Original Article

Knowledge, attitude, and practice of needle stick and sharps injuries among dental professionals of Bangalore, India

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Abstract

Background: A needle stick injury (NSI) is an accidental skin-penetrating stab wound from a hollow-bore needle containing another person's blood or body fluid. Healthcare workers (HCWs) including dental professionals are at an occupational risk of exposure to blood-borne pathogens following NSIs and sharps injuries (SIs). A thorough understanding of the safe practices while handling needles and sharps is crucial for HCWs to create a risk-free work place environment. **Aims and Objectives:** To assess the knowledge, attitude, practice, and prevalence of NSIs and SIs among dental professionals in a dental college at Bangalore. **Materials and Methods:** A cross-sectional survey was conducted in September 2012 using a structured, pretested, guided interview-based questionnaire that was administered to 200 dental professionals in a dental college at Bangalore to assess the knowledge, attitude, practices, and self-report information of NSIs. **Results:** In the present study, 81.5% of dental professionals were vaccinated against hepatitis B. A total of 27.5% participants had an NSI during the previous 12 months. About 41.80% of NSIs occurred during device recapping. Most common reason for failure to report the incidents of NSIs, as declared by 29.09% of the participants, included the fear of being blamed or getting into trouble for having an NSI. **Conclusion:** The knowledge of dental professionals on NSIs and their preventive measures are inadequate; however, training on Universal Precaution Guidelines, protocols regarding post-exposure prophylaxis, and safety devices has to be provided to prevent such injuries in future among the dental professionals.

Key words: *Dental college, dental professionals, needle stick injury, sharps injury*

INTRODUCTION

A needle stick injury (NSI) is defined as an accidental skin-penetrating stab wound from a hollow-bore needle (or any sharp) containing another person's blood or body fluid. Sharps injury (SI) is defined as a skin-penetrating stab wound caused by sharp instruments and accidents in a medical setting.[1]

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According to the World Health Report 2002, out of 35 million healthcare workers (HCWs), 2 million experience percutaneous exposure to infectious diseases each year. It further notes that 37.6% of hepatitis B, 39% of hepatitis C, and 4.4% of Human Immunodeficiency Virus (HIV)/AIDS among HCWs around the world are due to NSIs.[2] Globally, NSIs are the most common

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source of occupational exposure to blood and the primary cause of blood-borne infections of HCWs.[3] In India, around 3–6 billion injections are given per year, of which two-third injections are unsafe (62.9%), and the use of glass syringe is constantly associated with a higher degree of unsafeness.[4]

The routine use of sharp instruments in dental treatment, the presence of blood and saliva, and the diverse bacterial flora in the oral cavity all contribute to the hazardous nature of the dental workplace for blood-borne infections.[5] Preventing NSIs is a challenge faced in virtually every medical work place.[6] In a dental environment, the burden of NSIs and SIs can be reduced when a dental professional abides by the current and universally accepted standard precautionary measures against NSIs.[7] Every healthcare facility should have an infection control program in place through a working hospital infection control committee.[8]

There are no reliable surveillance data regarding occupational exposure in our country. The establishment of an effective infection control program requires information on occupational exposure and prevalence of the disease and the factors related to it. Such surveillance data is essential for developing and revising infection control policies and procedures.[9]

Hence, the present study was intended to assess the knowledge, attitude, practice, and prevalence of NSIs and sharp injuries among dental professionals in a dental college at Bangalore.

Aim

The aim of this study was to assess the knowledge, attitude, practice, and prevalence of NSIs among dental professionals in a dental college at Bangalore.

Objectives

- To assess the knowledge, attitude, and practice of NSIs among dental professionals in a dental college at Bangalore using a guided questionnaire
- To assess the prevalence of NSIs among dental professionals in a dental college at Bangalore using a guided questionnaire.

MATERIALS AND METHODS

A cross-sectional survey was conducted in September 2012 among the dental professionals in a dental college at Bangalore. The dental professionals included in the study were the dental house surgeons, dental postgraduate students, dental faculty, and nurses of the college. Nurses in this institution have formally completed their BSc Nursing course. They assist the dental professionals (dental house surgeons, dental postgraduate students, and dental faculty) in most of the dental treatment provided in the college. Though they are not recognized dental auxiliaries in our country, these seven nurses in the college have good years of working experience in the dental practice environment, making them eligible to be noted as dental nurses. Hence, this minor group of dental nurses is also considered to be equally susceptible to NSIs and SIs as the rest of the dental professionals.

