

OCCUPATIONAL EXPOSURE TO NEEDLE STICK INJURIES AND KNOWLEDGE & PRACTICE OF POST EXPOSURE PROPHYLAXIS AGAINST HIV AMONG HEALTH CARE PERSONALS IN A TERTIARY CARE HOSPITAL IN AGARTALA: A CROSS-SECTIONAL STUDY.



Community Medicine

Dr. Rituparna Das Associate Professor, Dept. of Community Medicine, Agartala Govt. Medical college, Agartala.

Dr. Paramita Barman Assistant Professor, Assistant Professor ESIC Medical College & Hospital, Basaidarapur, New Delhi.

ABSTRACT

Background: The present study addresses the important issue of needle stick injury (NSI) and aims at estimating the exposure and pattern of NSI among HCWs and to determine the factors associated with it. Besides, the study also aims to assess their Knowledge and practice of post exposure prophylaxis (PEP) for HIV infection following NSI. **Methods:** This was a Hospital based cross-sectional study conducted among 180 health care workers selected by Stratified random sampling using PPS technique, who were involved in handling needles in their daily patient care at a Tertiary Care Hospital, Tripura. **Results:** The prevalence of Needle stick injury among health care workers was 56.10%. Majority (30%) of NSI was due to rush. Majority HCWs washed the site of NSI with water and soap after NSI. Though, 35% HCW had knowledge about Post exposure prophylaxis (PEP) for HIV following NSI but only 3.96% HCWs had taken PEP after most recent NSI. The NSI was higher in resident doctors compared to nurses and technicians & Occupation of the respondents was significantly associated with NSI (p value-0.016). **Conclusion:** The prevention of needle stick injuries among the health care personnel should be an integral part of the hospital management mainly by training the workers regarding universal precautions and PEP.

KEYWORDS

Needle stick injury (NSI), Occupational Exposure, Response, Health Care Personals, Agartala.

INTRODUCTION

Percutaneous injuries, caused by needle sticks and other sharps, are a serious concern for all health care workers (HCWs) and pose a significant risk of occupational transmission of blood borne pathogens. A Needle stick injury (NSI) is the penetration of the skin by a needle or other sharp object, which has been in contact with blood tissue or other body fluids before the exposure¹. HCW are at an increased risk of accidental NSI and are at the risk of occupational acquisition of blood borne pathogens such as HIV, Hepatitis B & C, and other diseases.² According to WHO out of 35 millions health workers worldwide, about 3million receive percutaneous exposure to blood borne pathogens each year. More than 90% of these infections occur in developing countries.³ The average risk of transmission of HIV to a health care workers after percutaneous exposure to HIV infected blood has been estimated 3 in 1000.⁴ The risk increases further in a state like Tripura where HIV burden is on an alarming increase.⁵

Preventing NSI is an essential part of any blood borne pathogen prevention programme in the work place. The present study addresses the important issue of NSI and aims at estimating the proportion of exposure to NSI and pattern of injury among and to determine the factors associated with NSI. Besides, the study also aims to assess their Knowledge and practice of post exposure prophylaxis (PEP) for HIV infection following NSI.

MATERIALS AND METHOD

It was a Cross-sectional study conducted among 180 health care personals, namely Doctors, Nurses, and Laboratory technicians who are involved in handling needles in their daily patient care at Agartala Government Medical College and G.B.P. Hospital, West Tripura for a duration of 2 months. Doctors and Nurses, who were posted in clinical departments at the time of interview and Technicians from the Central laboratory, and those from Departments of Microbiology, Pathology, Biochemistry were included in the study. Those who did not give consent to participate in the study and Senior Faculty members who were infrequently involved in handling needles in their patient care were excluded. The sample size was calculated using the formula: $N = \frac{Z_{(1-\alpha/2)}^2 \times P Q / L^2}{}$ after taking probability of getting needle-stick injury in a tertiary care hospital (p) of 0.719 and relative precision of 10% of p i.e 0.0719⁶. Considering 10% Non-response rate, sample size was increased to = $151 + (10\% \text{ of } 151) = 166.1 = 167$ rounded to 180 health care workers. Stratified random Sampling procedure was adopted and HCWs were stratified according to their occupation, i.e. Resident doctors, Interns, Nurses, and Lab technicians according to PPS (Probability Proportionate to Size) technique and proportionately 112 nurses, 28 resident doctors, 28 interns, and 12 lab technicians were selected. Data were collected using a pre-tested, structured interview schedule after obtaining a written informed consent. Data was analysed using SPSS Version 29 and results obtained were expressed

in mean & proportions. Statistical test was conducted using Chi square test for categorical variables and Mann-Whitney U test for quantitative variables and p value < 0.05 was considered as statistically significant. The study was conducted after obtaining approval from the Ethics committee of Agartala Govt. Medical College.

