

## Research Paper: Evaluation of Frequency, Knowledge and Practice of Needle Stick Injuries among Dentists in Iran



Fahimeh Anbari<sup>ID</sup><sup>1</sup>, Pezhman Hadadi Madiseh<sup>ID</sup><sup>2</sup>, Mostafa Cheraghi Lohe Sara<sup>ID</sup><sup>2</sup>, Elham Sadat Afraz<sup>ID</sup><sup>\*3</sup>

<sup>1</sup> Assistant Professor, Department of Oral Medicine, School Of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup> Dentist

<sup>3</sup> Assistant Professor, Department of Oral and Maxillofacial Pathology, School of Dentistry, Semnan University of Medical Sciences, Semnan, Iran.

Use your device to scan  
and read the article online



**Citation:** Anbari F, Hadadi Mahdiseh P, Cheraghi Lohe Sara M, Afraz E. Evaluation of Frequency, Knowledge and Practice of Needle Stick Injuries among Dentists in Iran. Journal of Dentomaxillofacial Radiology, Pathology and Surgery. 2020; 9(2):19-23. <http://dx.doi.org/>

<http://3dj.gums.ac.ir>



### ABSTRACT

**Introduction:** Percutaneous injuries are one of the important health problems of health care workers, because such injuries are the main risk factors in transmission of blood-borne diseases. Needlestick injury (NSI) is the entrance of a bloody contaminated sharp instrument (needles, surgical blade, ...) into the body during or after treatment procedures of a patient. The aim of this study was to evaluate frequency, knowledge and practice about needle stick injuries among Iranian dentists attending retraining programs of Iranian general dentists community in 1394.

**Materials and Methods:** In this cross-sectional study, self-administered questionnaires were distributed among 150 dentists. Data were analyzed by Spearman, Mann-whitney U and kruskal wallis.

**Results:** 84.4 % of dentists had experienced NSI at least once. only 15.4% of dentists had never had NSI. Needle was the most common cause of recent needle stick injury (20%) among dentists. The mean score of knowledge was 6.35 (45.35% of total number) and the mean score of practice was 6.12 (68% of total number). There was no correlation between knowledge and practice ( $P < 0.848$ ). There was significant negative correlation between practice and age ( $p < 0.003$ ), and also between practice and years of work ( $p < 0.003$ ).

**Conclusion:** The results show high frequency of NSI among dentists. NSI occurrence can be reduced significantly by using standard precautions. Continuous education and retraining programs play an important role in updating knowledge of dentists.

#### Article info:

**Received:** 2020/05/03

**Accepted:** 2020/05/20

#### Keywords:

Needlestick Injuries,  
Knowledge,  
Dentists

#### \* Corresponding Author:

Elham Sadat Afraz

Address: Department of Oral  
and Maxillofacial Pathology,  
School of Dentistry, Semnan  
University of Medical Sciences,  
Semnan, Iran.

Tel: +98 9126453505

E-mail: [efraz75@gmail.com](mailto:efraz75@gmail.com)

## Introduction

The health care workers are estimated to be about 35 million people worldwide, accounting for 12% of the world's workforce population. This population includes physicians, dentists, nurses, paramedics and technicians. Following the first report of HIV transmission in this population in 1984, concerns raised about the risk of needle stick injury (NSI) for healthcare workers (HCW).(1)

In general, NSI is defined as insertion of an infected instrument (a sharp tool), blade, or needle, etc. into the body.(2) Subcutaneous exposure to an infected needle and other sharp objects is a risk to HCWs, which can be the source of diseases and mortality from blood-borne pathogens.(3) According to World Health Organization's statistics, 39% of cases of hepatitis C, 37% of cases of hepatitis B, and 4.4% of cases of HIV in HCWs can be attributed to occupational exposure.(4) The Center for Disease Control (CDC) declared the risk of transmission of infection through NSI 0.3% for HIV, 3% for hepatitis C, and 30% for hepatitis B.(5)

The incidence of these infections, in addition to psychologic and physical harms, has economic cost, as well. The emotional and psychological effects of NSI can be severe and last for a longtime, even if no serious infection occurs. [6] The dental health care workers are considered a high-risk group, because of continuous contact with blood and blood-borne secretions. Therefore, their knowledge about standard precautions is important to prevent transmission of these infections.(7)

Dentists may be exposed to these infections by direct contact with mucous membranes or injuries with sharp objects. The prevalence of NSI among dentists is reported 74% in different countries (31%),(2, 6, 8, 9)

