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NEEDLE STICK INJURY AND AWARENESS OF ITS MANAGEMENT AMONGST DENTAL INTERNS IN LAHORE

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ABSTRACT

Objective: To find out the frequency and perceived causes of needle stick injuries encountered by dental interns in teaching hospitals of Lahore and to study the level of awareness and associated factors regarding needle stick injury reporting, management and hepatitis B immunization status.

Study Design: Cross-sectional survey.

Duration and Place of Study: Multi center, from May to Jun 2019.

Methodology: Self-administered questionnaires were circulated amongst dental interns of randomly selected teaching hospitals of Lahore. Inclusion criteria was consenting dental interns completing 1-year internship by May 31st 2019.

Results: Forty one interns (41%) received a 3-dose hepatitis B vaccination once, while thirty (30%) had an additional 5-yearly booster administered. Sixty three interns (63%) endorsed post exposure prophylaxis administration for hepatitis B, C and human immunodeficiency virus. Thirty three interns (33%) encountered sharp injury. No correlation was found between having knowledge about Universal Precaution Guidelines and frequency of sharp injury (p=0.218). Eleven interns (33%) reported injury to a senior. The most common cause of injury was "being rushed" 40 (40%). Eight interns (36%) identified anesthesia needle as the agent of injury. A statistically significant difference was found (p<0.001) between needle recapping preference of interns and their knowledge about Universal Precaution Guidelines.

Conclusion: The low sharp injury reporting rate and lack of knowledge regarding post-exposure prophylaxis warrants a need to increase awareness regarding sharp injury prevention, surveillance and management.

Keywords: Intern awareness, Needle stick injury, Sharps injuries, Sharp injury management.

INTRODUCTION

Needle stick or sharp injuries are an occupational hazard commonly encountered by healthcare personnel[1]. Accidental sharp injuries can be a potential source of contracting blood-borne infections such as hepatitis B, C and HIV. Every year 600,000 – 800,000 needle stick injuries are reported in the U.S as compared to 100,000 in the U.K[2].

Hollow bore needles causing percutaneous injuries are the most common cause of transmission of blood-borne infections[3]. The probability of virus transmission following an occupational percutaneous injury varies widely. It is dependent upon the concentration of virions present in the fluid the operator was exposed to, the volume of infectious material transferred and the mode of transmission. In 2012, Ontario Medical Association estimated the risk of acquiring infection after injury from a contaminated needle to be 6-30% for HBV, 2% for HCV and 0.3% for HIV[4].

According to the Center of Disease Control U.S, very often healthcare workers do not identify an accidental occupational exposure to be potentially infective. Many a times, even if they do realize, they do not seek post exposure assessment and management[5]. A large proportion of these sharp injuries goes unreported, thereby lacking timely assessment of need of post-exposure prophylaxis and institution of early treatment[6,2]. According to existing literature there

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is a severe under-estimation of the actual incidence of transmission of occupational blood borne infections amongst healthcare workers as evidenced by under-reporting rates ranging from 17-97%[6].

In 1981, Food and Drug Administration United States (FDA U.S) approved the first commercial hepatitis B vaccine for human use[7]. In 1982 Advisory Committee on Immunization Practices (ACIP) recommended that all healthcare workers should be vaccinated[8]. Hepatitis B immunization is an established prophylactic measure against hepatitis B infection[9]. Current WHO recommendations urge healthcare workers to be immunized against hepatitis B[9,10]. Improvement in prevention is only possible by studying the immunization practices of healthcare workers, assessing the actual magnitude of the transmission rate, evaluating data regarding factors influencing percutaneous injuries and introducing simple measures to reduce risk of sharp injury.

Studying reporting rate of sharp injuries is the first step towards prevention and timely management of occupational injuries. In order to improve future prevention of sharp injuries and post exposure proceedings, research needs to be done to identify factors affecting the occurrence of a needle stick injury and factors influencing its reporting. Obtaining sharp injury surveillance data at an institutional level, followed by provincial and national levels is imperative for making an effort towards formulation of central reporting system which will then be helpful in effective policy development regarding immunizations, sharp injury prevention and post exposure management. Amongst dental institutes in Pakistan, data regarding needle stick injuries was available from cities like Karachi and Peshawar but limited amount of such research was found to be done in Lahore. With this background, we conducted our study amongst dental interns of Lahore with the objective of assessing frequency of needle stick injury, hepatitis B immunization status, level of awareness regarding NSI prevention and management, circumstances leading to occurrence of sharp injury and factors influencing prompt reporting.

METHODOLOGY

This was a cross sectional survey study. Sample size estimation was done using WHO calculator version 12.2.6. The sample size was calculated to be 93.

