Needlestick Injuries among Medical and Dental Students at the University of Kerman. A Questionnaire Study

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Abstract:
Objective: The aim of this study was to determine the prevalence of needlestick injury (NSI) and the factors associated with it among medical and dental students in Kerman province during the 2006 year.

Materials and Methods: A cross-sectional study was conducted among 269 medical and dental students to evaluate NSIs and practices regarding the protective strategies. These students were asked to complete a self-administered questionnaire. The data were analyzed by t-test and chi-square test.

Results: The questionnaires were completed by 245 students, of which 74.3% (182) had NSIs. The highest incidence among medical students was found to be in surgery ward and the emergency room, followed by Orthopedics and Internal medicine wards, whilst the highest incidence among the dental students was seen in Endodontics, Surgery, and Periodontics Departments.

Conclusion: Medical and dental students were found at a high risk of NSIs and blood–borne infections during their clinical activities. Therefore, some preventive measures seem necessary to be taken into consideration.

Key Words: Prevalence; Needlestick Injuries; Students, Dental; Students, Medical

INTRODUCTION
Hundreds of thousands of health care workers are out in the open to deadly viruses every year. They are exposed to preventable injuries involving over 20 different blood borne pathogens resulting about 1,000 infections per year of which the most common are HBV, HCV, and HIV [1]. In November 2002, it was demonstrated in World Health Report data that 2.5% of HIV and 40% of hepatitis B and C cases among health care workers worldwide are results of occupational exposures [2].

Six to eight hundred thousand needlestick and other percutaneous injuries are estimated to occur for more than eight million health care workers in the United States every year. About half of these injuries, if not more, are believed to go unreported [3]. As for HBV, the risk of pathogen transmission with a sharp object has been estimated to be 6 to 30% while the number is 5 to 10% for HCV and 0.3% for HIV [4,5]. Post-exposure prophylaxis is shown to be effective in 75 to more than 90% of the cases for HBV. As for HIV, they are found reduce the risk of infection; however, the way of preventing HCV acquisition following needlestick injury (NSI) is still unknown [4,6].

The emotional impact of an NSI can be severe and long lasting, even if a serious infection is
not resulted. Besides, it is not known that why the infection status of the source patient can accentuate the injured individual’s stress [3]. The aim of this study was to determine the incidence and the circumstance of NSIs among a group of dental and medical students as well as their knowledge, attitude and their protective strategies against exposure to blood-borne pathogens.

RESULTS

Of the 269 questionnaires, 245 were completed and returned (91.1%, 74.3% were medical and 25.7% were dental students, 148 female and 63 male, 24.76±2.75 years of age). Since entering the clinic, 74.3% had experienced 491 NSIs. The relation between career (medical students versus dental students) and NSIs was statistically significant (P=0.01), as opposed to sex (P=0.12). According to the questionnaires, 25.8% of the samples had had one, 39.6% had had two, 17.6% had had three, and 17% had had more than three NSIs.

MATERIALS AND METHODS

This cross-sectional study was done among 269 dental and medical students during their clinical training at Kerman University of medical sciences by an anonymous self-administered questionnaire in the year 2006. The period under study was March 2005 to March 2006. The questionnaire, pre-tested on randomly selected 35 samples to ensure its practicability, validity, interpretation of responses, and reliability (Cronbach's alpha α=0.871) was designed based on several studies and questions propounded in various references.

In this study, NSI was defined as an injury caused by a sharp instrument including, but not limited to, needles, lancets, scalpels, and contaminated broken glass. Cases of NSIs were the respondents who have had at least one experience of NSI and the number of injuries experienced by them was counted.

The data were analyzed of via chi-square test for categorical variables and student t-test for continuous variables using SPSS version 13.5. Alpha was set at 5% level.

Table 1. The frequency of needlestick injuries (NSIs) in dental and medical students according to locations.

<table>
<thead>
<tr>
<th>Locations</th>
<th>Dental students</th>
<th>Medical students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. of Endodontics</td>
<td>40 28.7%</td>
<td>Surgery Ward</td>
</tr>
<tr>
<td>Dept. of Surgery</td>
<td>29 20.7%</td>
<td>Emergency Room</td>
</tr>
<tr>
<td>Dept. of Periodontics</td>
<td>16 11.4%</td>
<td>Orthopedics Ward</td>
</tr>
</tbody>
</table>
| Dept. of Prosthodontics  | 12 8.6%        | Internal Medicine Ward | 42 12%
| Dept. of Operative Dentistry | 11 7.8% | CCU/ICU | 20 5.7% |
| Dept. of Pediatric Dentistry | 11 7.8% | Gynecology Ward | 17 4.8% |
| Unstated                 | 21 15%         | Unstated        | 37 10.5% |

N=number
dose not increase protection (14%). The relation between wearing two gloves and the students’ career was not statistically significant (P=0.09).

Some of the students (38.7%) reported that they always used sharp containers to dispose needles as 13.1% practiced recapping rarely or never. Such that 48.2% students always recapping needles. In addition, eye protection was not used routinely by the majority 83.7% of the medical students; although, 62.5% of the dental students used eye protection routinely (P=0.02).

Two hundred and twenty eight students (93%) had received the hepatitis B vaccine but about 31 students (12.6%) had not completed the vaccination process. because the reasons included being already positive to HBV antibodies, being busy on the day of the vaccination, or simply forgetting to complete the process. The relation between receiving the hepatitis B vaccine and career was found statistically significant (P=0.006).

Most of the students (98.8%) said to have acquired knowledge of blood-borne diseases mainly through formal lectures (88.6%) and books (79.5%).