Adherence to standard precautions can reduce the risks of occupational exposure.(10) However, there is still risk of transmission of infection through accidental injuries. Because of the small working area of dentists in the mouth, possible movement of the patient during work, and using sharp tools in dental treatments, there is a high risk of the accidental exposures in dentists.(11) Exposure by sharp instruments and its consequences can be largely avoided through some simple preventive measures such as vaccination. In the United States, implementation of the occupational safety principles reduced occupational exposure by 88%.(1)

Post-exposure prevention to avoid HIV and HCV infections is costly, and requires a robust and effective official system. One of the simple ways for effective prevention of injury by sharp devices is to avoid unnecessary injections and collect the infected sharp instruments immediately after use in tight containers without leakage. To reduce the risk of exposure of HCWs, governments should consider effective vaccination programs against hepatitis B. In addition, in cases where funds and facilities may be considered for the correct use of needle-free instruments, proper implementation of these principles can improve general health and safety of HCWs.(4)

## Materials and Methods

This research is a descriptive cross-sectional study. Convenience sampling method was used. The study population was a group of public and private dentists working in private and public sectors.

According to similar studies, the sample size was considered at 150. Data was collected through a questionnaire, completed by subjects.

Validity and reliability of the questionnaire were confirmed in a similar study by Ebrahimi et al. in 2013 (Cronbach's alpha = 0.91).(2)

This questionnaire had 29 questions: 9 questions about dentists' performance, 14 questions about dentists' knowledge, 2 questions about experiencing occupational incidents, and 4 other questions about the training and the need for retraining.

Data were analyzed using SPSS 19 software and descriptive statistics (frequency distribution, percentage, etc.), Spearman, Kruskal Wallis, and Mann-Whitney tests.

## Results

One hundred twenty seven participants in the study were in general dentistry and 22 were specialists. Eighty-three cases worked in private sector, 17 in public sector, and 50 in both sectors.

The minimum knowledge score of NSI was considered 0 and the maximum score was 14. The maximum score of knowledge gained by dentists participating in this study was 11 and the minimum score was 2 (mean: 6.35).

The minimum score of practice related to prevention and considerations following NSI were 0 and the maximum score was 9. The maximum score was 9 and the minimum score was 2 (mean score: 6.12).

Eighty-four percent of dentists experienced NSI at least once. The number of NSIs during the past

year is shown in table 1.(table1)

**Table 1: The number of NSIs during the past year**

Number of NSI	Frequency	Percentage
0	23	15.6
1	29	19.3
2	36	24
3	15	10
4	10	6.7
5	11	7.3
6	1	0.7
7	1	0.7
8	1	0.7
10	11	7.3
14	1	0.7
15	1	0.7
20	5	3.7
Unknown	5	3.3
Total	150	100

. Only 15.6% of dentists did not experience or did not remember experiencing NSI and 5 did not answer this question.

The frequency of exposure to each instrument is shown in table 2.(table2)

**Table 2: The frequency of needlestick injuries by different instruments**

Instrument	Frequency	Percentage
Needle	30	20
Matrix	9	6
Bur	13	8.66
Wire	2	1.33
Endodontic file	22	14.66
Blade	3	2
Dental explorer	17	11.33
etc	14	9.33
Undefined	1	0.7
Total	111	100

The highest NSI score was reported with needle (20%) and endodontic file was ranked next (14.6%).

To evaluate the normal distribution of variables, Kolmogorov-Smirnov test was used and the results indicated that the distribution of variables was not normal.  $P < 0.001$  was considered statistically significant.

According to the results of Spearman test, there was no significant relationship between knowledge and performance ( $p = 0.848$ ), between knowledge and age ( $p = 0.69$ ), and between knowledge and experience ( $p = 0.996$ ).

While there was a significant negative relationship between performance and age ( $p = 0.003$ ) and people with a higher age had a weaker performance. There was also a significant negative relationship between performance and experience ( $p = 0.003$ ). In other words, people with a greater experience had a weaker performance.

According to the results of Kruskal Wallis test, performance and knowledge did not have a significant effect on the number of needle sticks ( $p > 0.001$ ).

According to the results of Mann-Whitney test, there was no difference between the two genders ( $p = 0.849$ ), but the performance score was significantly higher in the female group than that of men ( $p = 0.001$ ).

The knowledge score in specialists was significantly higher than general dentists ( $p = 0.012$ ). However, there was no significant difference between the two groups in terms of performance ( $p = 0.068$ ).

