

Needle stick injuries as an occupational hazard: awareness, perception and practices amongst nurses in a premier tertiary care hospital of Northern India

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Abstract:

Background: Healthcare workers are highly prone to contract serious blood-borne infections as common occupational hazard. These infections are most commonly acquired through needle stick (percutaneous) injuries (NSI), nurses being most commonly affected staff category.

Objectives: To assess knowledge, attitude and practices amongst nursing staff regarding needle stick injuries.

Methods: In this cross-sectional study, 164 nurses posted in different areas of a premier tertiary care hospital were subjected to a semi-structured, self-administered questionnaire capturing data regarding awareness, perceptions and practices vis-à-vis NSI amongst participants.

Results: 42.1% nurses encountered NSI during their career, 24.6% suffering more than twice. Most common site of injury was finger (85.3%). 80% and 65% were aware of procedures to be followed post-exposure and diseases spread by NSIs respectively. 84.05% of those who suffered did also enquire about patient's disease history. 58.18% did not report injury. Amongst those not having reported, 20.4% were unaware of procedure, 6.1% felt landing into administrative troubles upon reporting, 6.1% didn't feel important to report and 14.3% did not report considering it a minor prick. Only 88.4% nurses took Post-Exposure Prophylaxis (PEP). Only 13.1% completed the recommended PEP course. 50.6% and 34.1% admitted not wearing gloves always and practising recapping respectively. 34.6%, 23.1%, 17.9% and 9.0% incidences were observed during administration of injections, discarding needles, recapping and clean-up respectively.

Conclusion: A high incidence of NSIs with high rate of non-reporting, non-compliance to universal precautions and indifferent attitude towards PEP despite adequate knowledge substantially indicates need of a continuous educational-cum-training programme to be in place.

Keywords: needle stick injury; healthcare occupational hazards; blood-borne diseases; post-exposure prophylaxis (PEP); recapping of needles

Introduction:

As in any other occupation, hazards and accidents are common to the profession of healthcare workers (HCWs) also. Needlestick injuries account for a major source of occupationally acquired blood-borne diseases amongst these staff, especially the ones directly dealing with patients and getting exposed to blood, body fluids, contaminated instruments and wastes. Nurses are amongst those who are at maximum risk of contracting blood-borne diseases due to such accidents.^(1,2) The most common and serious of these infections include hepatitis C virus (HCV), hepatitis B virus (HBV) and human immune deficiency virus

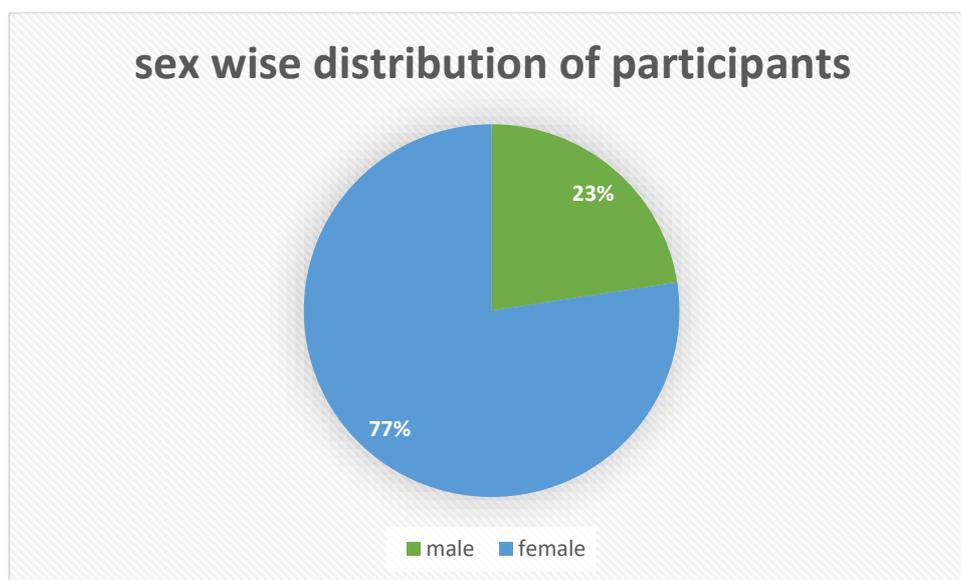
(HIV) amongst over 20 blood-borne pathogens. Overall fraction of infection with these three viruses amongst HCWs which is attributable to occupational percutaneous injuries has been shown to be up to 39%, 37% and 4.4%.⁽³⁻⁶⁾ Such incidences need to be mitigated as they can harm the physical and psychological health of workers, besides posing undesirable burden on the healthcare system either directly through expenditure on investigations, Post-Exposure Prophylaxis (PEP) and treatment costs or indirectly in the form of absenteeism and loss of man-days.⁽⁷⁻⁹⁾ Many steps have been devised and regulations put in place to prevent NSIs and reduce number of exposures in healthcare setups. These protection measures and infection control plans primarily focus on mechanisms like establishing standard operative procedures for handling and disposal of potentially contaminated sharps, adopting measures like universal precautions, prescribing use of personal protective equipment (PPE), PEP protocols, vaccinations, accident reporting and medical surveillance, engineering interventions like safety devices and needleless systems and continuous education and training of healthcare staff vis-à-vis NSIs.^(1,10-17) Despite all the measures, the incidence of NSIs has remained high across the globe and NSIs have been the commonest occupational hazard amongst healthcare workers.^(7,18-21) Moreover, researchers have found as high as 75% of such incidences not being reported due to varied reasons.⁽²²⁻²⁴⁾ In a study conducted by Indian Clinical Epidemiology Network (CLEN), they have projected that NSI prevalence in Indian healthcare setup could be as high as 2.4% of the total injections given in a year. Negligible reporting has however led to an underestimation of the incidence of NSIs in the country.⁽²⁵⁾ Hence it becomes imperative that all healthcare workers must actively report NSIs and take proper PEP. They must be well versant with the main aspects like preventive measures, mechanism of reporting, PEP and treatment consequent to NSIs and must be continuously trained for the same. This study was conducted to assess the knowledge, attitude and practices regarding NSIs amongst the most vulnerable section i.e. the nursing staff in Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh, a premier tertiary healthcare institute of Northern India.

