

ORIGINAL ARTICLE

Prevalence of needle stick injuries, its associated factors and awareness among nursing staff at tertiary care hospital of North India

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Abstract

Background: Needle Stick Injuries (NSIs) are defined as accidental skin penetrating injuries caused by needles. It is the single greatest occupational hazard to a medical personnel. In developing countries, needle stick injury is associated with the highest global prevalence of HIV, Hepatitis B, and Hepatitis C. **Aim & Objectives:** To estimate the prevalence of needle stick injuries, its associated risk factors and assess the awareness regarding needle stick injuries among nursing staff. **Material & Methods:** A cross-sectional study was conducted among nursing staff who were working at a tertiary care hospital in Northern India during June 2019 to November 2019. The study commenced after taking prior approval from institutional ethics committee. A census method was used to include the participants. **Results:** Around 66.7% of the nursing staff was exposed to NSIs during their working hours at the hospital. There was significant association of needle stick injuries with place of working and education of nursing staff in multivariate binary logistic regression. About 26% of the nurses were unaware that recapping should be done or not for used needle, and 35% of staff nurses recapped the needle after the use. **Conclusion:** Needle stick injuries can be prevented by continued education, effective training, providing better safety devices, a positive work environment.

Keywords

Awareness, Exposures, Needle stick injuries, Nursing staff, Percutaneous.

Introduction

Needle Stick Injuries (NSIs) are defined as an accidental skin penetrating injury caused by needles such as hypodermic needles, blood-collection needles, intravenous (IV) catheter stylets, and needles of IV delivery system.(1) Needle stick injuries (NSIs) are one of the key factors for blood-borne infections. It is the single greatest occupational hazard to medical personnel.(2) Health care personnel who are exposed to needles in their clinical activities are at risk of getting needle stick injuries which

may lead to serious and fatal infections with blood-borne pathogens such as human immunodeficiency virus (HIV), hepatitis B virus, hepatitis C virus.(3)

Worldwide, there is gross underreporting of NSIs with the actual incidence of NSIs being much higher than that reported.(4) Centre for Disease Control (CDC), Atlanta, United States of America estimated that exposure to blood and body fluids by sharp objects and NSIs affect around three million health care personnel annually with an estimated occurrence of six million NSIs each year.(5)

The average risk of transmission of HIV, Hepatitis B, and Hepatitis C to health care workers after percutaneous exposure is 0.1% to 0.3%, 10% to 30%, and 3% to 10% respectively.(6)

Needle stick injury is associated with the highest global prevalence of HIV, Hepatitis B, and Hepatitis C in developing countries.(7) Staff nurses have the highest rate of NSIs among health care workers due to their maximum exposure to the needles and other sharp instruments.(8) The psychological consequences of NSIs can result in anxiety, depression and emotional stress. This needs intensive programmes regarding awareness and knowledge to educate nurses on various aspects of needle stick injury preventive measures. It is anticipated that about three-fourth (75%) of the NSIs in developing countries are not reported.(9)

However, several studies consistently found that a very high proportion of health care workers receive NSIs while performing their work, both in India and globally and factors associated with an increased risk of occupational exposure to NSIs differ from place to place.(10) Published data mainly from north India are limited, so this study aims to find out prevalence, its associated factors, and awareness regarding NSIs among nursing staff at tertiary care hospital of North India.

Aim & Objectives

To estimate the prevalence of needle stick injuries, its associated risk factors and assess the awareness regarding needle stick injuries among nursing staff of a tertiary care hospital in North India.

Material & Methods

Study Type, study population, study area and duration: A cross-sectional study was conducted among nursing staff who were working at a tertiary care hospital in Northern India during June 2019 to November 2019. Pre-designed, pre-tested, structured, close-ended, self-administered questionnaire was used for collection of information about needle stick injury and associated correlates.

Questionnaire comprised of sections regarding socio-demographic profile, types of device which caused injury, time of injury, site of injury and the procedure during which they encountered injury. Before the start of study, validation of questionnaire was ensured firstly by going through the relevant scientific literature available both online and offline, secondly, by in-depth discussion with clinical medical experts regarding various correlates and lastly by conducting a pilot study among 33 nursing staffs who were not included in the study. A set of 18 questions related to knowledge about universal safety precaution guidelines and their practices as preventive measures to avoid needle stick injury were used and graded using dichotomous responses from them. A score of one for a correct answer and zero for incorrect answers was awarded. **Working Definition:** Needle Stick Injury (NSI)

was operationally defined as any cut or prick to the respondents by a needle used on a patient which was work-related and sustained within the hospital premises.(11) We had considered any episode of NSI encountered at the present working place. Moreover, the time of injury in the present study refers to 'morning/evening/night' working hours.