RESULTS:

The study was conducted among 180 health care workers. Majority (62.20%) were nurses followed by resident doctors and interns and technicians. Majority of the participants were between 20 to 30 years age (61.10%) and females (63.30%). 28.30% of the participants had ≤ 1 year of experience and 22.20% had > 10 year of experience.

Prevalence of NSI

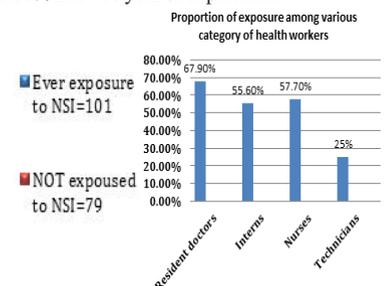
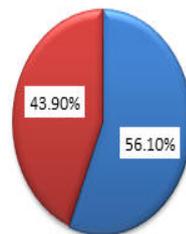


Fig 1: Proportion of health care workers exposed to NSI.

The study revealed that 56.10% health care workers had experienced Needle stick injury. Among the different category of health workers 67.90% of Resident doctors, 55.60% of interns, 57.70% of nurses and 25% of technicians had experienced NSI respectively. [Fig 1]

Table 1: Pattern of NSI among ever exposed health care workers (N=101)

Pattern of NSI among ever exposed health care workers, N=101			
Number of needle stick injury experienced by ever expositors Mean (±SD)		2.58 (±1.67)	
Type Of Needle stick injury, n (%)	Hypodermic needles	67 (65.7%)	
	IV needles / Cannula	10 (9.8%)	
	Suturing Needle	25 (24.5%)	
Procedure leading to needle stick injury n(%)	While pushing injections	IV	45 (45.5%)
		IM	7 (7.1%)
	Blood withdrawal	16 (16.20%)	
	Body fluid drainage	1 (0.99%)	
	Suturing	21 (21.2%)	
While manipulating needle (eg- recapping)	34 (33.66%)		

Degree of penetration n(%)	SC	57 (55.9%)
	IM	26 (25.74%)
	ID	16 (15.84%)
	IV	3 (2.97%)
Perceived Cause Of NSI n(%)	Rush	54 (30%)
	Lack of assistance	24 (13.30%)
	Agitated patient	12 (6.70%)
	Unmindful	10 (5.60%)

The study revealed that majority of the NSI was by hypodermic needle (65.7%) followed by suturing needle (24.5%). Manipulating needles during or after use like recapping was the commonest cause of NSI among health care workers (33.6%). Majority NSI occurred due to rush (30%) followed by lack of assistance (13.30%). (Table 1)

Table 2: Knowledge and practice of Post exposure prophylaxis following NSI

		Number	Percent (%)
Knows the name of diseases that can spread through NSI	HIV	15	8.3%
	Hep B	5	2.8%
	Hep C	1	0.6%
	HIV & Hep B	31	17.2%
	All of the above	126	70%
Usage of PPE at the time of NSI	NO	55	54.46%
Response after most recent NSI	Nothing	5	4.95%
	Washed with water	8	7.92%
	Applied spirit / betadine	6	5.94%
	Washed with water and soap	31	30.69%
	Washed with water and soap and applied spirit	47	46.53%
	Post exposure prophylaxis(PEP)	4	3.96%
Reporting the NSI to higher authority	Yes	36	35.64%
	No	65	64.35%
Where to contact following NSI	ICTC/ART centre	111	61.7%
	Don't know	69	38.3%
Knowledge about taking Post Exposure Prophylaxis (PEP) for HIV after NSI	Knows	71	39.4%
	Don't know	109	60.6%
Knowledge that PEP should be taken within 72 hrs.	Knows	63	35%
	Don't know	117	65%
Post exposure prophylaxis(PEP) taken		4	3.96%

Table 2 shows that majority of the participants (70%) were aware of the common blood borne diseases transmitted through NSI. The study also showed that majority of the participant health care workers washed the wound with soap and water and applied spirit following the NSI, however, majority of the participants did not report the recent NSI to the higher authority (64.35%). Regarding knowledge of Post Exposure Prophylaxis (PEP) for HIV, only 39.4% health care workers were aware about taking PEP after NSI and only 35% were aware that PEP should be taken within 72 hours of NSI. But only 3.96% participant took PEP following the most recent NSI