## Discussion

NSI is a relatively common injury. The first case of NSI was reported in 1830. Reports indicate a worldwide increase in the incidence of NSIs between 1990 and 1999.(6) Since many HCWs do not report NSIs the precise incidence of NSI is unclear. (12)

According to the results of the current study, 139 participants stated that there was no Infection Control Committee at their workplace to report NSI cases. Since most dentists work in the private sector, it is evident that their workplace lacks such a center. But according to these results, out of a total of 67 people working in public sector or private/public sectors at the same time, there were only 11 Infection Control Committees at work. This suggests that the incidence of NSIs cannot be recorded, even in some public centers.

According to the current study, 84.4% of dentists experienced NSIs at least once in the previous year; this value varied from one study to another: in Brazil 31%, in Canada 67%, in Jordan 66.5%, in Egypt 67.9%, in Shiraz-Iran 73% and in Isfahan-Iran 74%. (7, 10, 13, 14)

The difference in this rate is probably due to the difference in NSI's definition. In many studies, only injuries due to sharp needle is considered as NSI, while studies reporting a higher incidence, including the present study, has defined it as injury by any sharp means, including matrix, bur, file, etc. thus the reported frequency was higher than similar studies. In our study, the highest number of NSIs was reported by injection needle (20%) and then endodontic files (14.66%) and dental explorer (11.23%). Needle was the most commonly reported NSI factor in most studies (14.4% in Leggat's study and 40% in Rais' study).(3, 15) In Ebrahimi's study, bur (33.9%) and needle (19.6%) were the first and the second most common NSI factors.(2)

Considering that needle is one of the most important factors of exposure in dentistry, accidental NSIs can be prevented by observing some points, such

as avoiding recapping and cutting it by automatic cutter, or by one handed recapping, placing injection syringes with needle out of tray and out of access, and wearing two gloves. The mean knowledge score obtained in our study was 6.35 (45.35% of the total score) and the mean performance score was 6.12 (68% of the total score). Sufficient knowledge about NSIs and knowledge of its risks are not a guarantee to fully implement NSI prevention guidelines. In particular, the results showed that knowledge did not have a significant effect on the number of NSI ( $P = 0.924$ ); in other words, further knowledge did not reduce the incidence of NSI.

According to the results, there was no significant relationship between knowledge and age ( $P=0.69$ ) and between knowledge and experience ( $p=0.996$ ). Increasing age and working experience did not result in a decrease or increase in the knowledge level of dentists. There was a significant negative relationship between performance and age ( $p<0.003$ ) and between performance and experience ( $p<0.03$ ).

In other words, with increasing age and experience, people had a weaker performance in preventing NSIs. Since blood-borne infectious diseases in general, despite their serious and dangerous side effects, have a low risk of transmission through NSIs (0.3% HIV, 3% HBV), and despite higher transmission risk for HBV (30%) because of national vaccination against hepatitis B, there is immunity and protection against it. So lots of dentists that experienced NSI or have been exposed to oral secretions during their years of occupational activity may have never developed any of the infections caused by HBV, HIV, and HCV. Therefore, assurance about the absence of these diseases, despite experiencing NSIs, may decrease the sensitivity of more experienced dentists to infection control and proper implementation of the standard precautions.

Considering that there was no significant relationship between the number of NSIs and the frequency of NSI ( $P<0.541$ ), there may be an interventional factor that reduce the effectiveness of proper practice in preventing of NSIs. According to Sharma's study, the majority of HCWs reported fatigue as the most common cause of NSI.(16)

Probably increasing working hours and physical exhaustion can reduce the accuracy of HCW's work and increase the incidence of errors and NSIs. However, no significant difference was found between the two genders in terms of knowledge ( $p=0.849$ ), but the practice score of female dentists was sig-

nificantly better than male dentists ( $P=0.001$ ). The results of McCarthy's study also showed that female dentists had a better performance in infection control and personal protection than their male colleagues. (17) In Leggat's study, women were 11% less likely to have NSI than men. The most considerable point was the shorter working hours of women per week. In other words, female dentists visited fewer patients than male dentists.(18)

Knowledge score was significantly higher in specialists than general dentists ( $p=0.122$ ), but this difference was not significant in terms of practice ( $p=0.68$ ). This point emphasizes that higher knowledge alone does not improve the practice of individuals.

### Conclusion

The results of this study showed a high frequency of NSI among dentists. Using safer methods and protective principles during work and avoiding work during fatigue can significantly reduce the incidence of NSIs. Due to the potential side effects of NSI, continuous and effective education should be considered for dentists to improve their knowledge and practice about NSIs.

