Occupational exposure to blood and body fluids in medical students

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ABSTRACT

Many studies have shown that medical students are at risk of occupational exposure to blood-borne pathogens. This study sought to determine the number of incidents of occupational exposure sustained by a class of final year medical students, using questionnaires to collect data. At the end of their final year examinations, all students (n = 205) were asked to complete an anonymous self-reporting questionnaire; the response rate was 94.1% (n=193). Of these students, 22.2% (n=43) reported an occupational exposure to body fluids, 41.8% (n=18) of whom regarded their exposure as high risk. At least 39.5% (n=17) of all the source patients were HIV positive. Many of the students who experienced occupational exposure did not follow universal precautions or the recommended post-exposure prophylaxis guidelines (n=16; 37.2%). Greater attention and awareness is required with regard to preventive measures, as well as enhancing compliance with the recommended policies and protocols.

Keywords: post-exposure prophylaxis, needlestick injuries, universal precautions, blood-borne pathogens, exposure-prone procedures

INTRODUCTION

Occupational exposure to blood and other body fluids is not uncommon in the health care setting, with 55% of interns at a large Durban hospital reporting at least one exposure during their internship in 2010.¹ The incidence of occupational exposure has not changed much in 12 years: a study in 1998 showed that 69% of interns had sustained a percutaneous needlestick injury during their internship year at Chris Hani Baragwanath (CHB) hospital.² The risk of occupational exposure is not limited to qualified healthcare professionals. Medical students are expected to learn procedural skills, such as taking blood, putting up drips, doing lumbar punctures, and assisting in theatre during their undergraduate training. In 2002, a study reported 19 incidents of occupational exposure among 136 final year medical students over a 15-week period at Tygerburg Hospital.³ A report from Canada showed that 33% of the final year class had sustained at least one needlestick injury, and that 11% to 50% of medical students have some occupational exposure to blood or blood products during their training.⁴ A study in Germany reported that the incidence of needlestick injuries among medical students increased from 12% among first year students to 41% among fourth year medical students.⁵

There are few reported studies on occupational exposure to blood and other body fluids or reporting practices among medical students in South Africa. Although policies⁶-⁸ are in place to encourage preventive practices and to ensure that exposure to blood and body fluids is appropriately managed, under-reporting is common,²,⁹-¹⁰ potentially exposing health care professionals and students to serious infections. Accidental exposure to blood and blood products is a documented mode of transmission for many blood-borne pathogens, including Hepatitis B, Hepatitis C and the Human
Immunodeficiency Virus (HIV).\textsuperscript{6,9-11} Prevention of exposure by compliance with universal precautions in the handling of sharps and other material infected with blood and blood products is the primary way of preventing occupational exposure to these blood-borne diseases.\textsuperscript{9} Appropriate risk assessment and post-exposure prophylaxis (PEP), following occupational exposure plays an important role in reducing the risk of HIV transmission by up to 80%.\textsuperscript{9,11}

Under-reporting of exposure is common, with only 64% of needlestick injuries reported in the study at CHB hospital.\textsuperscript{2} Among medical students in Canada, only 46% of those who experienced a high risk exposure reported the incident.\textsuperscript{4} In Germany, a study reported that only 55% of medical students who sustained a needlestick injury reported the exposure.\textsuperscript{5} Appropriate reporting is essential, not only to monitor the incidence of occupational exposure, but also to identify areas of high exposure and to institute appropriate preventive measures. Reporting is also essential to ensure that healthcare workers and students receive appropriate counselling, prompt PEP, and follow up. With the high prevalence of HIV infection in South Africa,\textsuperscript{12} it is particularly important for healthcare workers and students to report all incidents of occupational exposure.

The objective of this study was to describe the number of needlestick injuries among a class of medical students, as well as to determine if they were appropriately reported and managed, and whether they attended the university occupational health department for the mandatory serology checks for HIV, Hepatitis B and Hepatitis C, following exposure, as well as for PEP when indicated.

The study was approved by the University of KwaZulu-Natal, Biomedical Research Ethics Committee (EXPO47/06), Dean of the School of Medicine, and the Medical Student Representative Committee.

