

Prevalence of Needle Stick Injuries and Associated Risk Factors among Nurses in a Tertiary Care Hospital

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ABSTRACT

Background: Personnel, who regularly practice invasive procedures, is particularly at risk for percutaneous injuries (PI). Needle stick injuries (NSI) presents the single greatest risk to medical personnel. Nurses have a high rate of NSI among health care workers. PI caused by NSI pose a significant risk of occupational transmission of bloodborne pathogens.

Objective: (1) To determine the prevalence of NSI among nurses. (2) To determine the association between NSI and selected variables such as years of experience and educational qualification. (3) To determine the circumstances leading to NSI and immediate measures taken by the respondents after the NSI.

Materials and Methods: A cross-sectional study was conducted among nurses of indoor patient department from October to November 2014 in a tertiary care hospital. Out of total 158 Nurses, 122 nurses participated in the study. A self-administered questionnaire was used for data collection. Data were entered in Microsoft excel 2007, and analysis was performed using SPSS version 16 statistical software.

Results: The prevalence of NSI among nurses who ever suffered an NSI was 65.6% among which within last 1 year was 57.5%. The majority of NSI occurred during recapping of the needle 63.7%, succeeded by during intravenous injection and suturing both 18.7%. Among total 122 nurses, 34.4% nurses dint have NSI with any type of needle, maximum 86.2% had NSI with Open bored type of needle. Only 20% took post-exposure prophylaxis. More than two-third (69.7%) of all nurses never attended any seminar, workshop or educational session on NSI.

Conclusion: NSI is an important health hazard among nurses. Notification to concerned authorities, proper screening promotion of safety measures should be encouraged.

Key words: Hospital, Injuries nurses, Prevalence, Risk factors

INTRODUCTION

Personnel who regularly practice invasive procedures are particularly at risk for percutaneous injuries (PI). Needle stick injuries (NSI) presents the single greatest risk to medical personnel. Nurses have a high rate of NSI among health care workers. PI caused by NSI pose a significant risk of occupational transmission of bloodborne pathogens.¹

Hepatitis C virus (HCV) and HIV are two of the most dangerous of the blood-borne pathogens that health care

workers are exposed to, in their work caring for the world's health. Personnel who regularly practice invasive procedures, such as blood sample collection and starting intravenous lines, Intramuscular injections, is particularly at risk for PI.²

The World Health Organization, in its world health report 2002, states that of 35 million health care workers, 2 million experience percutaneous exposure to infectious diseases each year. More than one-third of the health care personnel are exposed to each of the two types of hepatitis, i.e., hepatitis B

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virus (HBV) (37.6%) and HCV (39%) while 4.4% are exposed to HIV acquired immunodeficiency syndrome because of NSI's.³

WHO'S environmental burden of disease series, No. 11 published in 2005, states that among the 35 million health workers over the world, approximately 3 million workers are exposed to bloodborne pathogens every year due to PI, out of them those exposed to HBV were 2 million, while to HCV were 0.9 million and to HIV were 170 000. These seemingly insignificant injuries may result in a significant number of infections of HCV (15000), HBV (70000) and HIV (1000). In developing countries more than 90% of these infections are seen. It was observed that around the world, healthcare workers suffered from infections of HBV in about 37.6%, HCV in 39%, HIV acquired immunodeficiency syndrome in 4.4% because of NSI's, and these infection rates for southeast Asia region were higher 42%, 52%, and 7.9%, respectively. A rapid assessment survey carried out in India states that there were 2.27 Sharps injuries per health-care worker per year.

The 2011 U.S. EPI-net sharps injury data report shows the data that a total of 708 injuries occurred from 32 hospitals; PI rate was 19.46 per 100 occupied beds for all hospitals; the majority of incidents were seen at operation theatre 33.5% and patient ward 33.2%; disposable syringes (37.4%) and suturing needle (18.6%) caused most of the injuries; occurrence of maximum injuries were observed during use (40.7%) of item and after use but before disposal (15.5%).⁴

Objectives

1. To assess the prevalence of NSI among nurses,
2. To determine the association between NSI and some selected variables like years of experience, educational qualification, marital status, etc.
3. To determine the circumstances leading to NSI, activities associated with NSI and to assess measures taken by the respondents after the NSI.