Ethical Approval and Consent: The study commenced after taking prior approval from institutional ethics committee. The nursing staffs were explained about the purpose of the research and anonymity was maintained at all levels. **Sample size:** A census method was used to include the participants. All nursing staff working at different places of the hospital were enquired about acquisition of needle stick injuries because their working places keep on changing according to their roster-wise duties. **Strategy for data collection:** After obtaining their informed consent, the questionnaire was distributed to all nursing staff who were working in various areas of the hospital namely general wards of different departments, intensive care unit, operation theatre, emergency ward and immunization clinic in the outpatient department, excluding those who could not be contacted or did not give consent to participate in the study. On the same day questionnaire was collected. Out of the total 456 staff nurses contacted in the hospital, only 330 nursing staff submitted the filled questionnaires. The identified reasons for non-submission were that many nursing staff were involved in administrative work in the hospital rather than nursing care of patients while some of them directly refused to provide their details.

For quality assurance of data, on each survey day in evening, the questionnaire was checked for completeness. If any information was missing or there was any confusion regarding any particulars, the respective participants were revisited again on the next day.

Data Analysis: Data were entered into computer-based Microsoft excel spreadsheets and analysed using SPSS software, version 24, IBM Statistics, Chicago, USA. Data related to quantitative variables were expressed as mean \pm SD while percentages and box plots were used for categorical variables. Percentages of the categorical variables were computed in descriptive analysis and association between NSIs and their correlates was analysed by the Chi-square test and Adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

Results

Among the total of 456 staff nurses working at the study place approached for data collection, 330 staff nurses responded. These staff nurses were of mean age (\pm SD) 31.59 \pm 4.66 years ranging from 22 to 45 years. The majority 156 (47.3%) of staff nurses were between 30-37 years of age and the least 41 (12.4%) aged between 38-45 years of age. Two hundred fourteen (64.9%) were females while males comprised 116 (35.1%). Majority of them, 238

(72.2%) were junior staff nurse by designation. As per their educational qualification and duration of service, majority 207 (62.7%) had diploma in nursing, and 250 (75.8%) had work experience up to 10 years with the overall mean duration of service (\pm SD) being 6.85 (\pm 3.41) years. (Table 1)

Prevalence of needle stick injury during procedures among the study participants was found to be 66.7% (Figure 1). Among those who experienced needle stick injuries (n=220), majority 74 (33.6%) reported in the evening time and it was also observed that 77 (35.0%) nursing staff got injured during intravenous procedure. Fingers were the commonest site of NSIs reported by 126 (57.3%) nursing staffs and 132 (60.0%) of them got injured by sterile needle while 53 (24.1%) got injured by non-sterile needles. Disposable syringe was a common device (182, 82.7%) followed by intravenous sets and auto-disabled syringes that caused the NSIs. (Table 2)

Table-3 depicts that statistically significant association was observed between needle stick injuries and duration of service ($p=0.037$), place of working ($p=0.013$), marital status ($p=0.028$) and educational qualification ($p=0.008$). Multivariate binary logistic regression analysis, revealed that the adjusted odds ratio (AOR) for NSI versus duration of service was 1.66 which explains that the nursing staff who had work experience up to ten years had 1.66 times higher chances of needle stick injury than those who had working experience more than 10 years.

Similarly, on comparing NSI versus place of work, in comparison to those posted at OPD, the nursing staff posted in emergency ward had 3.89 (CI 0.96-15.82) times, at operation theatre (OT) 3.45 (CI 0.93-12.78) times and general wards 3.29 (CI 0.96-11.23) times more likelihood of getting injured by needle stick. The chances of getting NSI were higher (AOR 1.62, CI 95% 0.901-2.919) among married staff nurses in comparison to the unmarried nursing staff. AOR for NSI versus educational qualification was 0.46 showing that those having degree in nursing had 54% less likelihood of getting NSI in comparison to those having diploma in nursing.