Materials and Methods:

This cross-sectional, questionnaire-based study was conducted in 1948 bedded hospitals of PGIMER Chandigarh. Approvals from institutional ethics committee and after obtaining written informed consent from each participant, nurses posted in six broadly classified areas of the hospital where procedures like injection, intravenous cannulation etc. are commonly performed viz. Emergency, Advanced Trauma Centre, Indoors, Intensive Care Unit (ICU), Operation Theatre (OT) and Out-Patient Department (OPD) were subjected to a questionnaire. Amongst the total population of nurses posted in these areas over the study period, a sample size of 164 nurses was derived using online sampling tools (a confidence interval of 10 and confidence level of 99% was used). Participants were enrolled using proportionate stratified random sampling technique from each of the six areas and from all four grades of nursing staff viz. Deputy Nursing Superintendent (DNS), Assistant Nursing Superintendent (ANS), Grade I and Grade II. The study tool used in this study was a 25 instrument, semi-structured, self-administered questionnaire capturing data on awareness, perceptions and practices regarding NSIs amongst participating nurses. It consisted of dichotomous, multiple choice and unstructured questions. All those nursing officers who consented to participate were considered in the study. The collected data from these questionnaires was compiled using Microsoft Office Excel and analyzed using SPSS version 20 software. Measurement data was presented using mean values \pm standard deviations while categorical data was summarized as counts and percentage. Unpaired t-test and ANOVA were used as the test of significance. All the tests were two sided and a level of $\alpha = 0.05$ was taken as significant.

Results:

Demographic profile of participants: Out of a total 164 participating nurses, 127(77.4%) were female and 37(22.6%) were male. The proportion of participating DNS/ANS (administrative in-charges), Grade I and Grade II was nil, 1.2%, 23.3%, 75.5% respectively. 35.4% were diploma holders, 54.3% were graduate & 7.9% were having postgraduate qualifications. The minimum age of nurses included in the study was 20 years & maximum 56 years. Mean age was 33.19 years with a S.D. of ± 7.96 years. The participants were having a minimum experience of 6 months and a maximum of 35 years with mean of 10.08 ± 7.52 years.