Table 3: Factors associated with needle stick injury

	Exposure to NSI		Significance
	Yes	No	
Age of the participant (in years)	33.19 (±10.05)	31.71 (±8.19)	0.415*
Years of experience (in years)	8.16 (±9.29)	6.09 (±6.88)	0.518*
Gender	Male	33 (50.0%)	33 (50.0%)
	Female	68 (60.7%)	44 (39.3%)
Occupation	Resident doctors	20 (71.4%)	8 (28.6%)
	Interns	15 (55.6%)	12 (44.4%)
	Nurse	64 (57.7%)	47 (42.3%)
	Technicians	2 (16.7%)	10 (83.3%)
Use of PPE at the time of NSI	Yes	46 (100%)	0
	No	54 (98.2%)	1 (1.8%)

Knowledge of Post exposure prophylaxis	Yes	32 (50%)	32 (50%)	0.20**
	No	66 (60%)	44 (40%)	

* p value calculated using Mann-Whitney U test

** p value calculated using chi square test.

The study revealed that 71% of the Resident doctors had been exposed to NSI compared to 16.7% lab technicians and 57.7% Nurses and occupation of the respondents was significantly associated with needle stick injury. The study also showed that age or gender, even the years of experience had no association with exposure to NSI. (Table 3)

DISCUSSION:

In this study, we examined the Occupational Exposure and Response to Needle Stick Injuries among Health Care Personals. It was found that a majority (56.10%) of the health care personals had experienced NSI at some point in their careers with an average exposure of 2.58 (±1.67) times. Similarly, 79.5% of HCWs reported having one or more NSIs in their career in a study conducted by Sharma R et al carried out in Delhi.⁴ This may be attributed to patient overload and different work culture in the Indian scenario. A study in rural North India too had found a similar prevalence of NSI (73%).⁶ Several other studies too have consistently found that a very high proportion of HCWs have received NSI while performing their work, both in India and internationally.⁷⁻¹²

Among the HCWs, resident doctors had more exposure to NSI, with 67.9% per cent of them having experienced NSI and occupation was statistically associated with NSI. This may be due to their limited experience especially in handling needles unlike nursing staffs and technicians in high patient load environment.

The study revealed that majority of the NSI was by hypodermic needle (65.7%) mostly during IV procedure followed by while recapping needles. Similar finding was obtained from a study conducted in Kochi by Raj A et al¹⁵ where 33.8% injuries occurred during injection procedures. But, majority study highlighted that most of the injuries occurred during recapping of needles as found by Sharma R et al,⁴ Aliyo A et al¹⁴ and Mengistu Da et al¹⁵ respectively. In contrast the present study highlighted that there is a definite need to maintain caution while pushing injections and showed that injuries not only happens during recapping procedures.

The study highlighted that Majority NSI occurred during rush hours (30%) followed by due lack of assistance at work stations (13.30%). Work load was found as an important determinant in a systematic review conducted by Mengistu Da et al.¹⁵ Hence workload and rush during work has been consistently associated with NSI across the world which should be more focused upon.

The present study showed majority of the participant health care workers washed the wound with soap and water and applied spirit following the NSI, with non-reporting of injuries being very high (73.61%). However, only 3.96% participant took PEP against HIV. Similar finding was obtain from a study conducted by Sarma R et al⁴ where in their most recent NSI, 60.9% washed the site of injury with water and 7.8% of the HCWs took post-exposure prophylaxis. Again, in a study conducted in Yemen¹⁶ Non-reporting injuries were very high (73.61%), but one-third (34.21%) proceeded in the process of management.

The study also revealed that though majority of the participants (70%) had knowledge of the common blood borne diseases transmitted through NSI, but 39.4% health care workers were knowledgeable about taking PEP but only 3.96% participant took PEP following the most recent NSI which is very poor compared to studies conducted in other parts of India¹⁵. Thus the study highlighted that the awareness regarding PEP is poor, and those who were aware even in them, the practice for PEP following NSI has been alarmingly poor, which is a matter of concern specially for a state like Tripura where HIV burden is on an alarming rise.

