

Evaluation of Awareness, Frequency and Type of Occupational Injury in Dental Personnel - A Cross Sectional Study

Maimoona Naeem¹, Fasahat Khan², Syed Mahmood Shah³, Zafar Abbas⁴, Amna Rehman⁵,
Muhammad Saad ul Hassan⁶

Abstract

Objective: To evaluate the awareness, frequency and type of occupational injury in dental personnel of Karachi.

Methods: This cross-sectional prospective study was conducted using a pre-designed questionnaire addressing dental personnel of two dental hospitals in Karachi. The inclusion criteria included dental personnel of both genders aged between 20 years to 60 years given verbal consent. The non-cooperative respondents and unwilling participants were excluded. The sample population includes final year BDS students, house officers (HOs), dental officers (DOs), general dental practitioners (GDPs), consultants, post-graduate residents (PGs) and dental staff assistants (DSAs). The dental health care workers were asked for the frequencies, tool, procedure and the departments in which they experienced NSI/SII; their knowledge and practice regarding standard management protocols for NSI/SII and their reporting was assessed. The ample size of 201 personnel has participated. The researcher filled out the questionnaire, enter and analyzed the data on SPSS version 19.00.

Results: Female and final year BDS participants were 74.6% (n=150) and 35.3% (n=71) respectively. Needle stick injury or sharp instrument injury was 69.6% (n=140). Most frequent instrument causing injury was dental needle i.e., 54.3% (n=76) while most frequent procedure was injury during local anesthesia administration i.e., 28.6% (n=40). Department of Oral Surgery was the most common department reported for injury i.e., 53.6% (n=75). Total 86.6% (n=174) were aware of knowledge of standard protocol of needle stick injury management and 79.3% (n=111) of dental personnel followed standard protocols for its management. The statistical analysis was done with Statistical Package for Social Sciences (SPSS) version 19.0.

Conclusion: It has been concluded that the frequency of dental occupational injury is high and most injuries were caused by needles during oral surgical procedures. Awareness of dental personnel towards dental occupational injury and its management protocols in Karachi is adequate but continuing education activities related to the topic must be planned.

Keywords: Wounds and Injuries, occupational injuries, dental instruments

IRB: Approved by Ethics Committee of Liaquat College of Medicine and Dentistry. Ref# EC/23/19. Dated: 22nd August 2019.

Citation: Naeem M, Khan F, Shah SM, Iqbal Z, Rehman A, Hassan MS. Evaluation of Awareness, Frequency and Type of Occupational Injury in Dental Personnel - A Cross Sectional Study [Online]. Annals ASH & KMDC 2022;27:82-88

(ASH & KMDC 27(2):82;2022)

Introduction

Sharps injuries are the most common type of injury affecting dental hospital staff. Every year, hundreds and thousands of health care workers are exposed to dangerous and deadly bloodborne pathogens through contaminated needle sticks and

sharps injuries (NSIs) because of performing daily procedures in clinical activities. An occupational hazard is a risk to a person that usually arises from their job. It can also refer to a job, a material, a substance, a process, or a setting at work that predisposes to or causes accidents or disease. The function of occupation in the dynamics of health and disease may be traced back to the 18th century, when Bernardino Ramazzini, known as the "Father of Occupational Medicine," identified the significance of occupation in the dynamics of health and disease¹.

Dentists and other clinical dental workers face similar workplace dangers around the world, which

^{1,2,6}General Dental Practitioner

³Department of Orthodontics, Muhammad Denatl College, Sindh

⁴Department of Oral Medicine & Diagnosis, Dow International Dental College, Karachi.

⁴Department of Oral & Maxillofacial, Surgery, Liaquat College of medicine & Dentistry, Darul Sehat Hospital Karachi.