Ethical approval was obtained from the parent Institutional Review Board before circulating the questionnaires. A list was obtained from the Pakistan Medical and Dental Council website which showed 26 registered private & public dental colleges of Punjab. Amongst these 26 dental colleges, the website enlisted 9 institutes to be located in Lahore whereas the rest were located elsewhere in Punjab. Names of these 9 dental teaching hospitals of Lahore were entered and lottery method was used to select 3 different teaching hospitals in order to fulfil the sample size. Dental interns of majority of these 9 institutes were found to be completing their 1 year internship program by May 2019. Therefore, over a period of 1 week (27th May to 1st June 2019), hard copies of 150 self-administered questionnaires were handed out to faculty members of the selected teaching hospitals of Lahore (Institute of Dentistry, CMH Lahore Medical College, de'Montmorency College of Dentistry/Punjab Dental Hospital, Fatima Memorial Hospital College of Medicine & Dentistry). Inclusion criteria was consenting dental interns who were at the completion of one-year internship by May 31st 2019. Exclusion criteria was interns completing their yearlong internship program after May 31st 2019 and those enrolled in programs outside of the city of Lahore. Out of 150 questionnaires circulated, 100 completed responses were returned. The questionnaire comprising of close ended questions required interns to answer questions on demographics, details of how they sustained needle stick injuries and associated risk factors, hepatitis B vaccination status, their knowledge regarding Universal Precaution Guidelines and post exposure prophylaxis. In several questions,

it was acceptable to choose more than one answer from the given options.

Data was entered and analyzed with statistical analysis program (SPSS version 22). Mean ± SD was presented for quantitative variables while frequency and percentage computed for qualitative variables. Pearson chi-square test was used for analyzing qualitative variables with "yes/no" answers or presence/absence of NSI experience. An alpha level of 5% was taken, i.e. if any '*p*' value was ≤0.05 it was considered as significant.

RESULTS

Total 150 questionnaires were circulated, out of which 100 completed proformas were returned, generating a response rate of 66.7%. The mean age of interns was 24.01 ± 1.50 years with 30 subjects (30%) being males and 70 (70%) being females. No statistically significant difference was found between gender and NSI reporting (*p*=0.733).

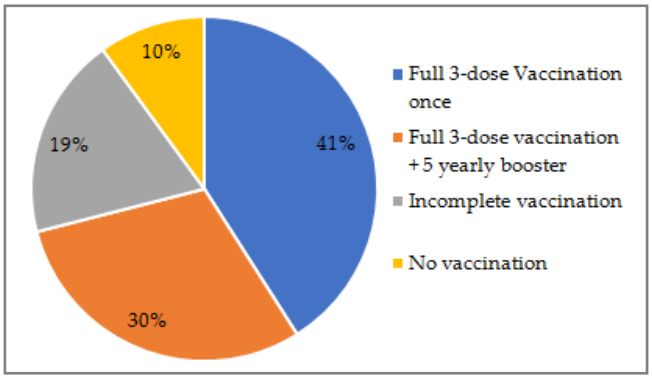

Figure: Vaccination status of dental interns.

Eighty five (85%) interns reported being educated about management of sharp/needle stick injuries during their undergraduate program, while 74 (74%) endorsed being taught regarding post exposure prophylaxis (PEP). Sixty three (63%) interns believed that PEP is recommended in case of occupational exposure to all three blood borne pathogens HBV, HCV and HIV. Fifteen (15%) were of the view that exposure to HCV and HIV qualifies for need of PEP as compared to 11 (11%), 6 (6%) and 3 (3%) for HBV, HCV and HIV alone, respectively. Two (2%) interns did not attempt this section and their response was excluded. None of the respondents was of the opinion that the combination of HBV and HIV only qualified for post exposure prophylaxis. Hepatitis B vaccination status of the interns is described in figure.

Thirty five (35%) interns claimed to have a central reporting system for NSI in their institute. Fifty eight (58%) said that PEP was available in their institute or could be arranged in case of need. A large percentage of interns 81 (81%) felt that they had adequate knowledge about Universal Precaution Guidelines and 88 interns (88%) were of the view that needles should be recapped after use. Out of the 88 interns who advocated recapping of needles, 76 claimed to have adequate knowledge about Universal Precaution Guidelines and 12 stated their knowledge to be inadequate. A statistically significant (*p*= 0.000) difference was found between the interns' knowledge about Universal Precaution Guidelines and their application exhibited by recapping of needles when not in use. Pearson chi-square test was applied to analyze this correlation that whether being taught about Universal Precaution Guidelines at undergraduate level influenced their needle recapping choice in actual clinical practice.