Thus the present study highlighted that the prevalence of needle stick injury was high among health care workers especially among the resident doctors of the tertiary care hospital. Majority of the NSI occurred during rush hours, while pushing IV injections or recapping needles. Majority of the participants had the knowledge of the common blood borne diseases transmitted through NSI however

knowledge regarding PEP was poor and few had taken PEP following their latest exposure. Thus the prevention of needle stick injuries among the health care personnel should be an integral part of the hospital management mainly by training the workers regarding universal precautions and post exposure prophylaxis and making sure that they are adhering to these norms.

REFERENCES

1. The National Surveillance System for Healthcare Workers (NaSH). *Summary Report for Blood and Body Fluid Exposure*. CDC 2011. Available from: [https://www.scirp.org/\(S\(lz5mnp453ednsp55frrgjt55\)\)/reference/ReferencesPapers.aspx?ReferenceID=679805](https://www.scirp.org/(S(lz5mnp453ednsp55frrgjt55))/reference/ReferencesPapers.aspx?ReferenceID=679805) [Accessed on 28th April 2019].
2. Gerberding JL. Incidence and Prevalence of Human Immunodeficiency Virus, Hepatitis B virus, Hepatitis C virus and Cytomegalovirus among healthcare personnel at risk for blood exposure. *Final report from a longitudinal study. J Infect Dis.* 1984; 170:1410-7.
3. Holla R, Unnikrishnan B, Ram P, Thapar R, Mithra P, et al. *J Community Med Health Educ S2: 004. Occupational Exposure to Needle Stick Injuries among Health Care Personnel in a Tertiary Care Hospital: A Cross Sectional Study.* 2014. Available from: doi:10.4172/2161-0711.S2-004.
4. Sharma R, Rasanias S K, Verma A, Singh S. Study of prevalence and response to needle stick injuries among health care workers in a tertiary care hospital in Delhi, India. *Indian J Community Med.* 2010;35:74-7.
5. Aids Control Programme. Achievement of Tripura State AIDS Control Society since last 4 years. Available from: <https://health.tripura.gov.in/aids-control-programme>. Accessed on: 01.12.25.
6. Kermod M, Jolley D, Langkham B, Thomas MS, Crofts N. Occupational exposure to blood and risk of bloodborne virus infection among health care workers in rural north Indian health care settings. *Am J Infect Control.* 2005;33:34-41.
7. Askarian M, Malekmakan L. The prevalence of needle stick injuries in medical, dental, nursing and midwifery students at the University teaching hospitals of Shiraz, Iran. *Indian J Med Sci.* 2006;60:227-32.
8. Whitby RM, McLaws ML. Hollow-bore needlestick injuries in a tertiary teaching hospital: Epidemiology, education and engineering. *Med J Aust.* 2002;177:418-22.
9. Ebrahimi H, Khosravi A. Needlestick injuries among nurses. *J Res Health Sci.* 2007;7:56-62.
10. Makary MA, Al-Attar A, Holzmuller CG, Sexton JB, Syn D, Gilson MM, et al. Needlestick injuries among surgeons in training. *N Engl J Med.* 2007;356:2693-9.
11. Singru SA, Banerjee A. Occupational exposure to blood and body fluids among health care workers in a teaching hospital in Mumbai, India. *Ind J Comm Med.* 2008;33:26-30.
12. Pourmaras S, Tsakris A, Mandraveli K, Faitatzidou A, Douboyas J, Tourkantonis A. Reported needlestick and sharp injuries among health care workers in a Greek general hospital. *Occup Med (Lond).* 1999;49:423-6
13. Raj A, Haider A, JA, Agraja J, Anjali A, Andrew A, Aparna S, Sasidharan N, Johnson M, Aswathy S. Prevalence of Needle Stick Injuries Among Healthcare Workers at a Tertiary Care Centre in Kochi, India. October 21, 2024; *Cureus* 16(10).
14. Aliyo A, Gemechu T. Needlesticks and sharp injuries and their associated factors among health care workers of Bule Hora University Teaching Hospital, Southern Ethiopia. *International Journal of Africa Nursing Sciences* 20 (2024) 100753.
15. Mengistu DA, Tolera ST. Prevalence of occupational exposure to needle-stick injury and associated factors among healthcare workers of developing countries: Systematic review. *J Occup Health.* 2020;62:e12179.
16. Almoliky MA, Elzilal HA, Alzahrani E, Abo-Dief HM, Saleh KA, Sameer Alkubati SA, Saad M S, Sultan AM. Prevalence and associated factors of needle stick and sharp injuries among nurses: A cross-sectional study. *SAGE Open Medicine*, 2024; Volume 12: 1-8