

Risk of Needle-Stick Injuries among Nurses in a Tertiary Care Hospital

Ashok Agarwal¹, Esther Marry Peter², VK Agrawal³, Pooja Agrawal⁴

Abstract

The health care workers who deal with patients, especially who are exposed to blood, body fluids and potentially contaminated instruments or wastes, are at high risk of contracting serious blood-borne infections like hepatitis B (HBV), hepatitis C (HCV) and HIV through occupational injuries during their professional activities.

This hospital based retrospective study on 400 nurses involved in patient care showed that 86.0 percent of them sustained at least one needle stick injury in the last 12 months. The risk of such injuries per thousand nurses per year was found to be 6000. Out of the most recent injury among the nurses, 80 percent remained unreported to the appropriate authorities; in 20 percent events, hand gloves were worn by the nurses only, 4.0 percent of those nurses received the hepatitis B vaccine, 1.50 percent Hepatitis B immunoglobulin and none of them received post exposure prophylaxis for HIV. It is recommended that health care workers should be motivated by IEC activities to adhere to universal safety precautions to minimise needle stick injuries. Universal immunisation with appropriate vaccine like Hepatitis B Vaccine should be given to them while admitting in nursing school. Post exposure prophylaxis for HIV as per national guidelines should be readily available to health care worker in case of needle stick injury.

Health care workers dealing with patients, especially who are exposed to blood, body fluids and potentially contaminated instruments or wastes, are at high risk of contracting serious blood-borne infections like hepatitis B (HBV), hepatitis C (HCV) and HIV through occupational injuries during their professional activities. Percutaneous injury is the most common method of exposure to blood borne pathogens. In the USA approximately 6,00,000 to 8,00,000 needle stick injuries (NSI) occurs annually among the health workers, and as a result more than 1000 of them contract Hepatitis C or HIV. The most affected category of health care worker is the nurses who are involved in 42 to 74 percent of the reported needle stick injuries.

Many needle sticks and other cuts can be prevented by using safer techniques (for example, not recapping needles by hand), disposing of used needles in appropriate sharps disposal containers, and using medical devices with safety features designed to prevent injuries. Using appropriate barriers such as gloves, eye and face protection, or gowns when contact with blood is expected can prevent many exposures to the eyes, nose, mouth, or skin. Post-exposure prophylaxis with antiretroviral medications can reduce the risk of HIV transmission by 80 percent. In 2003, the World Health Organisation (WHO) and the International Council of Nurses (ICN) launched a pilot project in three countries to protect healthcare workers from needle stick injuries. The results of the project will be disseminated worldwide, along with best policies and practices for prevention. The present study was planned to find out the prevalence and determinants of needle stick injuries in a tertiary care hospital at Uttar Pradesh.

¹Assistant Professor, Dept of Pediatrics, ²Principal, College of Nursing, ³Professor & HOD Dept of Community Medicine, Rohilkhand Medical College Bareilly (UP); and ⁴MBBS Student, Sri Guru Ram Rai Institute of Health & Medical Sciences, Dehradun (UK).

Material & Methods

This hospital-based retrospective study was conducted among the nurses involved in patient care to quantify the incidence and risk of needle stick injury during the patient care in the hospital setting in Bareilly (UP) and to assess certain aspects of their practices profiles during and after such events. Taking needle stick injuries rate as 50 percent, the sample size will be 384 with 0.5 margin of error at 95 percent confidence level. For this particular study considering 5 percent non-response the sample size of 400 has been arrived at. This sample size is statistically relevant to provide an estimate of needle stick injuries among nurses in a tertiary care hospital $e = \{\text{sqrt. } (p \cdot q / n)\} \times Z$, where, e = sampling error, p = probability of event, $q = 1 - p$, n = sample size, Z = Z value for associated confidence level.

Upon approval by the administration and getting list of total nurses from the nurses' authorities, 400 nurses were selected for the study by simple random sampling technique which constituted the sample size. After review of literature and inputs from experts in epidemiological studies the draft questionnaire was prepared. This was pretested among 12 nurses after which the final questionnaire for data collection was prepared. The nurses themselves reported data on their experience in the last 12 months period. In case of multiple injuries, the detailed information about the most recent injury was elicited. The anonymity of the respondents was ensured. The data analysis was done using suitable descriptive statistics (rate, ratio

and proportion). The risk of the NSI per 1000 nurses per year was calculated as follows:

$$\frac{\text{The cumulative incidence of NSI among all nurses in last 12 months}}{\text{Total number of nurses studied}} \times 1000$$

Results

Table 1 shows distribution of respondents according to age. Respondent's age were between 19-28 years of age. Mean age was 22.5 year; 49.6 percent of nurses were educated up to intermediate while 10.0 percent nurses were educated up to MA; 48.7 percent nurses were Staff nurses; 24.8 percent nurses were in third year of Nursing and 26.5 percent nurses were in second year of Nursing. Mean work experience was 5.4 years.

Table 2 depicts the prevalence and determinants of needle stick injuries in study population. Out of 400 nurses 344 nurses (86%) reported at least one needle stick injury in last twelve months. Incidence of needle stick injury was one to ten times during last one year. Average was six times a year. The risk of the NSI per 1000 nurses per year was 6000. 67.2 percent nurses sustained injuries during IV procedure, 21.7 percent during intramuscular injection, and 6.6 percent during intra-dermal and 9 percent during subcutaneous injections. Ninety percent nurses sustained injuries at finger and 10 percent sustained in palm and hands.