**Table 1: Socio-demographic characteristics of participants**

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	P Value
Male	37	13	20	629	17.00	1.986	0.374
female	127	11	20	2197	17.30	1.738	
grade1	38	14	20	659	17.34	1.547	0.540
grade2	123	11	20	2113	17.18	1.873	
Ans	2	17	20	37	18.50	2.121	
Diplo	58	11	20	988	17.03	1.946	0.524
Grad	89	11	20	1536	17.26	1.774	
Pg	13	15	20	232	17.85	1.405	

Knowledge, attitude and practices scores: 65% of nurses had correct knowledge of diseases spread by NSIs. 51.8% nurses had knowledge about transmission rates of HIV following NSI. Overall, 92.7% participants (83.8% amongst males & 95.3% amongst females) were aware of the existence of hospital policy vis-a-vis reporting NSIs. 80% nurses were aware of procedures to be followed post NSI. 83.8% male nurses & 95.3% female nurses were aware of the person to be contacted in the hospital post NSI.

34.1% nurses were indulging in the practice of re-capping of needles. Only 50.6% nurses admitted to wearing gloves. 42.1% nurses encountered NSI during their career. A decreased incidence of NSI was seen with experience. 42.2% nurses had NSI once, 14.4% nurses had

NSIs twice, 24.6% nurses had NSIs more than twice, &18.8% nurses did not remember. Out of the total incidences of NSIs, 35.8% occurred in wards, 28.4% in emergency area, 9.9% in OPDs, 16.0% in I.C.U & 9.9 % in O.T. 84.05 % nurses of those suffering NSIs enquired about the patient's disease history. Out of the total incidences of NSIs, 34.6% were encountered during administration of injections, 7.7% during manipulation of I.V. line, 17.9% during recapping, 23.1% during discarding needle,9.0% during clean-up and 7.7% in other situations. 10.7% incidences of NSI were in the palm, 85.3% in fingers, 2.7% in arm and 1.3% in other parts of the body. 58.18% nurses did not report Needle Stick Injuries.

The reasons cited for not reporting NSIs were as follows: 20.4% of nurses were unaware of reporting procedure post NSI,26.5% assumed patients did not have HIV or Hepatitis, 4.1% didn't get time to report, 2% were concerned about their confidentiality, 6.1% felt they might get into administrative trouble on reporting, 6.1% felt it was not important to report NSIs and 14.3% did not report considering the prick as minor. 20.4% cited other reasons.

Only 88.4% of those suffering NSI had taken Post Exposure Prophylaxis.55.5% of participating nurses were unaware of where to get PEP. 51.8% of nurses did not consider PEP necessary while 3.7 nurses felt it was not available in the hospital. 48.1 nurses said that they were told by others that PEP was not required. Only 13.1% of nurses suffering NSI completed the recommended PEP course. 59.4% nurses felt that they did not get adequate psychological support from the hospital.

Discussion:

Earlier research has sufficiently indicated that occupational surveillance to assess and monitor NSIs and practice of following set protocols such as standard precautions and standard operative procedures is effective in preventing occupational incidence of blood-borne infections.^(9,12,14,26,27)The awareness of healthcare staff regarding major aspects of NSIs, their attitude and practice of following the set procedures plays a crucial role in avoiding the preventable NSIs.⁽⁹⁾

In this study, we observed that on 2/3rd (65%) participating nurses at PGIMER Chandigarh had adequate knowledge about diseases that can be transmitted through NSIs. Only about half (51.8%) the participants could correctly tell transmission probability of diseases like HIV post exposure. Zafar et al.⁽²⁸⁾have observed that about 90% of NSIs occur amongst nurses working in areas with deficient in resources and training and thereby low level of knowledge about the topic. Norsayani et al.⁽¹⁹⁾ and Patel et al.⁽²⁵⁾ have observed high level of knowledge regarding blood-borne diseases transmitted through NSIs amongst medical students. It is evident that continuous medical education regarding the subject keeps healthcare worker's knowledge updated as most of the nurses who could not answer these basic questions had not underwent any training/educational session since long. Continuous teaching and training sessions must be organized to keep the staff updated about the topic.

We observed that 92.7% participants were aware of the hospital policy regarding reporting of NSIs which was quite higher than that observed by Kakizaki et al.⁽²⁹⁾(80.4%) in tertiary care hospitals of Mongolia. Wilburn et al.⁽¹²⁾ and Sharma et al.⁽³⁰⁾ have demonstrated and emphasized on the importance of awareness regarding hospital policies in prevention, control and reducing harmful sequel of NSIs amongst healthcare workers. About 20% participants in this study were unaware of the exact procedures to be followed after an accidental NSI. This meant that although most of the staff was aware that some sort of provision for handling NSIs exists in their institute, they were not exactly aware how to go about it. This calls for widespread dissemination of information regarding institute's policy and procedures amongst the healthcare workers. Interestingly, a significant difference was observed in the knowledge

scores of female nurses when compared to that of male nurses, females having higher knowledge level than males.

