

# Incidence of Needlestick Injuries in Oral Surgery Clinic among Dental Students: A Retrospective Study

<sup>1</sup>Fareedi M Ali, <sup>2</sup>Ghassan M Al-Iryani, <sup>3</sup>Huda Y Mdabesh, <sup>4</sup>Afnan A Essa, <sup>5</sup>Ali M Nammazi  
<sup>6</sup>Mohammed A Kariri, <sup>7</sup>Dawood MY Somaili

## ABSTRACT

**Introduction:** Practitioners in the dental field carry an occupational risk of injuries when performing routine procedures and hence the possible contraction of serious infections. Dental college students are considered at a higher risk because they start performing such procedures with no or very little experience. Although needlestick injuries (NSIs) are preventable, they are still a common happening and the main concern is the risk of transfer of more than 20 pathogens. The most serious are hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).

**Aim:** The aim of this study is to evaluate the incidence and patterns of NSIs sustained by undergraduate dental students in Oral Surgery Clinics at College of Dentistry (Jazan University), Jazan, Kingdom of Saudi Arabia.

**Materials and methods:** This was a retrospective epidemiological investigation conducted among 230 undergraduate dental students studying at College of Dentistry (Jazan). Fourth, fifth, and sixth year undergraduate dental students and interns working in the Department of Oral Surgery were included. Those who were not willing to participate were excluded from the study. An anonymous questionnaire proforma was prepared including closed- and open-ended questions divided into two parts. Data were entered into Statistical Package for the Social Sciences (SPSS, version 17.0) statistical software for analysis.

**Results:** More than half of the sample size (54.8%) had suffered sharp instruments injury in different anatomical sites, and of these, 67.4% were pricked with gloves on. Only 27% of the students reported to the faculty after being pricked. Most of the participants (55.3%) had a single incidence of injury during the past 1 year and 16.2% were stuck for several times. Fingers (60.7%) were the most commonly affected anatomical site pricked by sharp instruments, followed by the thumb (22.2%), hand (9.6%), and palm (7.4%).

**Conclusion:** Infection control teaching and training should be an integral part of the curriculum of all disciplines in health care including medical, dental, and paramedics.

**Keywords:** Dental students, Infection control, Needlestick injuries, Occupational risks.

**How to cite this article:** Ali FM, Al-Iryani GM, Mdabesh HY, Essa AA, Nammazi AM, Kariri MA, Somaili DM. Incidence of Needlestick Injuries in Oral Surgery Clinic among Dental Students: A Retrospective Study. *World J Dent* 2018;9(1):29-33.

**Source of support:** Nil

**Conflict of interest:** None

## INTRODUCTION

Needles and sharp instruments are an essential part of today's dental practice. Injuries from these items are a major concern for dental practitioners because of the risk of blood-borne diseases transmission (HBV, HCV, and HIV). The estimated transmission rates for HBV, HCV, and HIV after an NSI from a dental needle are 6 to 30, 2.7 to 10, and 0.1 to 0.3% respectively.<sup>1</sup> The risk of infection to the dentist or dental student depends on the prevalence of the disease in the patient population and nature and frequency of the exposures.<sup>2</sup>

Using sharp instruments in the narrow confinement of the oral cavity and the possibility of unexpected movement of the patient have always subjected dentists and dental students to percutaneous injuries while performing surgical procedures. Hence, they are at high risk to acquire blood-borne diseases.

## MATERIALS AND METHODS

This was a retrospective epidemiological investigation conducted among 230 undergraduate dental students studying at College of Dentistry (Jazan). Before commencement of the study, approval was obtained from College of Dentistry review board and from the ethical committee. Informed consent was included in the questionnaire.

### Criteria of Selection

The fourth, fifth, and sixth year undergraduate dental students and interns working in the department of oral surgery were included in the study. Those who were not willing to participate were excluded from the study.