In the present study, it was found that median score of awareness regarding NSI among male and female nursing staff was 15 and 14 respectively.

Figure-2 shows that about (80.9%) of the nursing staff knew universal precautions and 92.1%, 97.0% and 98.5% knew that NSIs can transmit hepatitis-B, Hepatitis-C, and HIV infections respectively. About 73.6% of staff nurses had not used gloves during injecting or withdrawing injection from patients while about 62.7% of staff nurses were not using gloves when disposing of the contaminated needle or sharp. About 26.1% of the nurses were unaware that recapping should be "done or not" while 34.8% of staff nurses recapped the needle after use.

Discussion

Prevalence of NSIs was found to be quite higher (66.7%) among the nursing staff in the present study. Various studies done in India also reported higher prevalence of NSIs with a maximum of 73% (12, 13) while other studies done in Pakistan and Iran showed relatively low prevalence of NSIs 54.2% and 63.3% respectively. (14, 15) High prevalence of NSIs in our study could be attributed to heavy load of patients in various departments due to presence of only one tertiary care hospital in the radius of approximately hundred kilometres and that too in the rural setting. All accidental and emergency cases of this region are in majority managed in this tertiary care hospital.

Fingers were the most common site of needle stick injury reported by the nursing staff in present study. Studies conducted in Mumbai and Chennai showed that index finger was most common site of needle stick injury. (16,17) A study done in Karachi, Pakistan also reported finger as the commonest site for injuries.(18) Maximum NSIs occurred among those staff that had working experience up to or less than 10 years. A study done in Bareilly, India reported similar observations and rate of NSIs decreased with increase in years of working experience. (19) Disposable syringe was the commonest type of device for NSIs reported by nursing staff in our study which is similar to the findings by other studies that maximum injuries occurred through hollow bore needles followed by suturing needles.(12,19,20)

It was observed in the present study that working-place is a significant factor associated with needle stick injuries, and the working places of the hospital where maximum NSIs took place were operation theatre (OT) followed by emergency and general ward. A study done by Bagdey P et al in Central India also reported OT as the commonest place for needle stick injuries(6) while a study done in North India reported that NSIs most commonly occurred at Emergency and ICU wards.(9) These observations suggest that working place plays an important role for occurrence of needle stick injuries. Hence, nursing staff should be trained adequately and regularly about needle safety measures before their posting in different wards.

In the present study, needle stick injury was lower among those who had attained bachelor's degree in nursing in comparison to those who had done diploma in nursing. One of the possible reasons could be the finding that knowledge about infection prevention and needle safety measures was higher among nursing staff with graduation in nursing as compared to diploma holders. When knowledge regarding Universal Safety Precautions was accessed on the basis of response in the term of 'yes' or 'no' among nursing staff, it was a 'yes' response among 80.9%. But when their knowledge was accessed on different components of Universal Safety Precautions, 26.1% of them didn't know whether recapping should be

done. In the present study, there were 9 (2.7%) nursing staff who encountered needle stick injuries during recapping. Probably, adequate nursing education and training is the best tool to bring behavioural change about safety measures. In our study we observed a significant association between marital status and NSI (p-value 0.028). In our study out of 252 married nursing staff, 176(69.8%) were exposed to NSIs. A component of stress factor of child care and family responsibilities among married nursing staff could have resulted in a causal approach while handling patient making them prone for NSIs. Further studies are required to confirm this.

Conclusion

Prevalence of needle stick injuries was fairly higher among nursing staff. There was statistically significant association of needle stick injuries with duration of service, place of working, marital status and educational qualification. Place of work and education were significant predictors for needle stick injuries in multivariate binary logistic regression. Majority of staff nurses were not using gloves during injecting or withdrawing injection from patients, and disposal of the contaminated needle or sharps. Workshop regarding guidelines of universal precautions may be organized at frequent intervals and the hospital management should ensure compliance among all members of the nursing staff.

Recommendations

There is a need for on-going training activities regarding safe injection practices and protective device usage among the nursing staff in the hospital. Information, education, and communication materials should be exhibited prominently at the places of every worksite. Self-reporting of NSI should be emphasized in all the nursing staff in the hospital.

