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ORIGINAL CONTRIBUTIONS

THE PREVALENCE OF NEEDLE STICK INJURIES IN MEDICAL, DENTAL, NURSING AND MIDWIFERY STUDENTS AT THE UNIVERSITY TEACHING HOSPITALS OF SHIRAZ, IRAN

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ABSTRACT

BACKGROUND: Medical, dental, nursing and midwifery students are at high risk for occupational exposure to blood-borne pathogens (BBPs) via sharp injuries such as needle stick injuries (NSIs). **AIMS:** The aim of this study was to determine the frequency of NSIs and the knowledge, attitude and practices of these students regarding their prevention. **SETTINGS AND DESIGN:** The clinical students at Shiraz University of Medical Sciences, Iran, were eligible to participate in a survey conducted by a self-administered questionnaire in 2004, asking them about NSIs during their clinical training undergraduate years. **MATERIALS AND METHODS:** A cross-sectional study evaluated NSIs and practices regarding protective strategies against BBPs in medical, dental, nursing and midwifery students at Shiraz University, Iran, in 2004. These students completed a self-administered questionnaire. **STATISTICAL ANALYSIS:** The data were entered into a personal computer using Epi-Info (version 2000). Chi-square and Fisher's exact tests for categorical variables and student t-test for continuous variables were performed, where appropriate, using SPSS version 10. Alpha was set at the 5% level. **RESULTS:** The questionnaire was completed by 688 (53%) students. 71.1% (489/688) of the students had NSIs that most commonly (43.6%) occurred in patient rooms. 82% (401/489) of NSIs were not reported. 87.8% (604/688) of the students received information about standard isolation precautions and 86.2% of them had been vaccinated against hepatitis B. **CONCLUSION:** NSIs and non-reporting of NSIs were highly prevalent in these students. Education about the transmission of blood-borne infections, standard precautions and increasing availability of protection strategies must be provided.

Key words: Blood-borne pathogen, dental student, medical student, midwifery student, needle stick injury, nursing student.

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One of the serious problems of medical and paramedical students is the risk of occupational exposure, via sharp injuries, to blood-borne pathogens (BBPs) such as Hepatitis B (HBV), Hepatitis C (HCV) and human immunodeficiency virus (HIV).^[1-6] Thirty percent of needle stick injuries (NSIs) are not reported in the United States.^[7] The risk of pathogen transmission from infected persons to nonimmune persons through an injury with a sharp object has been estimated to be between 6 and 30% for HBV, between 5 and 10% for HCV and 0.3% for HIV.^[7,8] Effectiveness of administration of post-exposure prophylaxis varies from 75 to more than 90% to prevent HBV infection. Post-exposure prophylaxis for HIV has also been shown to lower the risk of infection after sharp injuries. However, there is no known way of preventing HCV acquisition following NSI.^[7,9] The purpose of this study was to calculate the frequency and the circumstance of NSI among a group of health care students as well as their knowledge, attitude and practices regarding the use of protective strategies against exposure to blood-borne pathogens (standard isolation precautions, double gloving and post-exposure prophylaxis).^[10]

MATERIALS AND METHODS

All 1,299 medical, dental, nursing and midwifery students during clinical training at

Shiraz University of Medical Sciences were eligible to participate in a survey conducted by an anonymous self-administered questionnaire in 2004 that asked them about NSIs during their clinical training undergraduate years after having oral informed consents. The proposal, including ethical views, was approved by the University's Vice Chancellor of Research. The survey tool was a questionnaire that was pre-tested on a random sample of 55 participants to ensure practicability, validity and interpretation of responses. The reliability of the questionnaire was assessed using Cronbach's alpha (0.812).

Statistical analysis

The data were entered into a personal computer using Epi-Info (version 2000) and analysis of frequency and tested for significance. Chi-square or Fisher's exact test for categorical variables and student t-test for continuous variables were performed using SPSS version 10 when appropriate. Alpha was set at the 5% level.

RESULTS

The survey was completed by 688 (53%) students of whom, 343 (57.2%) were medical, 208 (47.8%) were nursing and midwifery and 137 (51.9%) were dental students, consisting of 386 female and 302 male students. Since entering their clinical year, 71.1% (489/688) experienced a total of 1,336 NSIs, giving a ratio of 1:1.9 NSIs sustained by students in their undergraduate clinical school over, on an average, a 12 month period (maximum 17 months). For the students who reported that they had sustained an NSI, 27.8% (136/489)

had one, 18.8% (92/489) two, 13.5% (66/489) three and 39.9% (195/489) more than three NSIs. The majority ($P<0.043$, $df=3,485$, $CI=4.308-2.708$) of all NSIs were sustained in patients' rooms and occurred most frequently during venous sampling or intravenous (IV) injections [Tables 1 and 2].

For the last injury recalled, 74.6% (365/489) involved students injuring themselves. Overall, 82% (401/489) of all NSIs went unreported, most of which were because the injured student did not know about the reporting mechanism [Table 3].

