

# A STUDY ON THE PROFILE OF NEEDLE STICK INJURIES PRESENTING TO THE EMERGENCY DEPARTMENT OF A TERTIARY CARE ACADEMIC HEALTH ORGANIZATION OF NORTHERN INDIA

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## Abstract

Introduction: Needle Stick Injuries (NSI) are one of the common occupational hazards in healthcare industries. Aims and Objective: the study was conducted to determine the profile of NSI visiting to the Emergency Department (ED) of a tertiary care teaching hospital over a span of one year. Methods: a record based observational study was conducted. Data was collected from the records of all patients reported to have a NSI to the ED. Results: A total of 72 cases of NSI were reported with average of 6 cases per month. Majority of the NSI reported were staff nurses. Among the resident doctors, majority were from the anesthesia and otorhinolaryngology departments. Only 43.1% of the healthcare providers were completely vaccinated. Conclusion: Complete vaccination and proper infection control measures help in prevention of NSI. Frequent training and reinforcement is needed for the same.

## INTRODUCTION

The term 'Needle Stick Injury'(NSI) is defined as injury that occur due to needles or other sharp objects like intravenous cannulas, stylets, surgical blades, glass vials, forceps that accidentally puncture the skin [1]. NSI are very common in the healthcare settings and contributes to a serious occupational health hazard. The estimated worldwide prevalence of NSI is 40.97% [2] and the prevalence in India is around 61% to 79% [3]. As the data and numbers, itself prove to be alarming, so is the financial burden associated with every NSI. Approximately 79-90% of Health Care Personnels (HCP) report to have at-least one event of NSI in their career [2]. The Centre for Disease Control (CDC) estimates approximately 385,000 injuries annually among HCP's, with around more than 1000 injuries per day. The cost to personnel as well as the healthcare system too is enormous. CDC estimates each NSI to cost around 175 to 350 US dollars to the healthcare system.

Though it is a serious occupational health hazard, NSI's are one of the most preventable health hazards among HCPs too. The incidences and exposure are higher in developing nations compared to the developed ones. Also, under-reporting too is a major factor which determines the accuracy of data. Most of the injuries are not reported due to the lack of awareness and proper protocols. It is estimated that approximately 75% of the injuries in developing nations are not reported [4]. There is no central reporting system in India for reporting NSI. In percutaneous exposure, there is a break in the intact skin caused by the sharp object which is contaminated. Mucocutaneous exposure occurs when blood or body fluid contaminates non intact skin, mucosa like mouth or eyes. The major organisms involved in NSI are Hepatitis B (Hep B), Hepatitis C (Hep C) and Human Immunodeficiency Virus (HIV). Tetanus

should always be considered in every NSI and vaccination history need to be obtained. The average risk of acquiring the above infections after an exposure is, 9-30% for acquiring Hep B, 0.3% for HIV and 1-1.8% for Hep C [1]. Contaminated sharp objects need to be handled carefully to prevent the injuries. Needles should not be recapped or removed, but still these practices are common especially in developing nations like India.

Several studies have been conducted across the globe regarding the prevalence of NSI among HCP groups [5][6]. Very few studies are from the northern part of India especially the National Capital Region (NCR). This study was conducted to find the prevalence of NSI along with the factors leading to NSI among HCPs in a tertiary care teaching hospital in NCR.

## MATERIALS AND METHODS

This study was conducted in the emergency department (ED) of a tertiary care medical college situated in NCR of India. As per the existing protocol, if any NSI occurs, the HCP must report to the In-charge of the area and after the initial first aid, they should visit the ED. All injuries or exposure are documented in the register maintained in ED. The HCP was given first aid and wound care, if not done, following which the ED physician establishes the eligibility for Post Exposure Prophylaxis (PEP) and prescribe them accordingly. The initial laboratory evaluation was done during the first visit and later patient was referred to Medicine OPD for follow up.

The study aimed at exploring the profile of NSI's occurring in a tertiary care hospital. We conducted a retrospective record-based observational study. All data entered in the register from January 2023 till December 2023(12 months) was collected using data collection proforma. Patients were not involved in any part of the study. The data was collected and entered in Microsoft excel sheet and analysed using SPSS v.22.