Correspondence: Dr. fasahat Khan
Gernal Dental Practitioner Private Denatl Clinic

Email: fasahat_khan1@hotmail.com

Date of Submission: 10 Jan 2022

Date of Acceptance: 26 May 2022

include a wide range of risks and, in some cases, legal risks. The work environment, which might include physical, chemical, biological, mechanical, and social components, is the source of these dangers. Dental workers are exposed to a variety of work-related dangers when they practice dentistry. Working in a sedentary position, working with worried patients, exposure to microbiological aerosols created by high-speed rotating handpieces, exposure to various chemicals used in clinical dental practice and other dangers. These dangers can put dental professionals' lives in jeopardy. The contamination of health care workers (HCWs) with blood/ fluids of patients infected with Hepatitis B Virus (HCB), Hepatitis C virus (HCV) & Human Immunodeficiency virus (HIV) is called occupational exposure². Sharp injuries are penetrating wounds caused by instruments such as needles, scalpels and blades. Sharp instrument/ needle prick injuries cause these types of exposures; thus, creating a risk for transmission of blood-borne diseases such as HCB, HCV, and HIV³.

Dental Surgeons/Hygienists are more prone to these sorts of injuries because they are in close contact with the patient and sharp instruments like high-speed burs, needles, endodontic files and scalpel blades⁴. Among dentists and hygienists, dental students are more prone to these types of injuries due to a lack of knowledge and experience. The highest incidence of NSIs was seen in health care providers and the associated factors were age, level of education, number of shifts per month, and history of related training⁵. The highest rate of NSIs was related to instrument preparation, injection, and recapping of used needles. A study published in 2017 reports the injuries and discusses the transmission of blood-borne diseases among health care workers (HCWs). According to which the rate of NSI is highest among physicians and nursing staff⁶. The dental staff/students should be evaluated on their knowledge of NSI so that they have a sound knowledge of the preventive measures. Moreover, the HCWs should be vaccinated against HCB, those who have efficient blood titers are prevented from HCB seroconversion.

There is no vaccine against HCV. About 20 blood-borne diseases can be transmitted through occupational exposure, among them HCV, HCB and HIV are on the top of the list for many years. The injured person should offer specific prophylactic treatment which includes Hepatitis B immunoglobulin, Hepatitis B vaccine, antibiotics and postexposure prophylactics for HIV⁶.

HBV is globally a major health concern; about 350 million people are suffering from chronic liver infections. According to the WHO, about 500,000-700,000 million deaths are caused by liver diseases every year. The mortality rate caused by hepatocellular carcinoma is estimated to be 600,000. The prevalence of HBV is highest in the Middle East, South America, and Africa while it is lowest in Northern Europe, Southern Europe and in Central Europe. Incidents of percutaneous exposure are the most effective way to spread blood-borne illnesses between patients and health-care professionals. It could be linked to the fact that dentists work in a field with limited access and visibility and regularly utilize sharp instruments. Developing countries have a high risk of occupational exposure as there is no appropriate reporting system. The US Public Health Service (PHS) recommends that there should be proper follow-ups of individuals who are exposed to blood-borne diseases. Dental staff is more prone to NSI than their fellow medical staff, so they should be given academic training about the prevention of NSI⁷.

A study published in 2016 conducted in Pakistan showed the incidence of transmission of blood-borne diseases among HCWs after occupational exposure, among them 0.64%, are exposed to HCB, 0.8% to HCV in comparison to the general population (4.7% – 38%), but still, the exact incidence cannot be estimated.

The traditional barriers like gloves, masks, and eyewear decrease the risk of blood contact with skin and mucous membranes. Studies show that there is less risk of viral transmission through the mucous membrane. The blood borne diseases can

be transmitted from patient to patient, patient to dentist, or from dentist to patient. Safety measures can prevent this transmission as usually, the transmission is accidental⁸. Number of exposures strongly affect the viral transmission. All dental health care workers (DHCWs) should have sound knowledge about NSI/SII and about the protocols which should be followed after an injury to prevent further complications. This study was planned with the rationale to evaluate the awareness, frequency and type of occupational injury in dental personnel in Karachi.

After an in-depth search, few more studies have been reported that evaluated the awareness, frequency and type of occupational injury in dental personnel in Karachi. This study aimed to evaluate the awareness, frequency and type of occupational injury in dental personnel of Karachi.