Only half of the nurses (50.6%) admitted wearing gloves and about 1/3rd (34.1%) indulged in re-capping of needles. 17.9% NSIs occurred during re-capping & 23.1% NSIs occurred while discarding needles. The rate of NSI attributable to re-capping was very high in our study as was the rate of indulging in this practice. Yenesew et al.⁽¹⁴⁾ have demonstrated significant relationship of adhering to standard precautions and reduced incidence of transmitting blood-borne infection in healthcare setups. Wicker et al.⁽⁴⁾ observed good compliance to standard precautions in a 1247 bedded hospital with 4080 employees in Germany and consequently only 5.2% of NSIs were related to re-capping. Similarly Salelkar et al.⁽⁵⁾ observed 6.3% NSIs attributable to re-capping. The institute needs to emphasize on discouraging the practice of re-capping which would bring down incidence of NSIs considerably.

A very high proportion of nurses (58.18%) did not report NSIs. Low rate of reporting (under-reporting) has been observed by many researchers and is a common occurrence world-wide. Reporting rate varies widely across category of healthcare workers, disciplines, area, region and countries.^(3-5,9,19,23,25,29) Unawareness about the procedures to be followed and personal assumption of the healthcare staff that patient is not having HIV or Hepatitis without adequate scientific evidence accounted for about half the NSIs going unreported in this institute. PEP has been shown to prevent occurrence of diseases like HIV in 80-90% cases of NSIs and thus all NSIs must be promptly reported, investigated and treated. The healthcare workers must be sensitized regarding the need for reporting every NSI and a prompt and seamless procedure for the same must be there in the healthcare institutes to exact maximum compliance.

We also observed that a considerable proportion (59.4%) of nurses reported that they did not get adequate psychological support from the hospital after an incidence of NSI. This is an important observation worth pondering and must be taken seriously by the institute. Reasons for such a feeling amongst the healthcare staff needs to be addressed on priority basis if we have to succeed in attaining their compliance in reporting.

Limitation of this study was that it did not compare or take into account the incidence of NSI amongst other category of healthcare staff. The reasons for low reporting rate despite acceptable level of knowledge could not be evaluated using the study tool and must be researched further.

Conclusion:

Incidence of NSIs amongst nursing staff of the institute was observed to be high (42.1%). Non-compliance to standard precautions and preventive measures was observed highly prevalent amongst the nurses. Despite an acceptable level of knowledge regarding institute policy and procedures to be followed in case of NSI, there was high incidence of under-reporting from the nursing staff. About half of them felt having received inadequate psychological support from the hospital in the event of NSI. This calls for a review of the steps being taken by the institute for awareness of its staff and encouraging safe practices amongst them. Focus also needs to be kept on providing adequate support in case of any event of NSI. There is a need for rigorous and continuous education-cum-training programme to be in place.

References:

1. Lee JM, Botteman MF, Nicklasson L, Cobden D, Pashos CL. Needlestick injury in acute care nurses caring for patients with diabetes mellitus: a retrospective study. *Curr Med Res Opin.* 2005;21(5):741-7.

