



Medical students' knowledge of sharps injuries

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Summary Healthcare workers (HCWs) including medical students are at risk of occupational exposure to blood-borne viruses following sharps incidents including needlestick injuries. The recent Department of Health guidelines recommend that all HCWs entering a career involving exposure-prone procedures should be tested for hepatitis C, making preventative strategies even more relevant. A survey of current medical students' knowledge regarding prevention of sharps injuries in Birmingham, UK was carried out to determine their awareness of these risks and to compare the findings with an earlier cohort of students. Two hundred and fifty-six medical students were enrolled into the study. Their knowledge of needlestick injury, prevention and management had significantly improved compared with the previous study. This demonstrates that intensive teaching and self-learning programmes can improve the knowledge of HCWs and reduce the number of needlestick injuries.

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Introduction

Healthcare workers (HCWs) including medical students are at risk of occupational exposure to blood-borne viruses following needlestick injuries. Since the 1980s, there has been an increase in the reported incidence of blood-borne infections amongst HCWs and a concomitant enhanced awareness of the occupational risks of blood-borne virus transmission.¹ A review of recent studies of sharps

injuries illustrates that the overall sharps injury rate/10 000 HCWs/year ranged from 113 (1%) to 623 (6.2%), with a mean of 405 (4%).² Published reports, however, underestimate the actual risk because many exposures are not reported.² Until HCWs acknowledge the importance of reporting such incidents, the actual size of the problem cannot be determined accurately.

Although the likelihood of being infected by a blood-borne virus may be low after a single exposure, the consequences for the medical student who becomes infected are potentially serious, both from the health viewpoint as well as their

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career pathway.² Indeed, recent guidelines now recommend that hepatitis-C-positive HCWs including medical students may not be permitted to embark upon careers that include exposure-prone procedures.³

Medical students' knowledge of correct procedures, which reduce the risk of percutaneous sharps injuries thus decreasing the likelihood of contracting blood-borne viruses, must be evaluated regularly in order to identify any need for further education. This is especially important as there is currently no post exposure prophylaxis for hepatitis C, and hepatitis B vaccination is not completely protective.

Despite the risk of sharps injuries, several studies⁴⁻⁶ have highlighted that knowledge and compliance among medical students is inadequate regarding their prevention and management. Medical students are particularly vulnerable to accidental exposure to potentially infected body fluids because they lack experience and skill.⁶ However, the exact risk of exposure to blood-borne viruses among medical students is unknown. In studies in Oxford⁷ and Toronto,⁸ 44% and 48% of students, respectively, sustained a sharps injury. In an extensive seven-year study, Emilie *et al.*⁵ reported that 11.6% (119 of 1022) of medical students in San Francisco sustained sharps injuries. However, no study has been undertaken to investigate the outcome of improved teaching on the rate of needlestick injuries in medical students.

In this study, the knowledge of first, third and final year medical students at the University of Birmingham, UK regarding sharps injuries was reviewed prospectively, and compared with a study carried out four years earlier.⁹

Methods

A standardized questionnaire that determined medical students' knowledge regarding sharps injuries, risk and management following occupational exposure was devised. Two hundred and fifty-six medical students at Birmingham University participated in this prospective cross-sectional study. This included 66 final year students, 103 third year students and 87 first year students. Attached to each questionnaire was a covering letter explaining the purpose of this study and reassuring students of their anonymity.

Statistical analysis

Categorical data were analysed using the Chi-

squared test. Data were collated using Microsoft Access.

Results

Of 360 questionnaires distributed to the medical students over the three years, 256 (71%) were returned. Eighty-seven (73%) were returned from first year students, 103 (86%) from third year students and 66 (55%) from final year students.

The students were asked whether or not they considered bites, splashes into mucous membranes, or needlestick inoculation via the skin to be sharps injuries.

Only 36 of 256 students (14%) correctly defined a sharps injury; these were one first year student, 13 third year students and 22 final year students (Figure 1). Eighty-seven percent (222/256) of students were aware that a percutaneous sharps injury with a used needle constituted a sharps injury. Other types of sharps injury were, however, poorly understood. For example, only 43% considered a scratch to be an sharps injury. Similarly, only 50% considered a blade, 44% a bite, 49% a scalpel and 37% a splash of body fluid into mucous membranes to be an sharps injury. In addition, 25% (63/256) of students incorrectly considered that a stab with a clean needle constituted a percutaneous sharps injury.