MATERIALS AND METHODS

A cross-sectional study was conducted among nurses of the indoor patient department (IPD) in a tertiary care hospital in Nanded district, Maharashtra. Out of total 158 Nurses working in IPD, 122 nurses participated in the study. Nurses who were on leave during the study period due to any reason, or were not willing for interview were excluded. The duration of the study was 2 months from October to November 2014.

A pretested predesigned Self-administered questionnaire was used for data collection. Subjects were fully informed about the design and purpose of the study, and written informed consent was obtained. The questionnaire consisted of questions on particulars of the Respondent and questions about the needle stick event in the last 1 year or ever before in life.

Those respondents who had more than one NSI in the last 1 year, detailed information for the most recent NSI was taken. Various questions including the awareness regarding preventive measures such as HBV immunization and/or immunization against tetanus, the action to be taken in the event of an unknown NSI, immediate response after an NSI, etc. were asked. The case definition of NSI in the present study included any injuries caused by sharps such as intravenous (IV) cannulas, hypodermic needles, suture needles, IV sets, needles used to

connect parts of the IV delivery systems and blood collection needles. The filled questionnaires were collected on the same day or the next day.

Ethical approval was sought from Institutional Ethics Committee, and confidentiality was maintained. Data entry was done in Microsoft Excel 2007 and analysis was done by using Statistical Package for Social Sciences (SPSS) version 16.0 statistical software (IBM, Chicago, USA). Results in the form of charts and descriptive statistics were made. Different descriptive statistics was used such as mean, percentage, standard deviation, etc. Chi-square test was used to determine the association between NSI and some risk factors and a $P < 0.05$ was taken as significant.

RESULTS

Out of total 158 nurses who were eligible for the study, 122 nurses participated in the study with a response rate of 77%. Among them who participated, 17 were male nurses and 105 were female nurses. The prevalence of NSI within the last 1 year was 46 (37.7%) out of 122, and those who ever suffered an NSI during their work tenure were 65.6% (80 out of 122). There were 22 nurses who had, at least, one NSI in last 1 year. The mean age of the respondents was found to be 32 years with least being 22 years and maximum being 58 years.

Table 1 shows maximum NSI (48) were in age group of <30 years. Among the 122 study participants majority (84) were married. Among married nurses (66.7%) suffered from NSI. As per years of experience majority of NSI (46) was in nurses + having experience of 0-5 years. Educational qualification of nurses were divided into two groups; one showed that 97 (79.5%) had done either ANM or GNM and other showed remaining 25 (20.4%) had done BSc Nursing, MSc Nursing or some other Nursing course. Among the above mentioned two groups occurrence of NSI was 65 (67.7%) and 15 (60%), respectively.

Table 1: Distribution of NSI as per socio-demographic variables among the respondents

Variables	NSI's (n (%))		P value
	Present	Absent	
Age group (years)			Df=3; 0.350
<30	48 (60)	32 (40)	
31-40	17 (77.3)	5 (22.7)	
41-50	5 (71.4)	2 (28.6)	
>50	10 (76.9)	3 (23.1)	
Marital status			Df=2; 0.684
Unmarried	23 (62.2)	14 (37.8)	
Married	56 (66.7)	28 (33.3)	
Widow	1 (100)	0 (0)	
Years of experience			Df=3; 0.224
0-5	46 (59)	32 (41)	
6-15	17 (77.3)	5 (22.7)	
16-25	9 (81.8)	2 (18.2)	
>25	8 (72.7)	3 (27.3)	
Education qualification			Df=1; 0.821
ANM and GNM	65 (67.7)	32 (32.3)	
BSc, MSc and others	15 (60)	10 (40)	

NSI: Needle stick injuries

Figure 1 shows maximum NSI occurrence during recapping of the needle (63.7%), which succeeded by the occurrence of NSI during IV injection and suturing both (18.7%), followed by the occurrence of NSI during IM injection (12.5%), during blood collection (10%) and others (12.5%). While circumstances leading to NSI showed that maximum (39 [48.7%]) were because of the Uncooperative patient, next common circumstance in the line leading to NSI in 33 (41.2%) was due to rush. Lack of assistance, fatigue and other reasons leading to NSI constituted about 18 (22.5%), 10 (12.5%) and 10 (12.5%), respectively (Figure 2).