Subjects and Methods

This cross-sectional prospective survey was conducted on a pre-designed questionnaire, which consisted of thirteen questions addressing the dental personnel of two dental hospitals affiliated with public sector dental institutes. The duration of the study was September 2019 to February 2020. The Ethical approval was taken from the ethical review committee of the institute. The sample population includes final year BDS students, house officers (HOs), dental officers (DOs), general dental practitioners (GDPs), consultants, post-graduate residents (PGs) and dental staff assistants (DSAs) of Karachi Medical and Dental College (KM&DC) and Liaquat College of Medicine and Dentistry (LCMD). The dental health care workers were asked for the frequencies, tool, procedure and the departments in which they experienced NSI; their knowledge and practice regarding standard management protocols for NSI and their reporting was assessed. The sample was selected using non-probability convenience sampling. Raosoft software was used to calculate the sample size which was 201; using the population size of 420, the margin of error 5%, and 95% confidence interval. The inclusion criteria include dental perso-

nnel of both genders aged between 20 years to 60 years and who had given verbal consent for the study. The non-cooperative respondents, not willing to participate in the study were excluded. The statistical analysis was done with SPSS version 19.0. Statistically significant p-value was < 0.05 i.e., ($p < 0.05$).

Results

The study included 201 dental personnel among them 74.6% (150) were females and 25.4% (51) were males. A total of 257 questionnaires were distributed out of which 201 were returned filled, making a response rate of 78.21%. According to their designation, there were 1.5% (3) consultants, 10.4% (21) dental officers, 13.4% (27) dental staff assistants, 35.3% (71) final year students, 9.5% (19) general dental practitioners, 25.9% (52) house officers, and 4.0% (8) residents.

A total of 69.6% (140) dental personnel experienced dental occupational injury and 30.3% (61) weren't exposed to any injury in their professional career. Out of that 69.6% of personnel who have experienced injury, 38.5% (54) were exposed one time only, while 25 % (35) were exposed to dental occupational injury two times, and the remaining 36.4 % (51) were exposed more than 2 times.

The departments of exposure are listed in Table I. Tools causing injury in exposed dental personnel (69.7%) are illustrated in Fig 1.

Figure 2 explained the frequency of procedures during which dental personnel were exposed to needle stick injury (69.7%), i.e., encountered an injury. The immediate reaction after injury for most personnel was indifferent 47.1% (66), anxiety and stress 38.6% (54), and anger 14.3% (20).

Regarding the knowledge of standard protocol of needle stick injury management, 86.6% (174) reported positive while 19.2% (27) were unaware of it. Approximately 52.9% (74) of the personnel experienced injury reported of bleeding as a result of injury, while 47.1% (66) didn't have any bleeding. A total of 79.2% (111) of personnel who experienc-

ed injury followed the standard management protocols while 20.7% (29) did not follow the protocols of management. The reasons for not reporting the needle stick injuries are listed in Table II.

Only 17.1% (24) of dental personnel went for viral screening following the exposure to the incident while the remaining 82.9% (116) didn't have any viral screening. When asked about the knowledge of transmission of Hepatitis A, B, C, and HIV through needle stick/sharp instrument injury 92.0% (185) reported positive, while only 8.0% (16) reported negative.

Table 1. Showing the percentage distribution of needle stick injuries among different departments

Departments	n (%)
Oral Surgery	75 (53.5%)
Operative and Endodontics	38 (27.4%)
Prosthodontics	14 (10%)
Orthodontics	7 (5%)
Periodontics	6 (4.2%)

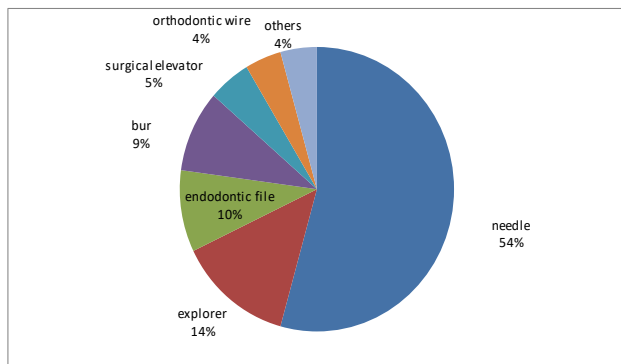


Fig 1. Pie chart showing percentage of injury caused by different tools used in dentistry