Table-I: Reasons for not reporting needle stick injury.

Reason for not reporting needle stick injury	n (%)
Didn't know how to report it	5 (23%)
It was only minor	4 (18%)
The item was unused	3 (13%)
No utility in reporting	2 (9%)
Takes too much time	2 (9%)
Stigma of having had a needle stick injury	2 (9%)
Fear of knowing about patient carrying blood borne disease	2 (9%)
Didn't know whom to report it to	1 (5%)
I was too embarrassed to report	1 (5%)

Sixty seven (67%) interns did not experience any sharp injury. Ten (10%) interns reported to have encountered sharp or needle stick injury once during their internship, while 12 (12%)

experienced it twice and 11 (11%) sustained multiple NSIs (more than 2). Amongst the 33 (33%) interns who had NSIs, 11 (33%) actually went forward to report it to a senior or faculty member or head of department whereas 22 interns (67%) did not report their injury. The main reasons identified for not reporting sharp injuries are presented in table-I.

Pearson chi-square analysis was performed to study whether having knowledge about Universal Precaution Guidelines had an effect on the frequency of encountering needle stick injuries amongst the interns. Amongst the interns who felt they had adequate knowledge about Universal Precaution Guidelines, 29 (29%) encountered a needle stick injury. Using Chi-Square analysis, a significant correlation was not found amongst having knowledge about Universal Precaution Guidelines and the occurrence of needle stick injury (p=0.218). Results of statistical analysis are tabulated (table-II).

Table-II: Effect of universal precaution guidelines knowledge on sharp injury frequency.

		Had needle stick injury	
		No	**Yes**
"Have adequate knowledge about universal precaution guidelines"	No	15 (15%)	4 (4%)
	Yes	52 (52%)	29 (29%)
Chi-square p-value (statistically significant if <0.05)	0.218		

Table-III: Task being performed at the time of injury.

Task being performed at the time of injury	**n (%)**
Needle recapping	8 (36%)
Suturing	5 (23%)
Needle loading	4 (18%)
Cleanup	3 (14%)
Passing needle to operator	2 (9%)

Major prevalent cause of injury was perceived to be "being rushed" (40%), "fatigue" (27%), "lack of skills" (20%) and "poor assistance" (13%). Eight interns (36%) identified anesthesia needle as the agent of their accidental sharp injury. The task being performed at the time of sustaining injury was inquired and the results are tabulated in table-III. The agents responsible for causing accidental injury were anesthesia needle 8 (36%), surgical blade 6 (27%), dental probe 4 (18%), irrigation needle 2 (9%), elevator 1 (5%) and endodontic file 1 (5%). None of the interns documented injury due to scissors or wire.

DISCUSSION

Although prevalence of infectious diseases in many developing countries is high, documentation of occupational exposure to blood-borne infections is negligible[11-12]. A systematic review conducted in Karachi in 2018 estimated the prevalence of sharp injuries amongst Pakistani dental healthcare workers to be 30% to 73% and the rate of reporting was estimated to be as low as 15%[13]. In our study, a total of 33 (33%) interns encountered needle stick injury from which only 11 (33%) proceeded with reporting the injury to a faculty member/senior whereas 22 interns (67%) did not report it. According to a recent study conducted in Singapore, published in July 2019, there is a severe lack of knowledge of percutaneous injury reporting process amongst junior doctors, due to which a vast majority of cases go unreported[14]. Ong *et al* suggested that this low reporting rate might depict a bigger problem of lack of attention to personal safety amongst junior doctors[6]. Awareness needs to be created amongst healthcare personnel that timely reporting and assessment of need of post exposure prophylaxis is an act solely in favor of the operator himself[14].

CDC recommends all healthcare organizations to make sure that healthcare workers are provided training to identify and report an occupational exposure[8]. Current Occupational Safety and Health Administration (OSHA) standards of USA recommend that in order to report an occupational exposure, the following details should be provided: 1. When the exposure occurred (date and time), 2. Details of the procedure being performed, the type of device that was

being used and how it caused injury, 3. Severity and type of exposure (amount of infectious substance contacted), 4. Information regarding the exposure source, 5. Details of immunization status of the health care worker, 6. Whether or not counseling, post exposure management and follow up was done[15]. A main reason identified in our study for not reporting an NSI was lack of knowledge of the reporting process and that reporting is very time-consuming. Another reason for not reporting was that there is a so-called low risk of transmission of blood-borne infections because of the agent causing injury being a clean object/being unused. These reasons are consistent with existing literature where healthcare workers assumed that clean injuries were not to be reported and the entire process was tedious[4]. The results of an Iranian study, conducted in 2015, also conclude heavy work load for being the reason of not reporting sharp injury in 47% of the interns followed by "low possibility of infection in the injured site" in 37% participants[3]. Mehak and Ruth concluded from their systematic review that the most common reason for not reporting the occurrence of an occupational exposure among doctors in Karachi was the lack of awareness regarding the reporting system[13].