## RESULTS

A total of 72 cases were reported over one year with an average of 6 NSI's per month. Majority of the HCPs were nursing staff. It was observed that 31.9% of the personnel reported with NSI were staff nurses, followed by nursing students who observe/assist the staff (20.8%) and postgraduate resident doctors (13.8%). Among the resident doctors, majority was from the departments of anaesthesia and otorhinolaryngology. Senior doctors which included consultants and professors constituted 6.9% only. The least was among medical interns (2.8%). The support staff which includes General Duty Assistant (GDA) and housekeeping constituted 18%. 5.6% were technicians from laboratory. (Table 1)

**Table 1: Needle Stick injury reported by HCPs (n=72)**

NSI	Number	Percentage
<b>Category of staff:</b>		
Senior Doctor	5	6.9
Resident Doctor	10	13.8
Intern	2	2.8
Staff Nurse	23	31.9
Nursing student	15	20.8
General Duty Assistant	8	11.1
Lab technician	4	5.6
Housekeeping staff	5	6.9

The area of the hospital where majority of the incidents occurred were wards. 31.9% of the injuries occurred in wards followed by 20.8% in Operation Theatres (OT) and 19.4% in Intensive Care Units (ICU). ED constituted only 12.5% which was less in comparison to the other high risk acute care areas of the hospital. There were few scattered cases reported from staff working in cardiac catheterisation unit, dialysis unit and labour room. Among the 14 NSIs reported from ICUs, 6 were from the paediatric ICU. (Table 2)

**Table 2: Department-wise distribution of the injuries**

Place of incident:		
OT	15	20.8
ICU	14	19.4
Wards	23	31.9
ED	9	12.5
OP	3	4.2
Labour Room	1	1.4
Dialysis	3	4.2
Lab	3	4.2
Cathlab	1	1.4

Majority of the injuries occurred on fingers and mostly during suturing and recapping (Table 3). 3 cases were reported on the forearm while cannulation. This stresses on the importance of using gloves during any procedure. Out of the total 72 cases, 63 HCPs were using glove during the incident. In 12.5% of the cases, glove was not used (Table 4). Every HCP needs to be trained in standard infection control precautions which is very important.

**Table 3: Exposure site of the NSI**

Site of exposure	Frequency	Percentage
Fingers	59	81.9
Palm	10	13.9
Others	3	4.2

**Table 4: Glove during the incident**

Wearing glove during the incident	Frequency	Percentage
Yes	63	87.5
No	9	12.5

In majority of the cases, procedure leading to the NSI was biomedical waste segregation (26.4%), followed by suturing (25%) and sampling (22.2%). 2 procedures involved where lumbar puncture and arterial blood gas analysis (others). 8.3% of the cases occurring during blood sugar check, which was significant in proportion, compared to the others.

**Table 5: Procedure associated with the NSI**

Procedure involved	Frequency	Percentage
Recapping	4	5.6
Suturing	18	25
RBS check	6	8.3
Cannulation	7	9.7
Sampling	16	22.2
Biowaste segregation	19	26.4
Others	2	2.8

The first step in management of a NSI is thorough washing of the affected area with water and soap. Several irrational practices exist like sucking blood out of the wound, squeezing the affected area. The injured part should be washed only with soap and not betadine or alcohol solutions which can aggravate the damage. 59.7% of the HCPs washed the injured are immediately with soap and water, as per the recommendations. 12.5% of the HCP's used disinfectants, 9.7% used only water, 4.2% squeezed out blood while 2.8% sucked out blood from the wound. 11.1% of HCPs did not do any first aid management after the injury.

**Table 6: First aid done by the HCP after the NSI**

Immediate action done by HCP	Frequency	Percentage
Washed with soap and water	43	59.7
washed with only water	7	9.7
Squeezed the affected part and washed	3	4.2
Sucked out blood	2	2.8
Cleaned with disinfectant	9	12.5
No first aid done	8	11.1

Among the three infectious diseases concerned with NSI, Hep B has pre-exposure prophylaxis with 3 doses at 0,1,6 months. It is mandatory that every HCP dealing with potentially infectious substances need to be vaccinated against Hep B. Unfortunately, this does not happen. In our study, only 43.1% of the HCPs were completely vaccinated with 3 doses against Hep B. 34.7% of the providers had incomplete vaccination status and 22.2% were unaware of the status. If the HCP is completely vaccinated and the anti-HBS titre is more than 10mIU/ml, then the HCP is completely safe.