An anonymous questionnaire pro forma was prepared including closed- and open-ended questions

<sup>1</sup>Department of Oral & Maxillofacial Surgery, Faculty of Dentistry College of Dentistry, Jazan University, Jazan, Kingdom of Saudi Arabia

<sup>2</sup>Department of Oral & Maxillofacial Surgery, Faculty of Dentistry College of Dentistry, Jazan University, Jazan, Kingdom of Saudi Arabia; Department of Oral & Maxillofacial Surgery, Sana'a University, Yemen, Kingdom of Saudi Arabia

<sup>3-7</sup>Department of Oral & Maxillofacial Surgery, College of Dentistry, Jazan University, Jazan, Kingdom of Saudi Arabia

**Corresponding Author:** Fareedi M Ali, Department of Oral & Maxillofacial Surgery, Faculty of Dentistry, College of Dentistry Jazan University, Jazan, Kingdom of Saudi Arabia, e-mail: faridi17@rediffmail.com

divided into two parts. First section included demographic details, such as sex, year of study, and whether right or left handed. Second section included questions about the incidence of injury with sharp instruments, such as frequency of injuries, number and nature, reporting practices, type of device that caused the injury, the event that leads to the injury, and whether the event was reported or not. Information was also gathered on the vaccination status of students and reasons for not reporting in cases of failure to report. Prevalence of injury related to other departments of dentistry was excluded.

Confidentiality and anonymity were maintained, and only researchers had access to the data. The questionnaire was pretested on a randomly selected 15 student sample to ensure its practicability, validity, and reliability (Cronbach’s alpha = 0.88).

**Data Analysis**

Data were entered into statistical software (SPSS, version 17.0) for analysis. Basic statistics were calculated which includes prevalence rates and overall numbers of NSIs. Descriptive statistics were obtained, and frequency distribution, means, and standard deviation were calculated. Student’s t-test was used for comparison of mean scores of injuries. A p-value of 0.05 or less was considered as statistically significant.

**RESULTS**

The study was conducted among 230 undergraduate dental students, 83 male and 147 female participants. Further, they were assorted according to academic level of study; 74 in fourth year, 71 in fifth, 56 in sixth, and 29 in internship. Most of the study participants (214) were right handed and only 16 were left handed as illustrated in Table 1.

More than half of the sample size (54.8%) had suffered sharp instruments injury in different anatomical sites in oral surgery clinics, and of these, 67.4% were pricked

**Table 1:** Demographic profile of the population

Demographics	Frequency (%)
<b>Gender</b>	
Male	83 (36.1)
Female	147 (63.9)
<b>Year</b>	
4th year	74 (32.2)
5th year	71 (30.9)
6th year	56 (24.3)
Intern	29 (12.6)
<b>Dominant hand</b>	
Right hand	214 (93.0)
Left hand	16 (7.0)
Total	230 (100.0)

**Table 2:** Response of study participants regarding NSIs

Questions	Yes (%)	No (%)
Have you any time before been injured by sharp instruments?	54.8	45.2
Were you wearing gloves while been pricked?	67.4	32.6
Have you ever reported to your staff or infection control department after NSI?	27.0	73.0
Do you recap the needle after usage?	96.5	3.5
Have you been vaccinated for hepatitis B?	59.9	40.1

**Table 3:** Prevalence of NSIs among the study participants

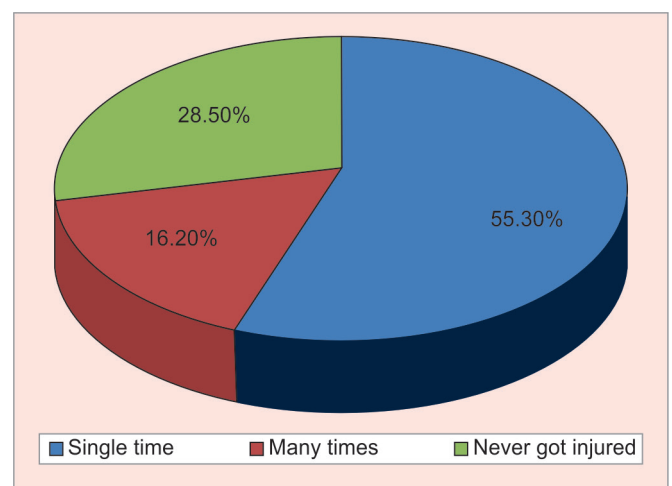
	Number	Mean ± SD	f-value	p-value
<b>Gender</b>				
Male	82	0.41 ± 0.496	1.115	0.292
Female	146	0.62 ± 0.486		
<b>Dominant hand</b>				
Right hand	212	0.55 ± 0.499	0.072	0.789
Left hand	16	0.56 ± 0.512		