Limitation of the study

Since this study was conducted in a tertiary level hospital in a rural setting, hence the findings cannot be generalized to health care facilities of all private and public health sector

Relevance of the study

All newly employed inexperienced staff nurses should be trained in the correct techniques of using protective devices. There is a need for on-going training activities and monitoring regarding needle stick practices among the nursing staff in the hospital.

Authors Contribution

All the authors have contributed significantly in the present study

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Tables

TABLE 1 SOCIO-DEMOGRAPHIC PROFILE OF STAFF NURSES AT TERTIARY CARE HOSPITAL (N=330)

S. No	Variables	Frequency (n)	Percentage (%)
1.	Age Groups		
	22-29 years.	133	40.3%
	30-37 years.	156	47.3%
	38-45 years.	41	12.4%
2.	Gender		
	Male	116	35.2%
	Female	214	64.8%
3.	Designation		
	Junior Staff nurses	238	72.2%
	Senior Staff nurses	92	27.8%
4.	Marital Status		
	Unmarried	78	23.6%
	Married	252	76.4%
5.	Educational Status		
	Diploma	207	62.7%
	Degree	123	37.3%
6.	Duration of service		
	≤10 years.	250	75.8%
	>10 years.	80	24.2%

TABLE 2 DISTRIBUTION OF STAFF NURSES WHO EXPERIENCED NEEDLE STICK INJURY ACCORDING TO VARIOUS CHARACTERISTICS. (N = 220)

	Characteristics	Frequency (n)	Percentage (%)
Time of Injury	Morning	68	30.9
	Evening	74	33.6
	Night	54	24.6
	Don't Remember	24	10.9
Procedures	Intravenous	77	35
	Intramuscular	70	31.8
	Sub-cutaneous	16	7.3
	Intradermal	32	14.5
	Don't Remember	25	11.4
Site of the injury	Finger	126	57.3
	Hand	60	27.3
	Leg	12	5.5
	Foot	8	3.5
	Don't Remember	14	6.4
Instruments status	Sterile	132	60
	Non-sterile	53	24.1
	Don't Remember	35	15.9
Types of syringes	Disposable	182	82.7
	Auto-disable	11	5
	IV set	27	12.3

TABLE 3 ASSOCIATION OF NEEDLE STICK INJURY WITH VARIOUS FACTORS AMONG STAFF NURSES

S/N	Variable	Subgroup	Needle Stick Injuries		p-Value	Sig.	Exp(β)	95% CI
			Yes (N=220)	No (N=110)				
1	Duration of service	≤10Years	61 (76.3%)	19 (23.8%)	P=0.037 χ ² =4.364	0.122	1.659	0.873-3.154
		>10 years	159 (63.6%)	91 (36.4%)			1	
2		Emergency	30 (71.4%)	12 (28.6%)	P=0.013	0.058	3.892	0.958-15.817

S/N	Variable	Subgroup	Needle Stick Injuries		p-Value	Sig.	Exp(β)	95% CI
			Yes (N=220)	No (N=110)				
	Working department	Ward	112 (68.7%)	51 (31.3%)	$\chi^2=12.635$	0.058	3.287	0.961-11.239
		ICU	22 (48.9%)	23 (51.1%)				
		OT	51 (75.0%)	17 (25.0%)				
		OPD	05 (41.7%)	07 (58.3%)				
3	Marital status	Married	176 (69.8%)	76 (30.2%)	P=0.028 $\chi^2=4.835$	0.107	1.622	0.901-2.919
		Unmarried	44 (56.4%)	34 (43.6%)				
4	Education	Degree	127 (61.4%)	80 (38.6%)	P=0.008 $\chi^2=7.057$	0.005	0.464	0.273-0.788
		Diploma	93 (75.6%)	30 (24.4%)				