DISCUSSION

NSI is one of the hidden problems in health care workers, which is also very prevalent [7-11]. The reports show an increase in NSI prevalence around the world during 1990 to 1999. The first NSI case ever was reported in 1838 [12]. The studies done in Canada showed that 70% of nurses, 47% of technicians, 78% of residents, 74% of laboratory technicians and 3.21% of dentists are exposed to the dangers of NSI [13].

Many of the medical students (30%) in Washington had at least one experience of NSI as most of these injuries (72.1%) occurred in the operating room [9]. In addition, most of the students (61.9%) in Taiwan had NSI and the majority (70.1%) of these NSIs occurred in patient rooms [10]. In Iran 71.1% of the students had NSIs that most commonly (43.6%) occurred in patient rooms as well [7].

Results of the above study is in agreement with the study by Lee et al [14] (at least one case of injury in 56% of students during the past year), and with the studies by Karstaedt and Pantanowitz [15] (83%), McCarthy and Britton [16] (82%), and Cervini and Bell [17] (51.9%). Although in some researchers, the percent of injury in medical students was reported between 22-35.5% [8,12,18-20].

One of the main factors causing different numbers of NSI cases may be the meanings of this word in different researches. Such that in many similar studies, the injuries from all types of sharp pointed instruments were under consideration, however, in some other studies only hollow needle was taken into account.

In our study, 90.6% of the students did not report their NSI experiences and the most common reason for that was the personnel's lack of knowledge that all injuries had to be reported.

<table>
<thead>
<tr>
<th>Procedures</th>
<th>N</th>
<th>%</th>
<th>Procedures</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument taking</td>
<td>36</td>
<td>39.6</td>
<td>Venous sampling or IV injection</td>
<td>191</td>
<td>47.7</td>
</tr>
<tr>
<td>Instrument washing</td>
<td>21</td>
<td>23.1</td>
<td>Recapping needle</td>
<td>85</td>
<td>21.3</td>
</tr>
<tr>
<td>Recapping needle</td>
<td>15</td>
<td>16.5</td>
<td>Wound suturing</td>
<td>78</td>
<td>19.6</td>
</tr>
<tr>
<td>Wound suturing</td>
<td>10</td>
<td>11</td>
<td>Instrument taking</td>
<td>19</td>
<td>4.7</td>
</tr>
<tr>
<td>Local anesthetic injection</td>
<td>9</td>
<td>9.9</td>
<td>Unstated</td>
<td>27</td>
<td>6.7</td>
</tr>
</tbody>
</table>

N=number
Other reasons are based on a background of insufficient knowledge as well as poor practices. The observed high level of underreporting suggests the students’ need for education on prevention, especially focusing on the importance of reporting all NSIs and the possibilities of prophylaxis after exposure against blood borne pathogens [4,5,10,11]. The most common departments in which the dental students had the experience of NSIs were Endodontics, Surgery, and Periodontics in decreasing order, mostly while receiving and/or washing the instruments. In the retrospective study done on job accidents in Bristol dental school between the years 1980 and 1988, it was shown that the injury from sharp pointed instruments was the most prevalent accident in dentistry such that 55% of all the injuries were from this manner. In that study, it was depicted that 45% of all the injuries from sharp pointed instruments occurred during local anesthetic injection and wound suturing. It is noticeable that the injuries from sharp instruments were occurred in the time of opening them, taking away them from units, preparing them for sterilization and throwing away the disposable ones [21]. In addition, in the research by McCarthy and Britton [16], it was reported that most of the injuries took place in the time of recapping the needles.

In the present study, the most common departments in which the medical students had the experience of an NSI were Surgery ward, Emergency room and Orthopedic ward, respectively; the NSIs mostly resulting during IV injections, recapping needles and wound suturing as previously found in several studies from around the globe [7,12-19,22-24]. In addition, Shen et al [19], Norsayani and Noor Hassim [8], Askarian and Malekmakan [7], Cervini and Bell [17], and Stewardson et al [22] reported Gynecology ward, Surgery ward, and Emergency room to be the most common departments for NSIs.

The present study showed that 6.1% of the medical students and none of the dental students (0.0%) were not vaccinated against hepatitis. Jepsen and Smith [20] involved 406 medical students in their study in 2001 of which 34% were not vaccinated against hepatitis. Al-Sarheed [25] in his study on 145 dental students found that 28.9% of them were not vaccinated. Duffy et al [24] reported 8% of their study population of Romanian dentists not to be vaccinated while 9% of them had received only two doses.

As it was mentioned, the present study shows that 74% of the medical and dental students did not use double glove technique. In the study by Norsayani and Noor Hassim [8], 75% of the physicians were claimed not using two gloves although being aware of its benefits. Meunier et al [26] also found 50% of the medical students in Strasbourg not using two gloves, because of the decreasing in hand sensation and lack of belief in its benefits. Our study showed 51.6% of the dental student using eye protection compared to 41.6% of the medical students doing so. In the study by Cervini and Bell [17], only 2.5% of the medical students used eye protection in the operating or the emergency room.

A study done by Naing et al [27] showed only 67.4% of the students recapping needles after use not being aware of the correct practice and just following other health workers with the same behavior. We found that 38.7% of our students using sharp containers to dispose needles while 13.1% recapping rarely or never.

CONCLUSION
Medical and dental students are at a high risk of NSIs during their clinical training. Therefore, preventive measures should be taken into consideration by the relevant universities. Also, focusing on the importance of reporting an NSI and the possibility of prophylactic measures seem quite necessary. Setting up an NSI management center in hospital wards, as
well as follow up of the injured individuals are recommended.

**ACKNOWLEDGMENTS**
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**REFERENCES**