Convenience sampling technique was used in which a total of 200 dental professionals who gave consent to be a part of the study were informed about the design and purpose of the study. The anonymity of the participants was maintained throughout the study.

A pilot study was conducted with few randomly selected dental professionals of the same college to assess the feasibility and applicability of the questionnaire. The pilot study confirmed the feasibility of the main study. Subsequently, minor changes were done in the questionnaire for effective communication among the participants.

Data for the main study were collected using a structured, pretested, guided interview-based questionnaire consisting of closed and open-ended questions. The questionnaire consisted of a section on demographic items such as age, gender, and type of profession. Another section collected data about their vaccination status; knowledge, prevalence, and occurrence of NSIs; the reasons for not reporting an NSI if in case there was one; knowledge and practice of universal precaution guidelines and also knowledge about post-exposure prophylaxis (PEP) and safety devices to prevent NSIs. The questionnaire included a range of response options designed to identify the practitioner's knowledge, attitude, and practice of the universal precautions in the medical field and about their awareness toward NSIs.

Ethical approval for the study was obtained from the Institutional Review Board of Krishnadevaraya College of Dental Sciences, Bangalore.

Statistical analysis

The data were entered into MS-office, Excel and analyzed using the statistical package, SPSS version 13. The

descriptive statistics of the key variables were reported; comparison of these variables between the different professions was made using Pearson's Chi-square test and the *P* value for the same was calculated. Statistical significance was set at $P < 0.05$ for this study.

RESULTS

Out of the 200 participants in the study, 41.5% were male and 58.5% were female participants, with an overall mean age of 30.26 years. Among them, 23.5% were dental house surgeons, 34% were postgraduate dental students, 39% were dental faculty, and 3.5% were dental nurses.

Majority of the dental professionals considered hepatitis B, hepatitis C, and HIV/AIDS to be transmitted by NSIs (88%; $P = 0.041$). About 79% respondents reported that injury caused while using all of the instruments (hand, rotary, surgical, hypodermic needles, suture needles, and lancets) constituted NSIs and SIs ($P = 0.0003$). A majority of the dental professionals had knowledge about the Universal Precaution Guidelines (58%; $P = 0.276$). Nearly 52.5% of the dental professionals were unaware of the safety devices available in the market to prevent NSIs ($P = 0.082$) and 62% were aware about the PEP in the management of NSIs ($P = 0.425$) [Table 1].

About 81% of the dental professionals reported that they would first contact a medical emergency room in case of an accidental NSI, 9% reported that they would contact the Oral Surgery Department, 6.5% would contact their professional colleagues, 2% would contact the Principal, and 1.5% would not contact anyone in case of NSIs ($P = 0.00$). The self-reported reasons that prevented the dental professionals to report NSIs were: 8% of the dental professionals thought he/she might get blamed or get into trouble for having an NSI, 5.50% reported that they were not aware of the reporting procedures, 5% did not report because the injury was due to sterile needle, 4.5% was concerned about the confidentiality, 2.5% did not have time to report, and 2% thought it was not important to report ($P = 0.404$) [Table 2].

Among the dental professionals who had an NSI in the past 12 months, 41.81% had it during recapping of the device, 38.18% had it during device use, 14.54% had it after device use and before disposal, and 5.45% had it during device disposal ($P = 0.950$). Most of the

Table 1: Knowledge on needle stick and sharps injuries among dental professionals