Overall, final year medical students were significantly more knowledgeable regarding sharps injuries than third year ($P < 0.01$) and first year students ($P < 0.001$). Similarly, third year students were significantly more knowledgeable than first year students ($P < 0.01$).

Ninety-seven percent (248/256) of students were

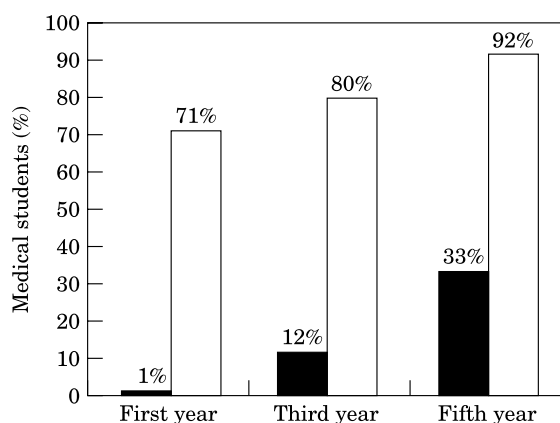


Figure 1 Percentage of 87 first year, 103 third year and 66 final year medical students who defined sharps injury correctly (solid bars) and who would have managed a sharps injury appropriately (open bars).

immunized against hepatitis B, comprising 94% (82/87) of first year students, 97% (100/103) of third year students and 100% of final year students (66/66). Forty-eight percent (130/248) of the immunized students knew their actual level of immunity: 67% (55/82) of first year students, 48% (48/100) of third year students and 41% (27/66) of final year students.

Less than half of the medical students (110/256, 43%) reported wearing gloves whilst taking blood. Forty percent of non-glove-wearing students (34/84) considered that gloves decreased dexterity, whereas 33% (28/84) thought that they were not advised. Furthermore, 4% (3/84) of students stated that they did not wear gloves as they were usually unavailable. Some students commented that wearing gloves was only necessary in high-risk patients or if they had open cuts on their hands. Some students thought that wearing gloves was of no benefit, as the needle would penetrate the glove.

Twenty-five percent (64/256) of students considered that it was acceptable practice to resheath needles. Significantly more first year students (55%, 48/87) than third (10%, 10/103) and fifth year students (9%, 6/66) said that they would resheath needles ($P < 0.0001$). Sixty-six percent of students who would resheath needles perceived that it decreased the risk of needlestick injury and it was safe practice. Only 36% of students reported taking the sharps box to the patient when participating in clinical procedures involving a sharp device.

Eighty percent of students would have managed a needlestick injury correctly (Figure 1). This included 71% of first year students, 80% of third year students and 92% of final year students. Fifty-seven percent (145/256) of students correctly identified the appropriate staff to notify following a sharps injury during working hours, and 39% (100/256) out of hours. Only 14% (36/256) of students considered it necessary to take donor patient details and determine their serology. Ninety-three percent (238/256) of students correctly stated that a needlestick injury should be reported within 1 h. Seventy-six percent (194/256) of medical students knew that medical attention would be required within 1 h if the source patient was human immunodeficiency virus positive.

Only 4% (10/256) of the students reported having received an inoculation injury, seven of whom were final year students, two were third year students and one was a first year student. Significantly more final year students had received such an injury than both first and third year students ($P < 0.01$). There was no significant difference in incidence of injuries between third and first year students. Eight of the injuries involved use of hollow-borne intravascular

needles used for venesection. The injuries occurred on disposal, with resheathing accounting for five episodes and two injuries due to a handling error following distraction. One other injury was related to a suture needle. Details of the other injuries were not available.

Discussion

Extensive research has shown that universal precautions including the management of sharp devices has been fundamental to HCWs' education and clinical practice for more than 15 years.^{1,2} This also applies to medical students. In the present study, the overall knowledge of medical students was still suboptimal. Of particular note, only 14% of students could correctly define a sharps injury and only 0.8% were aware of the exact risk of transmission of blood-borne viruses.