Among the nursing personnel 86.2% had NSI with an open bored type of needle and this association was found to be statistically significant ($P < 0.05$), remaining 8.7% had NSI with a close bored type of needle and 5% with others.

Only 20% took post-exposure prophylaxis as an immediate response to NSI and 22.5% respondents washed with soap and water and applied Antiseptic after NSI while the bulk of participants 35% washed with soap and water (Table 2). Maximum 32 (40%) nurses did not do any blood test after NSI. 11 (13.7%) nurses underwent HIV blood test, 6 (7.5%) did HBV blood test, 30 (37.5%) took both HIV and HBV blood test and only 1 (1.2%) did the blood tests for HIV, HBV and HCV.

Among the 80 respondents who suffered NSI, 28.7% (23) took TT vaccine, 11.2% (9) took HBV, 38.7% (31) took both the vaccines and 21.2% (17) did not receive any vaccine. In total 49.9% nurses received immunization for HBV. More than two third (69.7%) of all nurses had never attended any seminar, workshop or educational session on NSI and never received any authenticated knowledge about the NSI and its dangerous effects.

DISCUSSION

The prevalence of NSI observed in our study among the nurses within last 1 year was 37.7%. Similar findings of the prevalence of NSI within 1 year were seen ranging from 28% to 49% in various studies^{1,4,6} and prevalence in Paul *et al.*⁷ was 35% over last 6 months. Whereas the percentage of respondents ever encountered NSI was 65.6% in our study that was higher than Kaur *et al.*⁸ and Lulie *et al.*,⁹ (i.e., 57.5% and 59% respectively) but was lower than what was found in Sonkar *et al.*¹⁰ (i.e., 83.4%).

Lashiram *et al.*¹ found NSI were maximum among the age group of 41-50 years which differed from our study as the majority was seen in 19-30 years age group that was similar to findings of Kaur *et al.*⁸ and Manzoor *et al.*¹¹ Even in Paul *et al.*⁷ majority of the study subjects were in age group of 18-25 years.

Recapping was the single most common activity leading to NSI with 63.7%, followed by IV injection 18.7%. Similar studies supported our findings showing recapping as major contributor ranging from 32% to 66%, leading to NSI.^{5,6,8,11} On the contrary, Murli *et al.*¹² and Jayanth *et al.*¹³ showed blood collection/withdrawal being the top reason contributing to NSI (55% and 59.3%, respectively) and recapping came at second (39%) and third (14.4%). One more study showed contrast, where injections were the most common activity leading to NSIs (24.44%), whereas recapping of needles was at the second place (21.11%).¹⁴ The recapping of needles has been prohibited under the Occupation Safety and Health Administration blood-borne pathogen standard.¹⁵