Knowledge on needle stick and sharps injuries among dental professionals	No. of respondents (%)					*P*
	DHS	PGDS	DF	DN	Total	
Diseases that can be transmitted by NSIs are						
Hepatitis B	0 (0.0)	2 (40.0)	3 (60.0)	0 (0.0)	5 (2.50)	0.041*
Hepatitis C	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
HIV/AIDS	10 (52.6)	2 (10.5)	6 (31.6)	1 (5.3)	19 (9.50)	
All of the above	37 (21.0)	64 (36.4)	69 (39.2)	6 (3.4)	176 (88.0)	
Consider needle stick and sharps injury						
Injury while using hand instruments (explorer, scaler, endodontic instruments)	1 (50)	1 (50)	0 (0.0)	0 (0.0)	2 (1)	0.0003*
Injury while using rotary instruments (airotor, endodontic instruments)	5 (100)	0 (0.0)	0 (0.0)	0 (0.0)	5 (2.50)	
Injury while using surgical instruments (scalpel, scissors, elevators)	9 (42.9)	3 (14.3)	7 (33.3)	2 (9.5)	21 (10.50)	
Injury while using hypodermic needle, suture needles, and lancets	5 (35.7)	7 (50)	1 (7.1)	1 (7.1)	14 (7.00)	
All of the above	27 (17.1)	57 (36.1)	70 (44.3)	4 (2.5)	158 (79.00)	
Knowledge about Universal Precaution Guidelines						
Yes	24 (20.7)	45 (38.8)	42 (36.2)	5 (4.3)	116 (58.00)	0.276
No	23 (27.4)	23 (27.4)	36 (42.9)	2 (2.4)	84 (42.00)	
Knowledge on safety devices to prevent NSIs						
Yes	19 (20.0)	27 (28.4)	44 (46.3)	5 (5.3)	95 (47.50)	0.082
No	28 (26.7)	41 (39.0)	34 (32.4)	2 (1.9)	105 (52.50)	
Knowledge on post-exposure prophylaxis in the management of NSIs						
Yes	28 (22.6)	39 (31.5)	51 (41.1)	6 (4.8)	124 (62.00)	0.425
No	19 (25.0)	29 (38.2)	27 (35.5)	1 (1.3)	76 (38.00)	

**Statistically significant. DHS=Dental house surgeon, PGDS=Post graduate dental student, DF=Dental faculty, DN=Dental nurse, NSI=Needle stick injury*

dental professionals practice and follow one-handed needle recapping technique or scoop technique (69%; $P = 0.028$). The needle disposal method followed and practiced by most of the dental professionals is the use of needle burner and syringe destroyer (54.5%; $P = 0.001$) [Table 3].

About 27.5% of the dental professionals had an NSI in the past 12 months, resulting in 0.27 NSIs per dental professional per year ($P = 0.153$) [Table 4].

DISCUSSION

HCWs face a recognized risk of occupational exposure to blood-borne viruses such as the HIV, the hepatitis B virus (HBV), and the hepatitis C virus (HCV). Dental professionals are one among the HCWs.[10] In the present study, 88% of the dental professionals considered hepatitis B, hepatitis C, and HIV to be transmitted by NSIs. It was in accordance with the study conducted by Saini,[11] Guruprasad *et al*.,[12] Malik *et al*.,[7] and Kasat *et al*.[13] The analysis of dental professionals in the present study indicates that they have relatively good level of knowledge about the diseases transmitted through NSIs and SIs. This was in contrast to a study conducted by Alam,[14] which reported that 21% and 30% of HCWs (nurses and paramedical staff) were unaware of the fact that AIDS and hepatitis C can be transmitted by NSIs, respectively.

Table 2: Attitude on needle stick and sharps injuries among dental professionals

Attitude on needle stick and sharps injuries among dental professionals	No. of respondents					*P*
	DHS	PGDS	DF	DN	Total	
First contact person following an NSI						
Medical emergency room	40 (24.7)	43 (26.5)	74 (45.7)	5 (3.1)	162 (81.00)	0.000*
Oral surgery department	1 (5.6)	14 (77.8)	3 (16.7)	0 (0.0)	18 (9.00)	
Principal	2 (50.0)	0 (0.0)	0 (0.0)	2 (50.0)	4 (2.00)	
Would not contact anyone	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)	3 (1.50)	
Others	3 (23.1)	9 (69.2)	1 (7.7)	0 (0.0)	13 (6.50)	
Reasons for not reporting NSIs in the past 12 months						
I did not report because the injury was due to sterile needle	3 (30.0)	5 (50.0)	2 (20.0)	0 (0.0)	10 (5.00)	0.404
I did not know the reporting procedure	1 (9.1)	5 (45.5)	5 (45.5)	0 (0.0)	11 (5.50)	
I thought I might get blamed or get into trouble for having an NSI	4 (25.0)	7 (43.8)	5 (31.3)	0 (0.0)	16 (8.00)	
I did not think it was important to report	0 (0.0)	1 (25.0)	3 (75.0)	0 (0.0)	4 (2.00)	
I did not have time to report	0 (0.0)	5 (100.0)	0 (0.0)	0 (0.0)	5 (2.50)	
I was concerned about confidentiality	3 (33.3)	1 (11.1)	5 (55.6)	0 (0.0)	9 (4.50)	

**Statistically significant. DHS=Dental house surgeon, PGDS=Post graduate dental student, DF=Dental faculty, DN=Dental nurse, NSI=Needle stick injury*