The reasons given by students who did not routinely wear double gloves were inadequate facilities and decreased ability to manipulate tissues [Table 4]. Few (35.6%-245/688)

Table 1: Locations where injuries occurred

Location	Students	
	N	%
Patient room	583	43.6
Emergency room	302	22.6
Surgery ward	194	14.5
Theatre	168	12.6
Unstated	89	6.7

Table 2: How injuries occurred

Procedures	Students	
	N	%
Venous sampling or IV injection	382	28.6
Wound suturing	363	27.2
Arterial puncture	160	12
Recapping needles	144	10.8
Local anesthetic injection for dental procedures	80	6
Unstated	207	15.4

Table 3: Reasons NSIs were not reported

Reasons	Students	
	N	%
Did not know that all injuries had to be reported	382	28.6
Did not know to whom injuries should be reported	363	27.2
Believed reporting would not influence the outcome	160	12
Other	144	10.8

Table 4: Reasons students did not routinely wear double gloves

Reasons	Students	
	N	%
Inadequate facilities	360	52.3
Inability to manipulate tissues	297	43.2
Decreased hand sensation, tingling, numbness	41	5.9
Belief that double gloving did not increase protection	125	18.2

students reported that they always used sharp containers to dispose needles and 11.6% (80/688) practiced recapping rarely or never. Eye protection in the operating and emergency rooms was not used routinely by the majority (97.5%) of medical and nursing students. 52.5% of the dental students used eye protection routinely. HBV vaccination coverage was 86.2% (594/688). Of all NSIs, 2.5% (34/1336) of needles had been used on patients with HBV infection, 1.6% (22/1336) with HCV infection and 0.4% (6/1336) with HIV/AIDS.

Most students (58.1%, 400/688) were either extremely or very concerned about the possibility of contracting HBV infection. The students rated patient risk factors on a five-point scale, ranging from extreme to no concern. Most had extreme concern for the acquisition of AIDS (94.5%-651/688), HBeAg positive HBV infection (94.5%-651/688) and injecting drug users (88.5%-609/688).

DISCUSSION

This is the first survey of needle stick injuries (NSIs) in Shiraz, Iran. NSIs are one of the hidden problems in health care workers.^[2-4] In our study, 71.1% (489/688) of the students reported at least one NSI, most of which occurred in patient rooms during

venous sampling or intravenous injections. Many (30%) of the medical students in Washington had sustained at least one NSI and these most commonly (72.1%) occurred in the operating room.^[2] Most students (61.9%) in Taiwan had an NSI and the majority (70.1%) of these NSIs occurred in patient rooms.^[3] In Iran 31.7% of 203 anesthesiology personnel had at least one NSI.^[8] In other studies, it has been shown that lack of experience in many procedures, insufficient training, work overload and fatigue leads to occupational sharp injuries.^[10-12] In this study, 82% (401/489) of the students did not report these NSIs. The most common reason for under-reporting was the personnel's lack of knowledge that all injuries had to be reported [Table 3]. Other reasons are based on a background of insufficient knowledge or poor practices. The observed high level of under-reporting suggests that students need education on prevention, especially focusing on the importance of reporting all NSIs and the possibilities of prophylaxis after exposure to BBP.^[3-13]

Our study showed that 87.8% (604/688) of the students reported receiving information about Universal Precautions (UP) and BBP exposure. This is lower than the figure arrived at in the study by Patterson *et al* which evaluated NSIs among medical students and found that 98% of them reported receiving information about these topics.^[2] These data show that the students need to be provided structured education in UP for the improvement of occupational safety.^[14-17] In our study, only 86.2% (594/688) of the students reported having received three doses of vaccine and most students (96.2%)

reported gloving during wound suturing. Meaner *et al* reported that 50% of medical students in Strasbourg did not use gloves.^[18] In our study, 11.6% (80/688) of the students practiced recapping 'rarely to never' and 35.6% (245/688) of them always discarded needles in a sharp container. 58.1% of the students in this survey were extremely or very concerned about BBPs. That is similar to the study of Bilsik *et al* that reported that the most common cause of injuries from needles in nurses was improper handling of syringes and needles after injections (removing a needle from a syringe or placing the needle in a full container for medical waste).^[19] 87% of the medical students in Washington were moderately to extremely concerned about BBP.^[2] Our study revealed that the majority of students were either extremely concerned or very concerned about the possibility of contracting HBV infection (58.1%-400/688). 30.9% (213/688) of students also stated that their concerns had influenced their decision on choosing a specialty residency. Also, this concern and attitude about BBP transmission can influence their practice. However, it can be speculated that extended knowledge on this issue and professional counseling after exposure might lead to a changing attitude. Recently, a study conducted at an Australian hospital demonstrated that NSI events represent an important workplace issue for nurses.^[20]

The results of this study show that the way of educating about NSIs has to be changed so that health care workers realize the importance of occupational exposure UP and other protection strategies for blood-borne infections. We need further evaluation of the

effectiveness of improved education in the workplace. We recommend a surveillance system and a center for managing injured persons in each and every ward of hospitals to be set up as well as following up injured health care workers as part of a local research or ongoing audit project. Success of educational and other interventions as well as risks for different specialties or professional groups also need to be assessed in this way.

In conclusion, these students are at high risk for NSIs and BBPs exposure and we recommend that they need a targeted education about protection strategies for blood-borne infection.

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