Table 2: Prevalence and determinants of needle stick injuries

S No	Prevalence/ Determinants	Magnitude
1	Number of nurses reported injuries	86%
2	How many times she had NSI during last 12 month.	1 to 10 times (average 6 times)
3	What procedure was being carried?	IV : 67.2% IM : 21.7% ID : 6.6% SC : 4.5%
4	Place of injury	90% in finger 10 % in palm and hand
5	Character of injury	Puncture drew blood: 76.3% Puncture did not draw blood: 23.7%
6	Devices involved	Disposable needle: 81.3% Reusable needle: 13.1% Suture needle: 5.6%
7	Nature of syringes	Glass syringes reusable: 5.1% Disposable syringes : 81.3% Plastic syringes if reused: 13.6%
8	Reporting of injuries	Reported 19.2% Not reported 80.8%

Table1 : Demographic profile of study population

Demographic Profile	
Age	19-28 years
Mean age	22.5
Education	Intermediate : 49.6%
	BA: 11.4%
	BSc : 10.4%
	MA: 10.0%
	GNM:18.6%
Nursing year	Staff: 48.7%
	Third Year: 24.8%
	Second Year: 26.5%
Work experience	Mean 5.4, SD 1.7

In 76.3 percent cases puncture drew blood while 23.7 percent of cases puncture did not drew blood. Disposable needles were involved in 81.3 percent of cases while suture needle was involved in 5.6 percent of cases. In 5.1 percent of cases reusable glass syringe was involved and 13.6 percent of cases plastic syringe was reused. Only 19.2 percent nurses reported the injuries to appropriate authority. 74.6 percent nurses were not aware that all injuries were to be reported and 15.3 percent nurses said they did not know to whom injuries should be reported.

Table 4 gives distribution of nurses according to pre-exposure or post-exposure preventive measures taken during the most recent injury. 20.20 percent nurses did not use the gloves while giving the injections and did not follow the universal precautions. 34 percent nurses said they did not use the gloves due to inadequate facilities and 52 percent nurses said they did not use the gloves because after wearing gloves it is difficult to manipulate the tissues. 30.80 percent nurses washed their hand with soap and water after the injury while 69.19 percent washed their hand with antiseptic. Only 4 percent nurses received post-exposure prophylaxis for hepatitis B and 1.5 percent received Hepatitis B immunoglobulin also. None of the nurses were given antiretroviral therapy for HIV. Only in 3.5 percent cases test was done on source patient for HIV while in 14.6 percent of cases test was done on hepatitis B in source patient. In none of source patient test for hepatitis was done. In 11.6 percent nurses, hepatitis B test was done while in none of nurses' test on hepatitis C was done. Table 5 outlines common reasons for not routinely putting on the gloves.

Table 3: Reasons Needle stick injuries were not reported

SN	Reasons	%age
1	Did not know that all injuries had to be reported	74.6
2	Did not know to whom injuries should be reported	15.3
3	Believed reporting would not influence the outcome	5.10
4	Others	6.00

Discussion

Needle Stick Injuries are one of the hidden problems in health care workers. In our study, 86 percent of the nurses reported at least one NSI in last 12 months, most of which occurred in patient rooms during venous sampling or intravenous injections. Many (30%) of the students in Washington had sustained at least one NSI and these most commonly (72.1%) occurred in the operating room. Most students (61.9%) in Taiwan had an NSI and the majority (70.1%) of these NSIs occurred in patient rooms. In other studies, it has been shown that lack of experience in many procedures, insufficient training, work overload and fatigue leads to occupational sharp injuries. In this study, 80.8 percent nurses did not report these NSI. The most common reason for under-reporting was the personnel's lack of knowledge that all injuries had to be reported. Other reasons are based on a background of insufficient knowledge or poor practices. The observed high level of under-reporting suggests that students need education on prevention, especially focusing on the importance of reporting all NSIs and the possibilities of prophylaxis after exposure.

Conclusion

The present study proves that nurses involved in patient care in the hospital setting are at great risk of sustaining NSIs and acquiring dreaded blood borne infections like HIV, hepatitis B and hepatitis C as a

Table 5: Reasons Nurses did not routinely wear gloves

S.No.	Reasons	%age
1	Inadequate facilities	34.0
2	Inability to manipulate tissues	52.0
3	Deceased hand sensation, tingling, numbness	14.5
4	Belief that wearing gloves did not increase protection	9.50

consequence of their occupational exposures. There is lot of scope in improving their awareness and practices to minimise this risk and adverse consequences of such injuries through IEC activities (including in service training), strict adherence to universal safety precautions and universal immunisation for them with appropriate vaccine like hepatitis B vaccine. Similar study must be done in other parts of the country to find out incidence and determinants of needle stick injuries.

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Table 4 : Distribution of respondent according to pre-exposure / post-exposure preventive measures

S No	Pre-exposure / post-exposure preventive measures	Numbers/ percentages
1	Practice during the procedure	Used gloves : 20.20% Not used gloves : 79.80%
2	Hand washing after the injury	With soap and water :30.80% With antiseptic : 69.19%
3	Received post-exposure prophylaxis	Hepatitis B Vaccine : 4.0% Hepatitis B immunoglobulin : 1.5% Anti retroviral therapy for HIV: None
4	Test done on source patients	For HIV: 3.5% For Hepatitis B: 14.6% For Hepatitis C: None
5	Test done on nurses	For Hepatitis B: 11.6% For Hepatitis C: None