Table 3: Occurrence of NSIs and practice of needle recapping and disposal after use among dental professionals

Occurrence of NSIs and practice of needle recapping and disposal after use among dental professionals	No. of respondents (%)					*P*
	DHS	PGDS	DF	DN	Total	
Occurrence of NSIs in the past 12 months						
During device use	3 (14.3)	10 (47.6)	8 (38.1)	0 (0.0)	21 (38.18)	0.950
After device use, before disposal	3 (37.5)	2 (25.0)	3 (37.5)	0 (0.0)	8 (14.54)	
During device recapping	5 (21.7)	10 (43.5)	8 (34.8)	0 (0.0)	23 (41.81)	
During device disposal	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	3 (5.45)	
Needle recap after use						
One-handed needle recapping	36 (26.1)	51 (37.0)	47 (34.1)	4 (2.9)	138 (69.00)	0.028*
Two-handed needle recapping	9 (15.8)	15 (26.3)	31 (54.4)	2 (3.5)	57 (28.50)	
I do not recap an used needle	2 (40.0)	2 (40.0)	0 (0.0)	1 (20.0)	5 (2.50)	
Dispose a needle after use						
Puncture-resistant sealed container	7 (25.0)	5 (17.9)	16 (57.1)	0 (0.0)	28 (14.00)	0.001*
Needle burner and syringe destroyer	16 (14.7)	39 (35.8)	47 (43.1)	7 (6.4)	109 (54.50)	
Needle incinerator	6 (28.6)	7 (33.3)	8 (38.1)	0 (0.0)	21 (10.50)	
Needle cutter	18 (42.9)	17 (40.5)	7 (16.7)	0 (0.0)	42 (21.00)	

**Statistically significant. DHS=Dental house surgeon, PGDS=Post graduate dental student, DF=Dental faculty, DN=Dental nurse*

Table 4: Prevalence of needle stick injuries in the past 12 months

Needle stick injury in the past 12 months	No. of respondents (%)					*P*
	DHS	PGDS	DF	DN	Total	
Yes	11 (20.0)	24 (43.6)	20 (36.4)	0 (0.0)	55 (27.50)	0.153
No	36 (24.8)	44 (30.3)	58 (40.0)	7 (4.8)	145 (72.50)	

DHS=Dental house surgeon, PGDS=Postgraduate dental student, DF=Dental faculty, DN=Dental nurse

In the present study, 79% respondents considered the injury caused while using all of the instruments (hand, rotary, surgical, hypodermic needles, suture needles, and lancets) constituted NSIs and SIs and 7% considered hypodermic needles, suture needles, and lancets to constitute NSIs and SIs. In a study conducted by Saini *et al*.,[11] 28% of the dental students reported that hypodermic needles had the highest risk for NSIs. Therefore, it shows that dental professionals in the present study had a better knowledge when compared to the study conducted in Maharashtra.[11]

In the present study, 58% dental professionals had knowledge and 42% dental professionals did not know about the Universal Precaution Guidelines. Knowledge of the participants regarding Universal Precaution Guidelines is of low level when compared to other studies: Bhardwaj *et al.*[15] (96.7%), Jaber[16] (92.1%), George *et al.*[17] (91%), Malik *et al.*[7] (74%), and Sharma *et al.*[18] (73.6%). But the knowledge was almost similar to the studies conducted in Hyderabad and Karachi[19] (62.6%) and Saudi Arabia[14] (61%).

In this current study, 47.50% of dental professionals were aware of the safety devices used to prevent NSIs. This was similar to the studies conducted by Alam[14] (50% of HCWs – nurses and paramedical staff) and Malik *et al.*[7] (53% of the dental professionals) in which the participants had knowledge of the new needle devices and their safety features. But when compared to studies by Jaber[16] (93.5% of the dental UG students) and Prabhu *et al.*[20] (68.62% of the dental nurses), the knowledge of the dental professionals in the current study regarding safety devices to prevent NSIs was poor.

In the present study, 62% were aware about the PEP in the management of NSIs. The participants in this study had a better knowledge when compared to the studies by Jaber[16] (54.34%) and Salekar *et al.*[21] (55.5%) and had a poorer knowledge in comparison to the study by Kasat *et al.*[13] (68.8%). Therefore, the knowledge of the dental professionals about NSIs and SIs was inadequate.