Between 22% and 52% of occupational needlestick injuries occur whilst resheathing needles,¹⁰ and this was confirmed in the present study. It is interesting to note that Patterson *et al.*¹¹ reported in a survey of 224 medical students that sharps injuries most commonly occurred in theatres. This may reflect differences in the training schedules offered at the various medical schools.

It has been suggested that modifying practices such as resheathing would decrease the incidence of sharps injuries. Resheathing has been identified as a habitual behaviour, based on the desire to remove a sharp and potentially dangerous object from the immediate environment. In this present study, 25% of medical students would resheath needles in an apparent attempt to perform safe practice and decrease the risk of inoculation injury. This compares favourably with a previous study on Birmingham medical students carried out in 1998, where it was reported that 49% resheathed needles.⁹ In this earlier survey on Birmingham students,⁹ only 21% wore gloves during venepuncture compared with our finding of 51% of current third year and final year students, again demonstrating a significant improvement in performance. In this previous study,⁹ 14.6% of the third and final year medical students sustained a sharps injury in comparison to the present study where this was reduced to 5.3%. This suggests that substantial progress has been attained in improving the knowledge of medical students in Birmingham over the last four years. This rate is also significantly better than rates reported in other studies on medical students.

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publishes and widely distributes comprehensive guidelines encompassing practical procedures aimed at prevention of sharps injuries. The guidelines advise that general precautions are taken for any procedure that could involve contact with blood or other body fluids. They also clearly state that specialist training must be received before undertaking any procedure involving sharp devices on patients. During hospital attachments, training on needlestick injuries and prevention is also undertaken at each new placement regardless of year of study. In addition, some training occurs in general practice placements during the first year.

The introduction over the last four years of specific guidelines, roadshow training and increased awareness of sharps injury has resulted in an improved knowledge base with a concomitant significant reduction in needlestick injuries compared with a previous study on a similar cohort of medical students. It is evident, however, that despite continuous education, there are still some medical students with gaps in their knowledge which puts them at risk. This needs to be considered by hospitals involved in the training of junior doctors. None of the hospitals or clinical areas to which the medical students were attached had needlestick protection devices available. Perhaps in addition to education, these need to be introduced to offer protection to this vulnerable group.

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References

1. May D, Brewer S. Sharps injury: prevention and management. *Nurs Stand* 2001;15:45–52.
2. Trim JC, Elliott TSJ. A review of sharps injuries and preventative strategies. *J Hosp Infect* 2003;53:237–242.
3. Department of Health. *Guidance for Clinical Healthcare Workers: protection against infection with blood-borne viruses. Recommendations for the Expert Advisory Group on AIDS and the Advisory Group on Hepatitis*. London: Department of Health; 1998 [Available at www.dh.gov.uk, accessed April 2002].
4. Gamester CF, Tilzey AJ, Banatvala JE. Medical students' risk of infection with bloodborne viruses at home and abroad: questionnaire survey. *BMJ* 1999;318:158–160.
5. Osborn EHS, Papadakis MA, Gerberding JL. Occupational exposures to body fluids among medical students—a seven year longitudinal study. *Ann Intern Med* 1999;130:45–51.
6. Doig C. Education of medical students and house staff to prevent hazardous occupational exposure. *Can Med Assoc J* 2000;162:344–345.
7. Choudry RP, Cleator SJ. An examination of needlestick injury rates, hepatitis B vaccination uptake and instruction on 'sharps' technique among medical students. *J Hosp Infect* 1992;22:143–148.
8. Tereskerz PM, Pearson RD, Jagger J. Occupational exposure to blood among medical students. *N Engl J Med* 1996;335:1150–1153.
9. Sullivan M, Masters O, Venkatesan P. Needlestick injuries amongst medical students in Birmingham, UK. *J Hosp Infect* 2000;44:240–241.
10. Trim JC, Adams D, Elliott TSJ. Healthcare workers' knowledge of inoculation injuries and glove use. *Br J Nurs* 2003;12:215–221.
11. Patterson JMM, Novak CB, Mackinnon SE, Ellis RA. Needlestick injuries among medical students. *Am J Infect Control* 2003;31:226–230.