Thirty five percent (35%) of the interns participating in our study claimed to have knowledge regarding the existence of a central reporting system in their institute. Bekele *et al* suggest that every healthcare facility should introduce a system regarding how to proceed after an occupational exposure to sharp injury has occurred[9]. Attention needs to be drawn towards introduction of centralized systems for occupational sharp injury reporting at institutional level as well as provincial and national levels. Development of centralized reporting at these various levels can help in assessing the prevalence and transmission rate of blood borne infectious diseases nationwide, thereby helping in policy making regarding their prevention and timely management.

In our study, 8 (36%) interns identified anesthesia needle as the agent of their accidental injury and believed that the task being performed at the time of injury was needle recapping 8 (36%), followed by suturing 5 (23%) and needle loading 4 (18%). Eighty five percent (85%) of the interns in our study responded that needles should be recapped after use. Contrary to the previous CDC guidelines, current guidelines recommend recapping of all used needles after use and before disposal using a no touch method[5,8]. CDC recommends engineering controls (e.g. safety scalpel, self-sheathing needles) as the primary method for sharp injury prevention[8]. However, in cases where engineering controls are unavailable, CDC recommends use of work practice control which includes single handed scoop technique for recapping of needles before disposal and for reuse during multiple injections[8].

Considering that in our study, no significant correlation was found by chi square analysis amongst interns claiming to have adequate knowledge about Universal Precaution Guidelines (UPG) and the frequency of occurrence of needle stick injury. The authors feel that this owes to the fact that only acquiring knowledge about UPG is not sufficient and that practical application must be taught and reinforced at undergraduate level. This is also consistent with the findings of a study performed in Cairo University in 2018[17].

Similar to studies conducted by Madhavan *et al* and Ouyang *et al*, who reported perceived cause of injury to be "over work", "inattention", "ignorance" and "tiredness", interns of our study felt that "being rushed" (40%), "fatigue" (27%), "lack of skills" (19%) and "poor assistance" (13%) were prevalent reasons for contracting an NSI[16,4].

Similar to a study conducted at Cairo University in 2018, our study shows that dental interns have a good awareness regarding post exposure prophylaxis (74% responding "yes" to being taught about it at undergraduate level) but their knowledge regarding its implementation is poor[17]. In our study, 63% interns were of the view that post exposure prophylaxis is recommended against all three pathogens, HBV, HCV and HIV.

In the close ended question inquiring about need of administration of post exposure prophylaxis, none of the interns selected the combination of HBV and HIV exposures qualifying for post exposure management. This shows lack of knowledge regarding the fact that no FDA approved vaccine or immunoglobulin is available for HCV. According to both Center for Disease Control (CDC) and New York State Department of Health (NYSDOH) guidelines, neither immunoglobulin nor antiviral agents are recommended for HCV post exposure management[18]. It should be kept in mind that the decision regarding whether post-exposure prophylaxis should be prescribed or not, depends on evaluation of risk for the individual patient, followed by the risk benefit ratio of therapy[19]. During management of a potential HIV exposure incident, risk of possible transmission of other blood borne pathogens such as hepatitis B or C should also be kept in mind[19].

Literature also suggested an association between the occurrence of occupational needle stick or sharp injury and psychological issues ranging from acute anxiety, tremors and depression to Post Traumatic Stress Disorder (PTSD)[4,13]. This gives all the more reason for increasing awareness regarding identification of sharp injury as a significant occupational hazard in health care setup. Therefore, raising the need for development of effective measures of prevention and timely reporting followed by management of the injury[4]. Many studies suggested that continuing training programs and comprehensive workshops should be conducted for healthcare personnel in order to keep their knowledge regarding occupational exposures, immunization protocol and post exposure policy up to date with international recommendations[17-19].

LIMITATION OF STUDY

The fact that the present study was conducted in only 3 teaching hospitals of Lahore because of feasibility of data collection, the results depict an under estimation of the actual magnitude of sharp injury incidence and related practices amongst health care workers.

CONCLUSION

Our study results depict a lack of awareness amongst dental interns regarding NSI reporting, subsequent management, post exposure prophylaxis and the recommended immunization policy for blood borne infections. Identifying under reporting of sharp injuries is the first step towards prevention and timely management of occupational injuries.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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