In the current study, 81% of the dental professionals reported that they would first contact a medical emergency room in case of an accidental NSI and 1.5% would not contact anyone in case of NSIs. Previous investigations of dentists reported that 40.4% of them would report to the concerned authorities and 59.6% would not report to anyone regarding NSIs.[19] Salekar *et al.*[21] found that only 32% of HCWs reported the NSIs to the concerned superior. It has been noticed that the participants of the present study had a positive attitude toward reporting to the concerned authorities regarding NSIs if in case one occurs. This may be due to the good awareness about the blood-borne diseases that could be spread through these injuries.

In the present study, the reasons reported that prevented the dental professionals to report NSIs were that 8% of the dental professionals thought he/she might get blamed or get into trouble for having an NSI and 2% thought it was not important to report. Similar to our study, 37% of the dental UG students did not report because of the fear of stigmatization and discrimination, 28% did not report because the item was unused, 15.6% did not know how to report, 12.4% thought it was only minor injury, and 6.7% of the students were too embarrassed to report it.[16] Jan *et al.*[19] stated that 33.1% of dentists did not report as there was no use to report an NSI, 27.1% did not know where to report or did not want to report, 19.3% stated that the needle was new hence there was no need to report, 9% did not get time to report, 6% forgot to report, and 5.5% thought nothing will happen if they do not report. Thus, our study suggests that reporting of NSIs and SIs must be strengthened among the dental professionals through enhanced education programmes conducted regularly.

Under the Occupation Safety and Health Administration (OSHA) Guidelines, recapping of needles has been strictly prohibited.[22] The present study evaluated 41.81% of dental professionals had an injury during recapping of the device and 5.45% during device disposal. It was mostly the postgraduate dental students (43.5%) who had an injury during device recapping. Previous investigations found that recapping a needle was the most important cause of NSIs among dentists.[7,19,23] This may be attributed to the work load and fatigue among the participants in the current study.

In the present study, 69% practiced and followed one-handed needle recapping technique (scoop technique) and 28.5% practiced two-handed needle recapping. Muralidhar *et al.*[8] and Rais *et al.*[24] stated most of the HCWs used both hands while recapping the needle, which is a wrong technique (59% and 42%, respectively).

The present study found that 54.5% of the dental professionals practiced disposal of needles through needle burner and syringe destroyer, 21% used needle cutter, 14% used puncture-resistant sealed container, and 10.5% used needle incinerator. A study by Guruprasad *et al.*[12] noted that 44% would destroy the needle using needle destroyer and 15% would destroy using puncture-resistant container with a disinfectant. Another study by Prabhu *et al.*[20] found that 30.39% of the dental nurses dispose needles in a puncture-proof sealed box and 2.94% dispose needles using needle cutter.

In the present study, 27.5% had an NSI in the past 12 months, resulting in 0.27 NSIs per dental professional per year. This prevalence rate was similar to the studies conducted by Jaber[16] (23%), Malik *et al*.[7] (30%), Prabhu *et al*.[20] (33%), and Salekar *et al*.[21] (34.8%). The prevalence of NSIs in the present study was lower when compared to other studies conducted nationally and internationally: MP, India[9] (41%), Hyderabad and Karachi[19] (54.2%), Iran[25] (63.3%), Pakistan[26] (70.6%), and Saudi Arabia[14] (74%).

There were certain limitations of the study. Firstly, the response of the dental professionals may vary from what they actually know and practice because of their want to portray themselves as more knowledgeable individuals in their respective profession. This might give a chance for the occurrence of social desirability bias. Secondly, the memory of the events over the past 12 months may vary from each dental professional, leading to the underestimation of the NSIs and this might give rise to recall bias.

CONCLUSION

NSIs and SIs continue to be a serious occupational hazard in the field of Dentistry. The knowledge of dental professionals on NSIs and their preventive measures are inadequate. The attitude of the dental professionals toward the non-reporting of NSIs was poor and the prevalence of NSIs remains to be a major concern among this professional group.

Recommendations

The reporting facility for NSIs and SIs needs to be made mandatory and the dental professionals must be encouraged to report any incidence of NSIs within the dental college. The PEP needs to be immediately provided to the victims of NSIs and SIs. The dental professionals must never recap a syringe with a needle in it – AVOID RECAPPING! The new avenues in prevention of NSIs must be considered, such as use of scalpel with retractable blade, syringe with hinged cap, syringe with retraco needle, and syringe with sliding sleeve.

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Conflicts of interest

There are no conflicts of interest.

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