2. Joardar GK, Chatterjee C, Sadhukhan SK, Chakraborty M, Dass P, Mandal A. Needle sticks injury among nurses involved in patient care: a study in two medical college hospitals of West Bengal. *Indian J Public Health*. 2008;52(3):150–2.
3. Prüss-Üstün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med*. 2005;48(6):482–90.
4. Wicker S, Ludwig A-M, Gottschalk R, Rabenau HF. Needlestick injuries among health care workers: Occupational hazard or avoidable hazard? *Wien Klin Wochenschr*. 2008;120(15–16):486–92.
5. Vaz F, Salekar S, Motghare D, Kulkarni M. Study of needle stick injuries among health care workers at a tertiary care hospital. *Indian J Public Health*. 2010;54(1):18.
6. Hospital eTool: Healthcare Wide Hazards - Needlestick/Sharps Injuries [Internet]. [cited 2020 Oct 18]. Available from: <https://www.osha.gov/SLTC/etools/hospital/hazards/sharps/sharps.html#standard>
7. Motaarefi H, Mahmoudi H, Mohammadi E, Hasanpour-Dehkordi A. Factors associated with needlestick injuries in health care occupations: A systematic review. *J Clin Diagn Res JCDR*. 2016;10(8):IE01–4.
8. Talaat M. Occupational exposure to needlestick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *Am J Infect Control*. 2003;31(8):469–74.
9. Rodrigues C. Needle stick injuries & the health care worker--the time to act is now. *Indian J Med Res*. 2010;131:384–6.
10. Occupational Exposure to Bloodborne Pathogens; Needlestick and Other Sharps Injuries; Final Rule. - 66:5317-5325 | Occupational Safety and Health Administration [Internet]. [cited 2020 Oct 18]. Available from: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=16265&p_table=FE DERAL_REGISTER
11. Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens | Occupational Safety and Health Administration [Internet]. [cited 2020 Oct 18]. Available from: <https://www.osha.gov/enforcement/directives/cpl-02-02-069-0>
12. Wilburn SQ, Eijkemans G. Preventing needlestick injuries among healthcare workers: A WHO-ICN collaboration. *Int J Occup Environ Health*. 2004;10(4):451–6.
13. Ashat M, Bhatia V, Puri S, Thakare M, Koushal V. Needle stick injury and HIV risk among health care workers in North India. *Indian J Med Sci*. 2011;65(9):371.
14. Yenesew MA, Fekadu GA. Occupational exposure to blood and body fluids among health care professionals in Bahir Dar town, Northwest Ethiopia. *Saf Health Work*. 2014;5(1):17–22.
15. Rampal L, Zakaria R, Leong J, Zain A. Needle stick and sharps injuries and factors associated among health care workers in a Malaysian hospital. *Eur J Soc Sci*. 2010;13:354–62.
16. Habib H, Khan EA, Aziz A. Prevalence and factors associated with needle stick injuries among registered nurses in public sector tertiary care hospitals of Pakistan. *Public Health*. 2011;3:8.
17. Anderson DC, Ganguli L, Packer J. Preventing needlestick injuries. *BMJ*. 1991;303(6799):419–419.
18. Shiao JSC, Lin M-S, Shih T-S, Jagger J, Chen C-J. National incidence of percutaneous injury in Taiwan healthcare workers. *Res Nurs Health*. 2008;31(2):172–9.

19. Norsayani MY, Hassim IN. Study on incidence of needle stick injury and factors associated with this problem among medical students. *J Occup Health.* 2003;45(3):172–8.
20. Lotfi, Gashtasbi A. Needle stick and sharps injuries and its risk factors among health care personnel (ASTARA IRAN, 2006). *J Babol Univ Med Sci.* 2008;10(4):71–7.
21. Smith D, Wei N, Wang R-S. Needlestick and sharps injuries among Chinese hospital nurses. *Adv Expo Prev.* 2004;7:11–2.
22. Wilburn SQ. Needlestick and sharps injury prevention. *Online J Issues Nurs.* 2004;9(3):5.
23. Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of needlestick and injuries among health-care workers of a tertiary care teaching hospital in North India. *J Lab Physicians.* 2017;9(1):20–5.
24. Sriram S. Study of needle stick injuries among healthcare providers: Evidence from a teaching hospital in India. *J Fam Med Prim Care.* 2019;8(2):599.
25. Patel T, Bagle T, Maurya M, Sharma V. Knowledge, attitude and practice of needle stick injury and post exposure prophylaxis in undergraduate medical students. *Int J Basic Clin Pharmacol.* 2018;7:1297.
26. Hutin Y, Hauri A, Chiarello L, Catlin M, Stilwell B, Ghebrehiwet T, et al. Best infection control practices for intradermal, subcutaneous, and intramuscular needle injections. *Bull World Health Organ.* 2003;81(7):491–500.
27. Radecki S, Abbott A, Eloi L. Occupational human immunodeficiency virus exposure among residents and medical students: an analysis of 5-year follow-up data. *Arch Intern Med.* 2000;160(20):3107.
28. Zafar A, Habib F, Hadwani R, Ejaz M, Khowaja K, Khowaja R, et al. Impact of infection control activities on the rate of needle stick injuries at a tertiary care hospital of Pakistan over a period of six years: an observational study. *BMC Infect Dis.* 2009;9:78.
29. Kakizaki M, Ikeda N, Ali M, Enkhtuya B, Tsolmon M, Shibuya K, et al. Needlestick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia. *BMC Res Notes.* 2011;4:184.
30. Sharma A, Bhalla P, Gur R. Study on prevalence of needle stick injury among health care workers in a tertiary care hospital in New Delhi: A two-year review. *Indian J Public Health.* 2012;56(1):101.