SD: Standard deviation

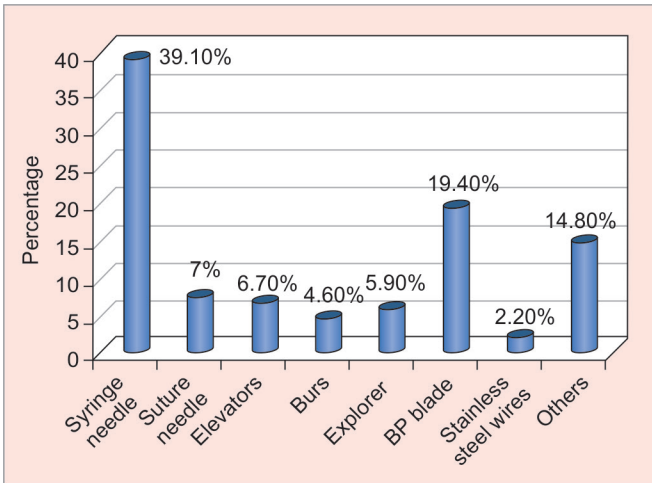
with gloves on. Only 27% of the students reported to the faculty after being pricked. Almost all the participants had the habit of recapping local anesthesia needle after use and around 60% of subjects were vaccinated against hepatitis B (Table 2).

It was noticed that female participants were comparatively more involved with sharp injuries, and left-handed practitioners were having a slightly higher incidence of injuries (Table 3).

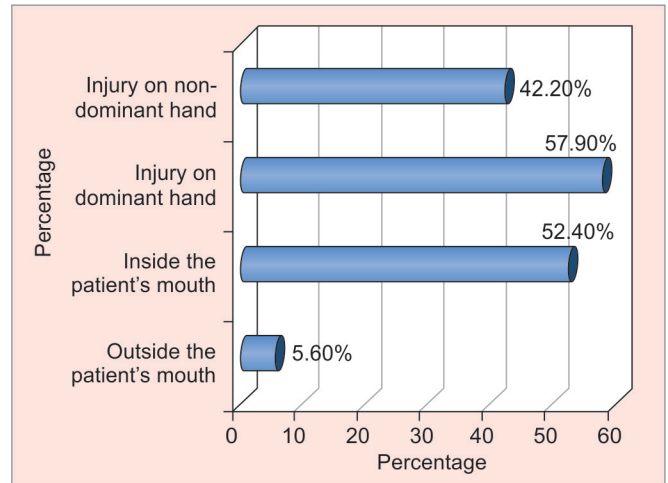
Most of the participants (55.3%) had a single incidence of injury during the past 1 year and 16.2% were stuck for several times (Graph 1). Needles (34.1%) were the main instrument causing the injury and very few got injured with stainless steel wires (2.2%) as shown in Graph 2. The occurrence of injury on the dominant hand was less in number (42.1%) than the nondominant hand (57.9%). The



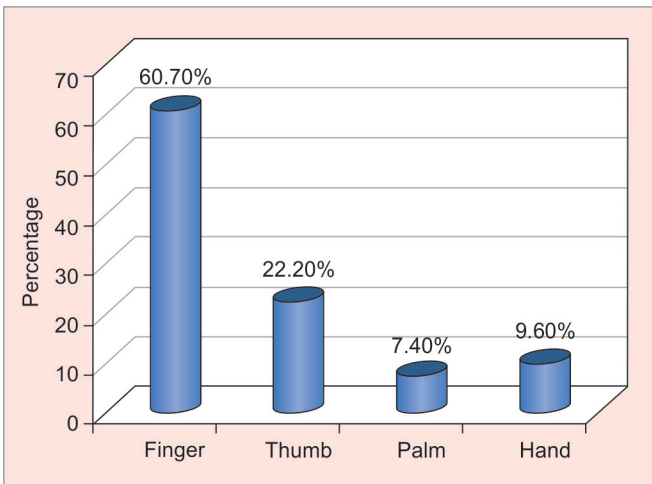
**Graph 1:** Frequency of being stuck by sharp instruments during the past 1 year