METHODS

This was an observational descriptive study conducted on a final-year class of medical students at the University of KwaZulu-Natal in November 2006. Data were collected, using two self-administered questionnaires which were presented to all the students at the end of the academic year. The questionnaires were developed using available international and national literature on needlestick injuries, and were piloted among a small group of students to ensure that they could understand and respond to the questions.

After completing the last block of examinations, the entire class of 205 students was asked to complete an anonymous self-reporting questionnaire, comprising 47 questions about knowledge of universal precautions and PEP. Those who had been occupationally exposed to blood or body fluids during their final academic year (through a needlestick injury) were asked to complete an additional questionnaire, comprising 35 questions about the circumstances surrounding the injury. It asked for details about the exposure (when, where, and how), the HIV status of the source patient (if known), whether the incident was reported or not, any risk assessment that was undertaken, PEP (antiretroviral treatment [ART]), and follow-up care. The risk assessment primarily determines the nature of the exposure and the need for PEP based on the infectivity of the source patient, type of injury and the probability of HIV transmission. Most of the questions required a ‘yes’, ‘no’ or ‘do not know’ response; however, there was provision for comments at the end of both questionnaires.

Exposure was considered to be high risk if the injury was sustained by a hollow bore needle and the source patient was HIV-positive, or if the clinical picture suggested that the patient was HIV-positive. All other exposures, including mucosal exposure, were considered to be low risk.

The purpose of the research was explained to each student and all the participants received a summary of the study, including a consent form and a letter motivating them to participate. A study information sheet was available in English and students were informed that participation was voluntary. They were under no obligation to complete the questionnaires and were informed that there would be no
detrimental consequences if they chose not to participate. The questionnaires were anonymous and contained no identifying data.

Data were entered into an Excel spreadsheet and analysed using SPSS.

RESULTS

Of the 205 final year students, 94.1% (n=193) participated in the study. Forty-three students (22.2%) reported an occupational exposure to body fluids, of which 53.5% (n=23) were percutaneous and 46.5% (n=20) mucocutaneous injuries. Eighteen (41.9%) students classified their exposures as high risk. Two students reported three separate incidents of occupational exposure and seven students reported two incidents of exposure each.

The female/male ratio of the students was 60/40, with 81.5% of the injuries occurring in female students.

The students rotate through various departments in their final year. As shown in Figure 1, the clinical departments where the occupational exposures occurred were obstetrics and gynaecology (37.2%; n=16), medicine (20.9%; n=9), surgery (16.3%; n=7), family medicine (14.0%; n=6), psychiatry (7.0%; n=3), paediatrics (4.7%; n=2).

The most common procedure associated with a needle-stick injury was a phlebotomy (39.5%; n=17), followed by assisting in theatre (18.6%; n=8), suturing (11.6%; n=5), and other procedures, as shown in Figure 2.

Forty-two per cent (n=18) of the students regarded their exposure as high risk. However, only 44.4% (n=8) of those had a formal post-exposure risk assessment, although 88.9% (n=16) started PEP.

Details about the exposed students’ self assessments, risk assessments and PEP are shown in Table 1. From the students’ answers on the questionnaires, the researchers independently evaluated the risks (as high or low), based on their professional knowledge and experience. They agreed with 11 of the 18 students who rated their risk as high; seven of the students over-estimated their risks. They agreed with 22 of the 25 students who considered their exposure to be low risk; 3 students under-estimated their risks.

PEP was obtained from various sources. Sixty-three per cent (n=27) of the 43 students reported that they started PEP following an injury, with 77.7% (n=21) of these students obtaining the treatment from the hospital where the occupational exposure occurred. Twenty-four of the 27 students (88.8%) started ART within the first hour of exposure. However, only 20 (74.1%) completed the required 28-day course.

Thirty-seven students (86.0%) who experienced a needle-stick injury answered the question about the status of the source patient. In 45.9% (n=17) of these cases, the source patient was known to be HIV positive.

Only 12 of the exposed students (27.9%) attended the university occupational health department for the required HIV and Hepatitis C serology follow up checks at three months.