Figures

FIGURE 1 DISTRIBUTION OF NEEDLE STICKS INJURIES AMONG STAFF NURSES AT TERTIARY CARE HOSPITAL N=330

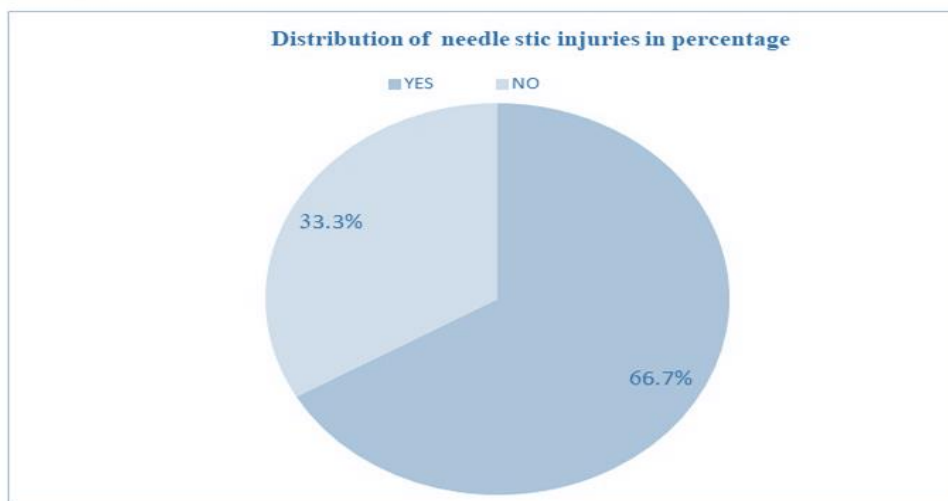
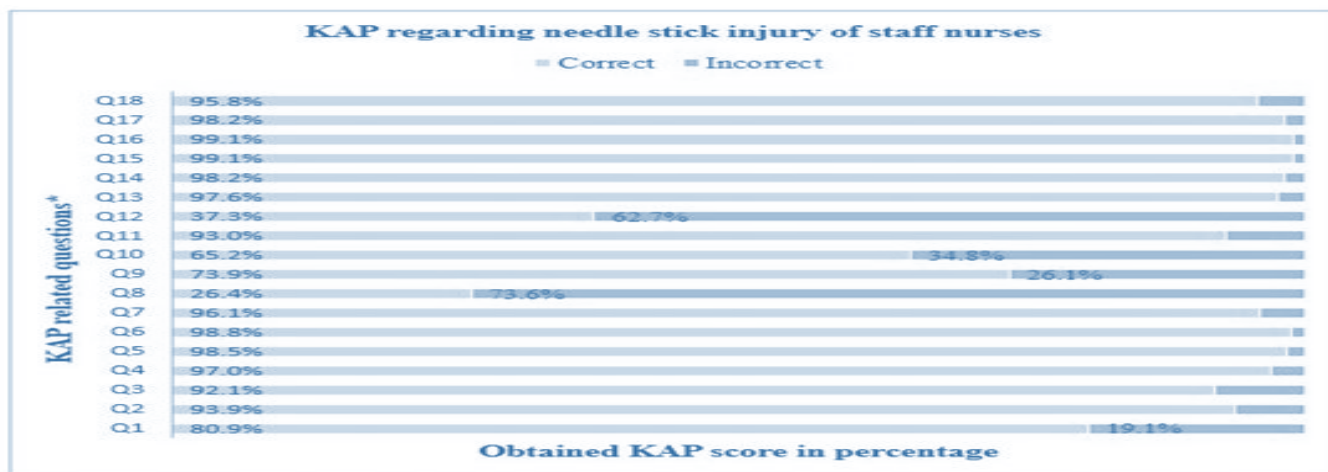


FIGURE 2 KAP REGARDING NEEDLE STICK INJURY AMONG NURSING STAFF



* Footnote: Q1. Do you know about Universal precaution guidelines? Q2. Do you know about needless safety device? Q3. Can Hepatitis B be transmitted by Needle stick and sharp injuries? Q4. Can Hepatitis C be transmitted by Needle stick and sharp injuries? Q5. Can HIV/AIDS be transmitted by Needle stick and sharp injuries? Q6. Do you need to wear gloves during Phlebotomy? Q7. Do you wear gloves during Phlebotomy? Q8. Do you wear gloves when injecting/withdrawing a needle from a patient? Q9. Should needles be recapped/bent after use? Q10. Do you recap needle after use? Q11. Do you disassemble used needles or sharps with your hand? Q12. Do you wear gloves when disposing of contaminated needles or sharps? Q13. Do you separate the needle from syringe prior to disposal? Q14. Do you throw used needles or sharps into the sharps bin immediately? Q15. Do you wear gloves when manipulating the sharp bin? Q16. Do needle stick and sharp injuries need to be reported? Q17. Have you ever had a needle stick injury? Q18. Was the incident of the needle stick/sharp injury reported?