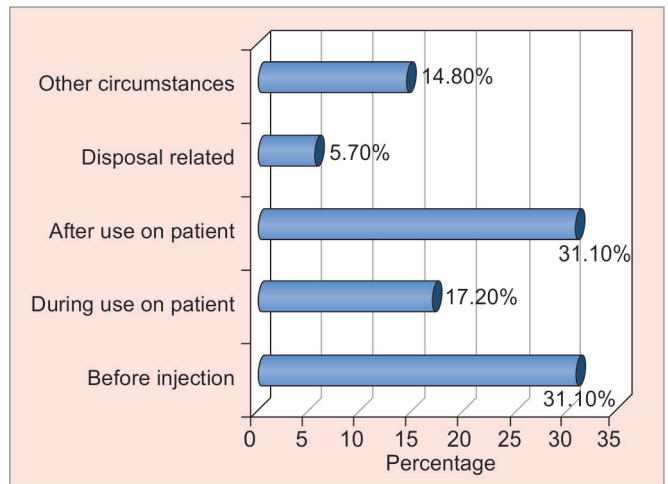
Graph 2: Instrument with which injury occurred



Graph 3: Occurrence of needle injuries among the study participants



Graph 4: Different anatomical sites for injury



Graph 5: Circumstances of the most recent needle injury

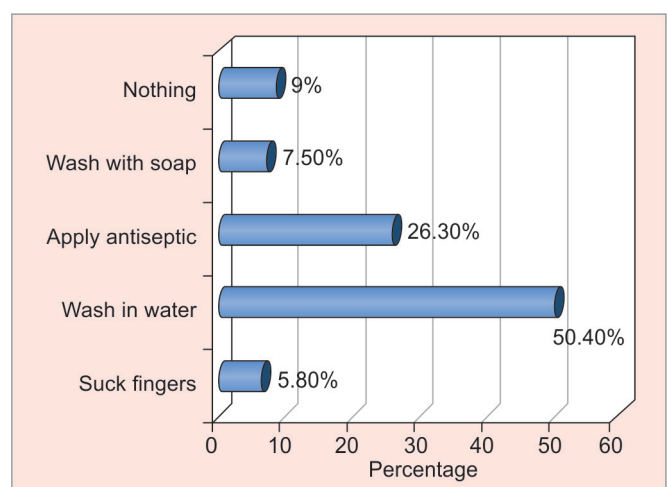
majority of injuries took place while operating inside the patient's mouth (52.4%; Graph 3).

Fingers (60.7%) were the most commonly affected anatomical site by sharp instruments followed by the thumb (22.2%), hand (9.6%), and palm (7.4%; Graph 4). Majority of injuries took place after use on patients by sharps (31.10%) followed by during use on the patient (17.20%) (Graph 5). Washing hands in water (50.4%) was the most common preventive measure taken by participants followed by antiseptics (26.3%) as mentioned in Graph 6.

**DISCUSSION**

Exposure to a variety of pathogens is always a risk factor for the health care workers. Hepatitis B virus, HCV, and HIV are the most common blood-borne viruses transmitted occupationally from infected staff to patients or from infected patients to the staff.<sup>3</sup>

By investigating and inspecting the causes of injuries, valuable facts may be gathered. Evidence regarding the circumstances surrounding the conveyed injury may be



Graph 6: Remedial measures taken immediately after prick

valuable in preventing further injuries by revising work practices.<sup>4</sup>

Occupational hazards might be of a greater concern for an inexperienced individual, working in a new

environment, e.g., medical/dental students and house officers during their clinical training rotations.<sup>5</sup>