DISCUSSION

All medical students are vaccinated for Hepatitis B on entry into the medical school, with confirmatory immunity checks post-vaccination. However, they are at risk of acquiring other blood-borne infections, such as HIV and Hepatitis C, when performing exposure-prone procedures. The risk of HIV transmission in occupational settings was identified in the early 1980s when the Acquired Immune Deficiency Syndrome (AIDS) was first described.13 Fifty-four documented HIV seroconversions occurred among healthcare workers in the United States from 1985 to 1995.14 However, since 1999, no proven HIV transmission has been reported in the United States after occupational exposure to body fluids due to the initiation of potent PEP and other preventive measures.14

In keeping with other studies,5,6 this study has shown that occupational exposure to blood and body fluids is relatively frequent among undergraduate medical students during the course of their clinical training in clinics and hospitals. Prompt reporting of all occupational exposures is essential for timely post-exposure management. In the South African context of heavy workloads and staff shortage in many public hospitals, medical students are often expected to do the “menial jobs” of taking blood and inserting intravenous lines, putting them at risk of occupational exposure to blood and blood products.15 Over and above this, students are considered to be a high risk group because of their inexperience, lack of skills and poor knowledge of PEP,5 and this should be taken into consideration when allocating clinical tasks to students.

We cannot be certain if the 43 reported incidents represent the total number of occupational exposures, as students might have forgotten some past exposures. However, as

Table 1. Exposed students’ self assessments, risk assessments and PEP

<table>
<thead>
<tr>
<th>Students’ self-assessment of risk</th>
<th>Researcher agreed with self-assessment</th>
<th>Formal risk assessment conducted</th>
<th>PEP taken</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>High risk</td>
<td>18</td>
<td>11</td>
<td>61.1</td>
</tr>
<tr>
<td>Low risk</td>
<td>25</td>
<td>22</td>
<td>88.0</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>33</td>
<td>76.7</td>
</tr>
</tbody>
</table>
needlestick injuries and other occupational exposures are stressful events, it is likely that the students had good recall of all their exposures. Regardless, 22% represents a high number of students potentially exposed to infectious material and this is cause for concern.

In keeping with findings from other studies, many students who were occupationally exposed to blood or other body fluids did not report the exposure and were at risk of seroconversion. This is of concern in our setting where there is a high burden of HIV infection. In this study, a formal risk assessment was not performed in more than 50% of the cases. This is an important assessment to determine the risk to the healthcare worker (and student), and the need for PEP. It is important to assess the risk of HIV transmission as soon as possible after an injury to ensure that students who need HIV prophylaxis receive it timeously (ideally within one hour) and that they are followed up for the prescribed period. Access to PEP should be available around the clock as injuries may occur at any time of the day or night. The lack of appropriate risk assessments in this study meant that some students took ART unnecessarily, while other students whose injuries were high risk, did not. PEP is required even for low risk injuries.

Students undergo skills training as part of their undergraduate curriculum. However, there is no substitute for hands-on clinical experience. In order to reduce the risk of occupational exposure among medical students, there is a need to constantly emphasise the importance of prevention of needlestick injuries and the need to comply with the institutional protocols with regard to reporting occupational exposures.

RECOMMENDATIONS

• Due to the high prevalence of HIV in the source patients and the consequent risk of seroconversion, it is important that students attend the university occupational health department for follow-up monitoring.
• At the commencement of their clinical training, all students should undergo a refresher programme with regard to the prevention and management of needlestick injuries. It may be useful if they have a "wallet card" with key information on what to do following a needlestick injury, including emergency contact numbers for assistance for PEP and counselling.
• Students visiting remote clinics should be offered a PEP starter pack to provide emergency cover in case of need.
• Collaboration is necessary between the medical school and the medical consultants at the placement hospitals with regard to supervision of new students undergoing exposure-prone procedures for the first time, to ensure that they are following safe practices. They should also be signed off as to their competence.
• Students should have access to, and comply with, the latest HIV post-exposure guidelines.

ACKNOWLEDGEMENTS

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CONFLICT OF INTEREST

The authors have no conflict of interest in this study.

REFERENCES