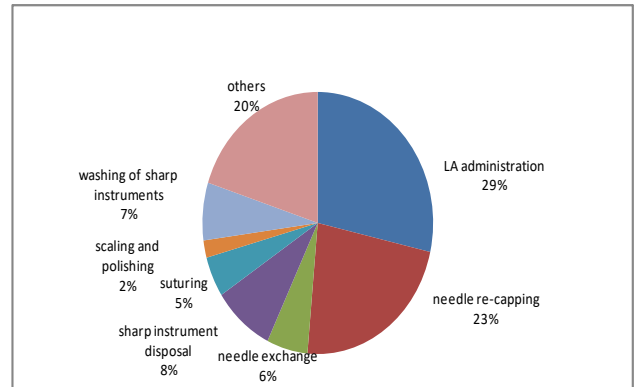


Fig 2. showing percentage needle stick injury caused during different dental procedures

Table 2. Showing percentage distribution of reasons of not reporting of NSI

Reasons	n (%)
Minor injury	47 (33.5%)
Vaccinated	25 (17.9%)
No reporting department	38 (27.2%)
Unaware of reporting the incident	30 (21.4%)

Discussion

Clinical dentistry staff gets exposed to potential dangers when they adapt to the workplace and routine functions over time due to the continual handling of potentially hazardous chemicals and working in a potentially polluted environment⁹. If sufficient safety measures are not taken, a worker's safety may be threatened significantly. Dental occupational injuries are common in dental practice. Dental clinicians and dentists are the most common victims¹⁰. Awareness regarding dental occupational injuries is important in order to prevent related morbidity of the injury. This study was conducted to evaluate the awareness of dental staff and dentists regarding occupational injuries.

In our study majority of the participants were females. This is similar to the other studies which also report a high proportion of female participants-

^{11,12}. It can be due to the increased proportion of female students and female dental staff working in dental hospitals and clinics.

The frequency of exposure to NSI is high i.e., 66.7% in our study. It's contradictory to the studies in which the prevalence of exposure is low¹³. It can be due to lack of awareness, shortage of time, and careless handling of instruments. The high prevalence of exposure indicates a dire need for counseling and educational programs to help the dental personnel to aware and understand the preventive measures and techniques to reduce future incidents.

The department within which the quantity of exposure is highest is Oral Surgery. It is due to the more frequent and greater amount of local anesthesia in procedures related to oral surgery as compared to other departments. This is often in contrast to the studies where there's a high frequency of exposure within the conservative and endodontic department¹⁴.

Sharp instruments and needle injuries are common among dental personnel i.e., 54%. It could be due to increased workload, shortage of time, and lack of repetitive awareness of infection control measures among dental personnel¹⁵.

The post-injury reaction after a sharp instrument or needle prick injury could be anxiety or stress, indifference, and anger. After a sharp instrument injury, the person shouldn't panic and follow the quality protocols to decrease the danger of catching blood-borne viruses¹⁶. Post-exposure protocols include washing the injured site thoroughly with water then cleansing it with povidone-iodine and properly dressing the positioning¹⁷. During this study, 86.6% of participants knew standard protocols. In this study, 82.9% of participants didn't choose viral screening while 11% had gone for viral screening¹⁸. This could be due to the unavailability of screening centers or lack of awareness of post-exposure procedures. This is most likely a reflection of non-doctors' attitudes, who may believe they are less at danger

of exposure and, as a result, do not seek the free vaccine given in the hospital. It is very important to go for viral screening after a sharp instrument injury if the patient is suspected to be Hepatitis B positive. The affected person should take prophylactic Hepatitis-B immunoglobulins to prevent the longer-term viral attack¹⁹. There is no prophylaxis for Hepatitis C, so dental personnel should be very careful while doing procedures in which exposure to blood-borne pathogens is high like extractions, suturing, etc. If dental personnel experience sharp instrument injury, they must go for their viral screening. The guidelines related to the treatment of patients suspected to have hepatitis B and C, or treated or in an active state

should be known and strictly followed to prevent any transmission. The patients should be treated with a full barrier technique that involves the use of a facemask, eye shield, double gloves, disposable gowns, and face shields. All surfaces should be covered with disposable covers as well to prevent any viral transmission. The disposable waste (such as protective gear items, gauze, suction tube, etc.) should be tackled very carefully and disposed of according to bio-hazardous waste disposal guidelines. All surfaces should be disinfected with 2% glutaraldehyde after the procedure is completed²⁰.