### References

1. Goniewicz M, Wloszczak-Szubzda A, Niemcewicz M, et al. Injuries caused by sharp instruments among healthcare workers--international and Polish perspectives. *Ann Agric Environ Med.* 2012; 19(3):523-7.
2. Farzin Ebrahimi S, Shadman N, Ghaempanah I. Needlestick injuries in dentists and their assistants in Kerman, Iran: prevalence, knowledge, and practice. *Journal of Oral Health & Oral Epidemiology.* 2015.
3. Rais N, Jamil HM. Prevalence of needle stick injuries among health care providers. *Int J Endorsing Health Sci Res.* 2013; 1(2):73-9.<https://doi.org/10.29052/IJE-HSR.v1.i2.2013.73-79>
4. Pruss-Ustun A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med.* 2005; 48(6):482-90.<https://doi.org/10.1002/ajim.20230>
5. Panlilio AL, Cardo DM, Grohskopf LA, et al. Updated U.S. Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. *MMWR Recomm Rep.* 2005; 54(RR-9):1-17.
6. Hashemipour M, Sadeghi A. Needlestick injuries among medical and dental students at the University of Kerman. A questionnaire study. *Journal of Dentistry of Tehran University of Medical Sciences.* 2008:71-6.
7. Golshiri P, Badrian M, Badrian H, et al. Survey of



Occupational Injuries and Knowledge on Standard Precautions about AIDS and Hepatitis among Faculty Members, Students and Educational Staff of Dentistry School in Isfahan University of Medical Sciences, Iran. *Journal of Health System Research*. 2012.

8. Bellissimo-Rodrigues WT, Bellissimo-Rodrigues F, Machado AA. Occupational exposure to biological fluids among a cohort of Brazilian dentists. *Int Dent J*. 2006; 56(6):332-7. <https://doi.org/10.1111/j.1875-595X.2006.tb00337.x>

9. McCarthy GM, Koval JJ, MacDonald JK. Occupational injuries and exposures among Canadian dentists: the results of a national survey. *Infect Control Hosp Epidemiol*. 1999; 20(5):331-6. <https://doi.org/10.1086/501626>

10. Khader Y, Burgan S, Amarin Z. Self-reported needle-stick injuries among dentists in north Jordan. *East Mediterr Health J*. 2009; 15(1):185-9. <https://doi.org/10.26719/2009.15.1.185>

11. Yadav P, Jain A, Agrawal M, et al. Occupational Exposures to Blood among Dentists in Jaipur District. *Int J Dent Med Res* | JULY-AUGUST. 2014; 1(2):6.

12. Whitby RM, McLaws ML. Hollow-bore needle-stick injuries in a tertiary teaching hospital: epidemiology, education and engineering. *Med J Aust*. 2002; 177(8):418-22. <https://doi.org/10.5694/j.1326-5377.2002.tb04881.x>

13. Hanafi MI, Mohamed AM, Kassem MS, Shawki M. Needlestick injuries among health care workers of University of Alexandria Hospitals. *East Mediterr Health J*. 2011; 17(1):26-35. <https://doi.org/10.26719/2011.17.1.26>

14. Askarian M, Malekmakan L, Memish ZA, Assadian O. Prevalence of needle stick injuries among dental, nursing and midwifery students in Shiraz, Iran. *GMS Krankenhhyg Interdiszip*. 2012; 7(1):Doc05.

15. Younai FS, Murphy DC, Kotelchuck D. Occupational exposures to blood in a dental teaching environment: results of a ten-year surveillance study. *J Dent Educ*. 2001; 65(5):436-48. <https://doi.org/10.1002/j.0022-0337.2001.65.5.tb03413.x>

16. Sharma R, Rasanias S, Verma A, Singh S. Study of Prevalence and Response to Needle Stick Injuries among Health Care Workers in a Tertiary Care Hospital in Delhi, India. *Indian J Community Med*. 2010; 35(1):74-7. <https://doi.org/10.4103/0970-0218.62565>

17. McCarthy GM, MacDonald JK. Gender differences in characteristics, infection control practices, knowledge and attitudes related to HIV among Ontario dentists. *Community Dent Oral Epidemiol*. 1996; 24(6):412-5. <https://doi.org/10.1111/j.1600-0528.1996.tb00890.x>

18. Leggat PA, Smith DR. Prevalence of percutaneous exposure incidents amongst dentists in Queensland. *Aust Dent J*. 2006; 51(2):158-61. <https://doi.org/10.1111/j.1834-7819.2006.tb00420.x>