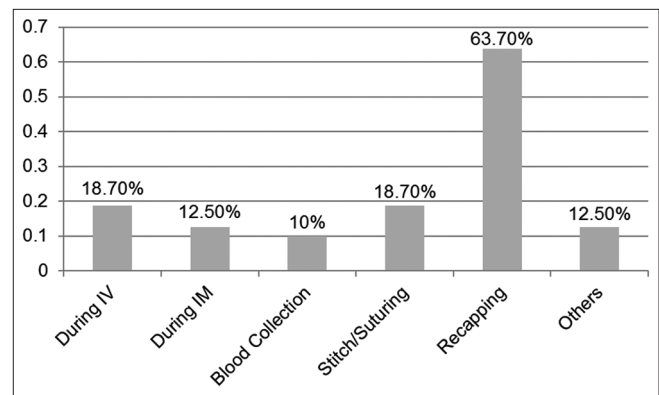


Figure 1: Distribution of activities leading to needle stick injuries

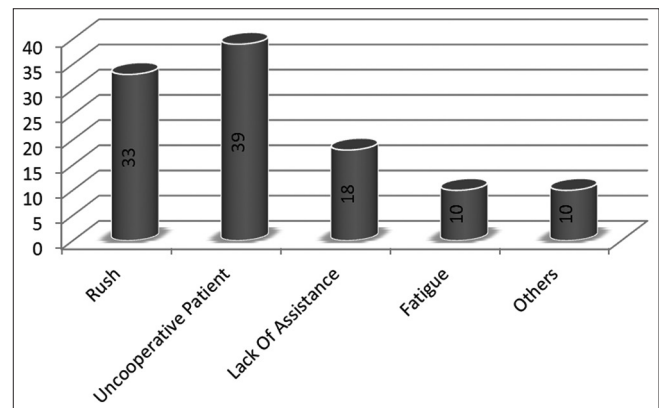


Figure 2: Distribution of circumstances leading to needle stick injuries

Table 2: Measures undertaken by the respondents after NSI

Measures undertaken	Frequency n (%)
Immediate measures	
Wash with water only	18 (22.5)
Wash with water and soap	25 (35)
Wash with water and soap and applied antiseptic	18 (22.5)
Wash with water and soap and applied antiseptic and PEP	16 (20)
Vaccination done after NSI*	
HBV vaccine	9 (11.2)
TT vaccine	23 (28.7)
Both HBV and TT	31 (38.7)
None	17 (21.2)

*NSI: Needle stick injury, HBV: Hepatitis B virus, TT: Tetanus toxoid vaccine

Majority of the nursing personnel (48.7%) had NSI because of the Uncooperative patient, next common circumstance in line 33 (41.2%) was due to the rush. Lashiram *et al.*¹ found the majority of the nursing personnel (44%) reported rush of patients was the number one circumstance leading to NSI, and 25.6% reported NSI due to the Uncooperative patient. A study conducted in Govt. Medical College of Beed district observed that about two third 66.6% of the health care workers suffered NSI due to Overload of patients.⁵ One more study reported two major circumstances resulting into NSI were inattention or haste (45.9%) and Heavy workload (43.2%).⁶

Overall 91% nursing personnel had NSI with open bored type of needle in our study. Open type of needle leading to NSI also formed the majority in various others studies.^{1,12,13}

In the present study, the observed percentage of nurses taken PEP after an NSI were low 20%, similar to the study of Murlu *et al.*¹² (25%). The study conducted in Imphal, Manipur showed that majority of nurses (94.3%) did not take PEP.¹ In our study, lower than one-fourth, (22.5%) nursing personnel washed the injured area with soap and water and used antiseptic solution. The study carried out by Sharma *et al.*¹⁵ and Kaur *et al.*⁸ reported dissimilar results that higher percentage (60.9% and 72.8% respectively) of respondents washed the injured part with soap and water and applied the antiseptic. In yet another study, contrast findings were observed that 70% of the nurses disinfected the wound with antiseptics.¹⁶

In the present study, we found that 49.9% nurses were vaccinated against HBV. Similar issues studied in a tertiary care institutes by Jaybhaye *et al.*⁵ and Sonkar *et al.*¹⁰ showed HBV vaccination in 40.9% of HCW's and 42.9% of staff nurses, respectively.^{5,10} Another study carried in a Tertiary Care Hospital of Kolkata, West Bengal, had similar findings that 52.5% of Nursing Personnel were vaccinated for HBV. Few studies showed a high percentage of HBV immunization of 74.1%, 81% and 81.5%.^{8,11,17} Prevention of NSIs is a major concern for nursing personnel.^{18,19} Researchers suggested that training program can lead to improvement in knowledge and reduction in NSIs.²⁰ Healthcare workers including nurses need to be familiar with immediate response in terms of management both for themselves and their colleagues if they become injured with the NSI's. Most of the healthcare workers don't know about the management of a sharps injury, particularly if this occurs out of hours.²¹

Limitations

As the study was conducted in a tertiary care hospital with a small population of nurses, the findings cannot be generalized.

CONCLUSION

NSI is an important health hazard among nurses. The prevalence of NSI among nurses within the last 1 year was 57.5%. Recapping of the needle was the major cause leading to NSI, hence, such practices should be stopped. The majority, 69.7% of all nurses, have never attended any seminar, workshop or educational session on NSI. Our findings point towards the need for a more awareness and updated education on the use of universal precautions or standard procedures in the nurses of all categories. Notification to concerned authorities, proper screening, and promotion of safety measures should be encouraged.

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