The limitations of our study are the small sample size, Cross-sectional design.

One of the most significant measures for preventing occupational injuries and disorders is education. The importance of one's occupation in sustaining personal health must be continually stressed so that workers are aware of any potential negative health consequences of their jobs and how to mitigate them.

It is recommended that continuing dental educational sessions and seminars must be planned and arranged to be attentive to dental personnel for the quality management protocols and contemporary infection control methods. Post-exposure protocols include washing the injured site. After a sharp instrument injury, the person

should not panic and follow the standard protocols to decrease the risk of catching blood-borne viruses.

Standard protocols should be taken for all patients consistent with WHO. Post-exposure protocols include washing the injured site thoroughly with water then cleansing it with povidone-iodine and properly dressing the positioning. The injured person is suggested to report to the department of emergency for risk assessment. The person may also choose viral screening. The immunization of clinical professionals against the Hepatitis B Virus should be a standard procedure in hospitals. The injured person should offer a selected prophylactic treatment that has Hepatitis B immunoglobulin, Hepatitis B vaccine, antibiotics, and post-exposure prophylactics for HIV.

One of the most recommended methods to prevent needle prick injuries is double scoop recapping. Dental personnel must be directed to ensure the use of this technique during work.

Besides, there's a dire need for the establishment of a pointy instrument injury department altogether in teaching institutes of Pakistan which ensures the protection of their staff against lethal infectious diseases.

It is recommended that further studies must be conducted with large sample size and with a prospective interventional design so that findings are more applicable and generalized. The most important factors that cause needle stick and sharp injury were recapping of the needle after use, job-related stress, not using universal precautions during the procedure, and lack of the required skill. Safe handling and disposal of needle sticks and sharp materials enable preventing blood-borne infections. Therefore, health care providers should get training to fill the skill gap, apply universal precautions during the procedure, and never recap needles after use.

Conclusion

It has been concluded that the frequency of dental occupational injury is high and most injuries were caused by needles during oral surgical procedures. Awareness of dental personnel towards dental occupational injury and its management protocols in Karachi is adequate but continuing education activities related to the topic must be planned.

Conflict of Interests

Authors have no conflict of interests and received no grant/funding from any organization.

References

1. Mohammed NS, Shaik MA. Occupational hazards in modern dentistry. *Int J Experiment Dent Sci*. 2013;2(1):33-40. [DOI: 10.5005/jp-journals-10029-1037]
2. Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of needlestick and injuries among health-care workers of a tertiary care teaching hospital in North India. *J Lab Physicians*. 2017;9(1):20-25. [DOI: 10.4103/0974-2727.187917]
3. Karimi-Sari H, Tajik M, Bayatpoor ME, Sharafi H, Alavian SM. Public awareness campaign and knowledge of Iranian (bio) medical students regarding hepatitis B and C infections. *Hepatitis Monthly*. 2017;17(5):6. [DOI: 10.5812/hepatmon.45929]
4. Tadakamadla J, Kumar S, Swapna LA, Reddy S. Occupational hazards and preventive practices among students and faculty at a private dental institution in India. *Stomatologija* [online]. 2012;14(1):28-32. Available from: <https://europepmc.org/article/med/22617332> [Accessed on 23rd May 2022]
5. Motaarefi H, Mahmoudi H, Mohammadi E, Hasanpour-Dehkordi A. Factors associated with needlestick injuries in health care occupations: a systematic review. *J Clin Diagn Res*. 2016;10(8):IE01-IE04. [DOI: 10.7860/JCDR/2016/17973.8221]
6. Karimi-Sari H, Alavian S. Needlestick injury against viral hepatitis elimination. *J Hosp Infect*. 2017;96(4):398. [DOI: 10.1016/j.jhin.2017.04.024]
7. Hasak JM, Novak CB, Patterson JMM, Mackinnon SE. Prevalence of needlestick injuries, attitude changes, and prevention practices over 12 years in an urban academic hospital surgery department. *Ann Surg*. 2018;267(2):291-6. [DOI: 10.1097/SLA.0000000000002178]