There is a high risk of exposure to pathogens among health care students while they become involved in patient's investigation and treatment during their clinical training.<sup>6</sup> The routine use of sharp instruments, i.e., hand, rotary, surgical, hypodermic needles, suture needles, and lancets in dental treatment, the presence of saliva and blood, various bacterial flora in the mouth, needle design, recapping practice, maneuvering needles in patient-linked work, conflict between health care workers on sharps while cleaning, handling/transfer of specimens, passing/handling devices, or failure to dispose of the needle in puncture-proof boxes, all contribute to the hazardous nature of the dental workplace for blood-borne infections.<sup>6-8</sup>

The injury can be superficial (scratch without bleeding), moderate (broken skin with bleeding), or deep (needlestick or deep cut with or without bleeding).<sup>4,9</sup>

The findings of the present study were consistent with those of many studies on accidental exposures to blood-borne pathogens in health care settings.

In the present study, more than half of the sample size (54.8%) suffered sharp instruments injury in different anatomical sites, and of these, 67.4% were pricked while wearing gloves. Only 27% of the students reported to the faculty after being pricked. In a study by Osman,<sup>6</sup> 69.9% of students were exposed to the sharp instruments injury during their study of 12 months. In contrast, Jaber<sup>3</sup> reported NSIs in only 23% of dental students in their study of 230 students, and among these injuries, 26% injuries occurred while recapping of the needles. Furthermore, a study by Mungure et al<sup>10</sup> found NSIs in 29% of the dental students. In the present study, almost all the participants had habit of recapping the needles after use, and around 60% of subjects were vaccinated against hepatitis B.

In our study, mostly the participants (55.3%) were injured by instruments only once in the past 1 year and 16.2% were injured for many times. In a study by Osman,<sup>6</sup> 28.1% of students were injured once, 28.1% were injured for twice, while 43.8% were injured for three or more times.

Our findings are compared with that of Moodley and Naidoo,<sup>4</sup> in which 43% had experienced a single injury, while more than half (57%) had suffered more than one injuries, and almost a quarter (24%) had experienced three or more NSIs.

In this study, needles (34.1%) were the main risk factors for injury followed by suture needle (7%) and elevators (6.7%), which is in accordance to the study by Osman,<sup>6</sup> in which hollow bore needle was the most common injury-causing tool.

Needlestick injuries from a hollow bore needle pose a greater risk of transmission of blood-borne pathogens than from a solid needle, because blood remaining inside the bore of the needle after use contains a large volume of viruses than the relatively small amount of blood remaining on the outside of a solid core needle, such as a suture needle.<sup>4</sup>

Fingers (60.7%) were most commonly affected by sharp instruments, followed by the thumb (22.2%), hand (9.6%), and palm (7.4%). These results are consistent with the findings of Siddiqi et al,<sup>11</sup> where 88.0% injuries occurred on the fingers.

In our study, washing the injury site with water (50.4%) was the most common action, while antiseptics were used to clean the wound by 26.3% of the injury-sufferer. The current study showed a higher incidence of injuries on nondominant hand (57.90%). Similar studies conducted by Moodley and Naidoo<sup>4</sup> and Siddiqi et al<sup>11</sup> showed that fingers of the nondominant hand that play a supportive role were the most common site of percutaneous injuries.

Double gloving is a combative recommendation. However, at least on the nondominant hand, it will help minimize injury as the nondominant hand is more often involved in exposures.<sup>11,12</sup>

Slightly more than half of the injuries in our study took place while operating inside the patient's mouth (52.4%). Our findings are inconsistent with the study by Younai et al,<sup>13</sup> who observed that more than 70% of local anesthetic-related NSIs occurred during needle insertion and/or needle withdrawal, while the rest of injuries occurred due to sudden patient movement at the time of attempted injection. Gaballah et al<sup>8</sup> in their study observed that nearly 90% of injuries took place either during administration of local anesthesia or during disposal of the used needles.