**Table 7: Vaccination status of the HCP**

Vaccination status	Frequency	Percentage
Completely vaccinated	31(25+6)	43.1
Incomplete vaccination	25	34.7
Unknown	16	22.2

## DISCUSSION

The worldwide estimate of NSI is quite alarming. There are several studies conducted across the globe estimating the prevalence of NSI. A study conducted in Saudi Arabia, a middle eastern country, showed the prevalence is as high as 74% [7]. Other studies conducted in Pakistan showed prevalence of 54.2% [8]. Most of the cases are not reported. The study conducted in our hospital revealed an incidence of 5.8. Majority of the incidents occurred in wards followed by operation theatre and ICU. A study conducted in New Delhi, the capital city of India, in 2017 reported that around 48% of NSI was reported from ED and ICUs [9].

Occupational health hazard due to NSI is on the rise. The study conducted in our hospital showed that of the cases were reported from wards. This finding was consistent to other studies conducted in South India were 75% of the cases occurred in wards [10][11]. The device causing NSI can be intravenous or intraarterial cannula, syringe, surgical blade, suture or any sharp objects. Our study revealed biomedical waste segregation as the most common reason of NSI, followed by sampling. Sampling is done using syringe and needle. This is in consistent with many studies where syringe needle was reported to be the major device leading to NSI [11]. Several studies show that the incident occur during sharp disposal. In our study, only 87.5%

were using glove during the time of NSI. Only 12.5% were without glove. This was of concern since every HCP is instructed to use glove while handling with potential infectious blood and body fluids. In a study conducted in new Delhi, 39% of the HCP were not using glove during the incident [12].

Another major factor is under-reporting of the incidents. As per the study conducted in new Delhi, 85% of the NSIs were not reported, with doctors being the major category [12]. Another study which was done in Iran showed that only 18% of NSIs were reported [13]. Though we have not analysed the percentage of reported and unreported incidents, the total frequency seemed to be less when compared to the strength of the hospital. There still exists a wide gap in reporting of the incidents worldwide which needs to be bridged.

Prevention being always better than cure, the HCP need to be aware of the health hazard. The major steps required are training, use of safe practices, dedicated Hospital Infection Control Committee (HICC) and establishing stringent protocol. HICC should have strict surveillance and conduct frequent training activities regarding awareness and use of safe practices. Strengthening and educating regarding NSI, awareness and safety measures is important. Effective short training sessions and proper supervision by the HICC can help in minimizing the incidence as well as improving the reporting of cases. Out of the total 72 cases, 66 were females (91.7%), which is consistent with various studies [14] but a study conducted in New Delhi showed male preponderance [12]. This gender distribution may not be accurate owing to the difference in distribution among various HCP categories. In our study, among the categories of HCP, the maximum cases were staff nurses (31.9%), which is consistent with most of the studies across the world [14][15]. This can be attributed to the roles nurses perform in majority of the patient areas. Nurses deal with sampling and administering medications in all the areas of the hospital.

Only 43.1% of the HCP was completely vaccinated. Out of this, 80.6% were doctors. This stressed the importance of checking vaccination status of all employees working in patient areas during pre-employment check. Ideally, every HCP needs to be completely vaccinated against Hep B with a titre of more than 10mIU/ml. 59.7% of the HCP's did immediate first aid measure by immediately washing the wound with soap and water, as per the recommendations. Many of the Indian studies show that the immediate first step is often not done. The study conducted in a similar tertiary care teaching hospital in New Delhi showed only 7.1% of the HCPs did this step [12]. The importance of regular training and surveillance is the key factor. The HICC plays a crucial role in education. Every HCP including the house-keeping and general duty assistants should undergo proper training in standard infection control measures and the immediate steps need to be done following an incident.

## CONCLUSION

Prevention is always better than cure. Prevention of NSI by proper training, education and monitoring is very important and remains the key factor. This study helps in further strengthening of the training activities and encourage the administration to ensure proper pre-employment check of every employee. Complete vaccination against Hep B adds on to the safety of the workers. Proper infection control measures against NSI need to be implemented in the wards where majority of the incidents occurred in our hospital. Specific information and training regarding wearing glove, using syringe,



avoid recapping and safe disposal of sharps need to be emphasized. Focused training on NSI, preventive measures and first aid after an event need to be educated to all HCPs working in a hospital and dealing with blood and potentially infective body fluids.

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