8. Karimi-Sari H, Tajik M, Bayatpoor ME, Alavian SM. Increasing the awareness of the general population: an important step in elimination programs of viral hepatitis. *Am J Gastroenterol*. 2017;112(2):393-5. [DOI: 10.1038/ajg.2016.534]
9. Alam Y, Huma Z, Hassan NU. Prevalence of hepatitis in paediatric oncologic patients: a single centre study. *N. Health Sciences*. 2017;2(1):8-13. [DOI: 10.21089/njhs.21.0008]
10. Thio CL, Seaberg EC, Skolasky R Jr, Phair J, Visscher B, Muñoz A, et al. HIV-1, hepatitis B virus, and risk of liver-related mortality in the multicenter cohort study (MACS). *Lancet*. 2002;360(9349):1921-6. [DOI: 10.1016/s0140-6736(02)11913-1]
11. Katsevman GA, Braca JA, 3rd, Sedney CL, Hatchett L. Needlestick injuries among healthcare professionals in training: using the surgical 'time-out' and hand-off protocols to deter high-risk needlesticks. *J Hosp Infect*. 2017;95(1):103-4. [DOI: 10.1016/j.jhin.2016.10.018]
12. Karimi-Sari H, Bayatpoor ME, Aftabi Khotbesara M, Ebrahimi MS, Sattari Z, Sattari P, et al. Knowledge, attitude, and practice of Iranian health sciences students regarding hepatitis B and C virus infections: a national survey. *Am J Infect Control*. 2017;45(11):e135-e41. [DOI: 10.1016/j.ajic.2017.07.012]
13. O'Brien CR, Lim JK. Prevention and management of hepatitis B in healthcare professionals. *Curr Hepatol Rep*. 2019;18:1-8. [DOI: 10.1007/s11901-019-00444-6]
14. Carter G, Lawrence C, Woodward B, Ohmit A. Accessing medical care after a needlestick injury: first responders' perception of HIV risk and attitudes toward syringe service programs. *J Community Health*. 2020;45(3):554-60. [DOI: 10.1007/s10900-019-00775-x]
15. Zuhaib Khan M, Saqib S, Irtiza Hussain Shah Gardyzi S, Qazi J. Prevalence of blood-borne viruses in health care workers of a northern district in Pakistan: risk factors and preventive behaviors. *Can J Infect Dis Med Microbiol*. 2016;2016:5. [DOI: 10.1155/2016/2393942]
16. Centers for Disease Control. Recommendations for prevention of HIV transmission in health-care settings. *MMWR* 1987;36. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/00023587.htm> [Accessed on: 24th May 2022]
17. Bell DM, Shapiro CN, Ciesielski CA, Chamberland ME. Preventing bloodborne pathogen transmission from health-care workers to patients: the CDC perspective. *Surg Clin North Am*. 1995;75(6):1189-203. [DOI: 10.1016/s0039-6109(16)46791-5]
18. Galougahi MHK. Evaluation of needle stick injuries among nurses of Khanevadeh Hospital in Tehran. *Iran J Nurs Midwifery Res* [online]. 2010;15(4):172-7. Available from: <https://pubmed.ncbi.nlm.nih.gov/21589791/> [Accessed on: 23rd May 2022]
19. Abebe AM, Kassaw MW, Shewangashaw NE. Prevalence of needle-stick and sharp object injuries and its associated factors among staff nurses in Dessie referral hospital Amhara region, Ethiopia, 2018. *BMC Res Notes*. 2018;11(1):840. [DOI: 10.1186/s13104-018-3930-4]
20. Dahiya P, Kamal R, Sharma V, Kaur S. "Hepatitis" - prevention and management in dental practice. *J Educ Health Promot*. 2015;4:33. [DOI: 10.4103/2277-9531.157188]