Improved techniques can minimize exposure injuries by controlled movements of instruments under force, e.g., controlling movement while using an elevator or surgical bur, or using the appropriate retractors while injecting instead of retracting using the fingers.<sup>14</sup> Fa and Cuny had introduced a modified retraction technique using a mouth mirror in preclinical anesthesia course with the goal of reducing needlestick exposure incidents. The results of this study show that there was a reduction in intraoral NSIs when a mirror retraction technique was introduced into the curriculum.<sup>15</sup>

Current Centers for Disease Control and Prevention guidelines state that used needles should never be recapped, purposely bent, or otherwise manipulated using both hands. One-handed recapping using a device or scoop technique is recommended for the prevention of such injuries. Announcing passage of instruments can

likewise reduce injuries to other workers during transfer over the surgical field.<sup>11</sup>

Furthermore, the implementation of education, universal precautions, elimination of needle recapping, and use of sharps containers for safe disposal can reduce the NSIs with additional reductions possible through the use of safer needle devices.

## CONCLUSION

Infection control teaching and training should be an integral part of the curriculum of all health disciplines including medical, dental, nursing, as well as for any institute providing training to paramedics. Moreover, each health care setting should have an active and dynamic infection control program. In due course, this multifaceted approach will definitely improve the attitude, knowledge, and practices of health care workers including dental students toward NSIs.

## REFERENCES

- Walsh LJ. Sharps injuries in dental practice: getting the point. *Dent Pract* 2006 Jan/Feb;66-68.
- Beltrami EM, Williams IT, Shapiro CN, Chamberland ME. Risk and management of blood-borne infections in health care workers. *Clin Microbiol Rev* 2000 Jul;13(3):385-407.
- Jaber MA. A survey of needle sticks and other sharp injuries among dental undergraduate students. *Int J Infect Control* 2011;7(3):1-10.
- Moodley I, Naidoo S. Percutaneous exposure incidents-prevalence, knowledge and perceptions of dental personnel and students at a dental training site in KwaZulu-Natal. *South Afr Dent J* 2015 Sep;70(8):334-339.
- Gichki AS, Islam A, Murad W. Knowledge and awareness about needle stick injuries among dental students of Bolan medical college, Quetta. *Pak Oral Dent J* 2015 Dec;35(4):562-566.
- Osman T. Epidemiology of sharp instruments injuries at a dental school in Sudan. *Int J Infect Control* 2014;10(4):1-10.
- Punjabi SK, Banglani MA, Priya, Mangi N. Needle stick injuries; concept and handling among junior dentist. *Prof Med J* 2017 Jan;24(1):177-181.
- Gaballah K, Warbuton D, Sihmbly K, Renton T. Needle stick injuries among dental students: risk factors and recommendations for prevention. *Libyan J Med* 2012 Jun;7:17507.
- Fernandes LH, Nunes WB, Silva LC, Wanderley RL, Barros CMB, Cavalcanti AL. Needlestick and sharp instruments injuries among Brazilian dentistry students. *Contemp Clin Dent* 2017 Jan-Mar;8(1):112-115.
- Mungure EK, Gakonyo JM, Mamdani Z, Butt F. Awareness and experience of needle stick injuries among dental students at the University of Nairobi, dental hospital. *East Afr Med J* 2010 May;87(5):211-214.
- Siddiqi A, Morkel JA, Stephen L, Moola M. Occupational blood exposures at a dental faculty: a three year review. *Int Dent* 2008 Jan;9(5):28-36.
- Ali FM, Chandra PM, Patil K, Tahasildar S. Double gloving in dentistry: importance and recommendations: a review. *Int Arab J Dent* 2016;7(1):37-40.
- Younai FS, Murphy DC, Kotelchuck D. Occupational exposure to blood in a dental teaching environment: results of a ten-year surveillance study. *J Dent Educ* 2001 May;65(5):436-448.
- Ali FM, Patil A, Prasant MC, Tahasildar S, Patil K. Needle stick injuries in dental clinics: a review. *J Evol Med Dent Sci* 2014 Jan;3(2):374-378.
- Fa BA, Cuny E. Preliminary evidence supports modification of retraction technique to prevent needle stick injuries. *Anesth Prog* 2016 Winter;63(4):192-196.