency in delivery which is progressive, so that students can imbibe this in their day to day practice. Some form of emphasis must be made in each semester in the form of lecture, clinical skills session or workshop for there to be some impact in students' knowledge and attitude. For the clinical year students, the present practice is that when they start Semester 6 (second half of Year 3 when they enter the clinical phase of teaching), they are introduced to the topic of hand washing and needle prick injury during their orientation week at the clinical school. Their next exposure after that is during the internal medicine posting (Year 3) where they are taught how to hand wash and don gloves in the CSU which is a single session during their rotation. Besides this, during

the surgical posting (early Year 4) they are also taught to scrub for surgery and again the technique of wearing gloves. The rest of the practice and knowledge is picked up as they go through all their other postings as there is no dedicated session on this after Year 3.

In this study we found that the students have a relatively good knowledge about the use of PPE. However, there were some questions where more than 10% of students made mistakes. We were interested in the areas where most of the mistakes were made so that we could improve on those areas. Technique of glove removal seems to be one such area. While most of the students wore gloves for invasive procedures, a significant proportion of them (17.5%; Table 1) were unaware about the right technique of removing the gloves.

Hand washing has been accepted globally as the most important measure to prevent and control health care-associated infections.^{2,3} Unfortunately 25% of the students seemed to be unaware of this. It is rather surprising to know that 17.5 to 20% of the students are unaware of the potential safety risk to them while attending to polytrauma patients. This is not in keeping with our teaching that every polytrauma patient is treated as potentially infective and hence PPE should be utilised as a self-precautionary measure.^{2,4,5}

It was surprising to find that 12.5% of students were not aware of the hand washing protocols available at the hospital. In our hospital, hand washing protocols are available as small posters at every hand washing area and at most of the critical areas of the hospital.

Thus, it was not clear whether the students understood the question or that they were genuinely unobservant. A study done locally in the same university on knowledge and practice of hand-washing showed that although knowledge in the technique of effective hand washing and awareness of its importance among medical students is satisfactory, it did not relate well when practice was assessed.⁶

In our study, 10% of students were not aware that stethoscopes can be a source of infection or that one

should wear a special mask on entering a room with a patient with possible airborne infection. (eg isolation room). Although this is a small percentage of students, it is still worrying to note the lack of knowledge in this area.

During invasive procedures 12.5% students did not wash their hands, 65% did not wear apron and 57.5% did not wear mask while attending to the patients. This is not acceptable and thus this area has to be strengthened. During non-invasive procedures, a significant proportion of the students did not wash hands before (70%) and after (75%) performing the non-invasive procedures. Only a small number of the students performed effectively in the non-invasive procedures. Students are probably more relaxed with the notion that the non-invasive procedures are less harmful.

A study done on 110 students to determine the long-term knowledge retention of infection control among fourth-year medical students who received training in their second year showed that although there was a significant knowledge increase about infection control immediately after participating in the intervention, there was no significant knowledge retention about infection control two years later.⁷ Thus this raises the question as to whether continued emphasis on the topics during the third year may have produced better results in terms of retention of knowledge. Although our students showed relatively good knowledge, there are still areas they have to improve on and they need to put to practice what they know. There is a need to find ways to ensure that this knowledge on PPE use and practice of standard precaution is translated to a habit that is second nature to them. There appears to be a tendency to throw caution to the wind especially with the non-invasive procedures which needs to be remedied in the future; this can be done by reinforcing knowledge on PPE use and practice during all the postings. A meaningful move would be to emphasize this at the beginning of each posting, improve faculty practice as students learn from our actions and small group workshops whenever possible.

Patient safety has become part of the medical curriculum in many academic institutions including IMU and our medical graduates need to be well versed in the components of patient safety. Generally not many studies have been done to assess the young doctors who pass out on their knowledge and practice of PPE. A survey done on 151 senior medical students (Year 4) at the University of Washington in 1992 on their knowledge of universal precautions was rather disappointing. The survey showed that many students, immediately before they graduated, lacked adequate knowledge of universal precautions in ten chosen clinical procedures (drawing blood, suturing, contact with coughing patient, suctioning airway, placing endotracheal tubes, gastrointestinal lavage, intravenous line insertion, casual contact with patients and touching non-intact skin).⁸ Although our students were not assessed on all the same procedures, they appear to have some similarities in terms of lack of practice with PPE and this further emphasizes the need for change.

Behavior and attitude undeniably play a role in compliance to safe practices by health care workers and students. A review of several behavioral theories (Health Belief Model, Theory of Reasoned Action and Theory of Planned behavior, self-efficacy and the Transtheoretic Model) notes that none of the theories consistently predict behaviors. However it has been discussed that some of the common contents of the theories (self – efficacy, beliefs, perceived health threats, cues, attitudes, intention and the stages and processes of change) can be integrated into an intervention to improve infection control practices.⁹ Improvement in attitude and readiness to comply with the right practice becomes possible if measures in the form of skills training and educational programs are undertaken early, such as in the preclinical phase and continued right through all the phases of medical school.

During their rotations in each department these young, would be doctors are exposed to different kinds of practice by health personnel, some of which may be incorrect. This has made teaching of the right practices a challenge. If there is a strong and clear idea of the proper use of PPE and infection control practices by the time

they reach clinical phase, these good practices could be further reinforced more effectively in the clinical years with fewer risks of them being influenced by incorrect practices.

Conclusion

There are still areas where the students' knowledge and correct practice of PPE is lacking. The present teaching sessions conducted appear to be inadequate, perhaps because there is no continuity and emphasis. More emphasis on the effective use of PPE should be initiated in the early clinical years and subsequently reinforced in the later clinical years. Protocols, posters, video demonstration and small workshops during some postings at the clinical skills unit would be a great help in strengthening the students' knowledge and compliance with the use of PPE.¹⁰

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