

# NEEDLE STICK INJURIES AMONG HEALTH CARE WORKERS IN TERTIARY CARE HOSPITAL OF RURAL INDIA

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## ABSTRACT

**Background:** Health-care workers are at increased risk of infection with blood borne pathogens because of occupational exposure to blood and other body fluids. Needle stick injuries (NSIs) are major cause of blood borne infections transmitted among health care personnel. More than 90% of these infections occur in developing countries but most of these NSIs remain unreported. It is also found that 37.6% of Hepatitis B, 39% of Hepatitis C and 4.4% of HIV/AIDS in Health-Care Workers (HCWs) around the world are due to needle stick injuries.

**Aims & Objective:** (1) To determine prevalence of needle stick injuries among health care workers. (2) To study circumstances under which they occur among health care workers in tertiary care hospital of Rural India.

**Material and Methods:** A cross-sectional study was conducted among HCWs of rural tertiary care medical college and hospital. A total of 220 health care workers were included in the study. A self-designed, semi-structured questionnaire was used to collect data from the participants.

**Results:** A total 130 (59.09%) HCWs reported having occupational exposure to blood and body fluid in last one year, out of these 108 (49.09%) had NSIs and 22 (10%) had history of splash of blood and body fluid. Maximum exposure of NSIs was found among nurses (50%), followed by resident doctors (25.93%).

**Conclusion:** NSIs were common occurrence among health care workers and they are grossly underreported.

**Key-Words:** Needle Stick Injury; Health Care Worker; Rural India; Occupational Exposure

## Introduction

Health-care workers are at increased risk of infection with blood borne pathogens because of occupational exposure to blood and other body fluids. Needle stick injuries (NSIs) are major cause of blood borne infections transmitted among health care personnel. These preventable injuries expose workers to over different blood borne pathogens<sup>[1]</sup> and the most common being Hepatitis B, Hepatitis C and HIV<sup>[2]</sup>. Most exposures among health-care workers are caused by percutaneous injuries with sharp objects contaminated with blood or body fluids. These sharps include needles, scalpels, lancets and broken glass.

According to World Health Report 2002, of the 35 million health-care workers, 2 million experiences percutaneous exposure to infectious diseases each year. More than 90% of these infections occur in developing countries but most of these NSIs remain unreported. It is also found that 37.6% of Hepatitis B, 39% of Hepatitis C and 4.4% of HIV/AIDS in Health-Care Workers around the world are due to needle stick injuries.<sup>[3]</sup>

The occupational risk of needle stick injuries not only affects the quality of health care delivered but also the safety and well-being of the providers. The health care

workers in operating, delivery and emergency rooms have enhanced risk of exposure and they experiences significant fear, anxiety and emotional distress, which may result in occupational and behaviour changes.<sup>[4]</sup> As it is one of the important occupational hazards in medical community, and despite its serious consequences, it may remain neglected and most of them under-reported. These needle stick injuries among health care workers are preventable through implementation of strict universal precaution methods, immunization against Hepatitis B, provision of personal protective measures and the management of exposures. In India, the data about occupational exposure to needle stick injuries is scarce.

Therefore, the present study has been planned to determine prevalence of needle stick injuries and circumstances under which they occur among health care workers in tertiary care hospital of rural India.

## Materials and Methods

The present study was carried out among the health care workers working at Rural Government Medical College and Hospital. It was conducted during December 1, 2011 to January 31, 2012. A cross sectional study design was adopted. The participants were resident doctors, interns, staff nurses and laboratory technicians.

As per the data available with the hospital record department, there were 90 resident doctors, 50 interns, 120 staff nurses and 25 laboratory technicians in the institution under the study. Those health care workers who were absent or not willing to give consent were excluded from the study. Total 220 health care workers were included in the study.

Data was collected with help of predesigned & pretested questionnaire by simple interview technique specifically to identify predictive factors associated with needle stick injuries. Questionnaire was designed to obtain information regarding incident of needle stick injuries occurred during last 1 year, circumstances leading to such exposure, type of device that caused the injury, what they did after the exposure?, notification to concerned authority, lab investigations and about post exposure prophylaxis. Information also collected about the work experience of health care worker and hepatitis B vaccination status.

Data was analysed using percentage, proportions and chi-square test.

Informed consent was taken from each respondent before conducting the interview. Ethical approval was taken from the institutional ethical committee.

**Case definition of NSIs:** In present study NSIs defined as injuries/prick with a needle or other sharp object during use of that object for patient care in last one year.

## Results

A total of 220 HCWs participated in the study, including resident doctors 70 (31.82%), interns 40 (18.18%), staff nurses 90 (40.91%) and laboratory technicians 20 (9.09%) giving overall response rate of 77.19% (Table 1). A total 130 HCWs reported having occupational exposure to the blood and body fluid in last one year. Of these 108 (83.07%) had a history of NSIs and 22(16.93%) HCWs had a history about splash of blood and body fluid.

Among the HCWs with needle stick injuries, staff nurses had highest percentage 54 (50.00%), followed by resident doctors 28 (25.93%) and interns 22(20.37%) and lastly the laboratory Technician (3.70%) (Table 2). Participants were also enquired about the notification of the injury to the concerned authority and Hepatitis B vaccination status. A much larger proportion of residents and interns (85.71% and 76.92% respectively) notified the occurrence of occupational exposure as compared to staff nurses (31.25%) reporting the incidence to the concerned

authority. This difference was statistically significant ( $p < 0.001$ ) (Table 3). Also, the larger proportion of resident doctors & interns are vaccinated with Hepatitis B vaccine as compare to staff nurses and laboratory technician. This difference was statistically significant ( $p < 0.001$ ) (Table 4).

**Table-1:** Distribution of Health Care Workers in Study

Category of HCWs	Total HCWs	Participants	Response Rate (%)
Residents	90	70	77.77
Interns	50	40	80.00
Staff nurses	120	90	75.00
Technicians	25	20	80.00
<b>Total</b>	<b>285</b>	<b>220</b>	<b>77.19</b>

**Table-2:** Distribution of Occupational Exposure among Health Care Workers

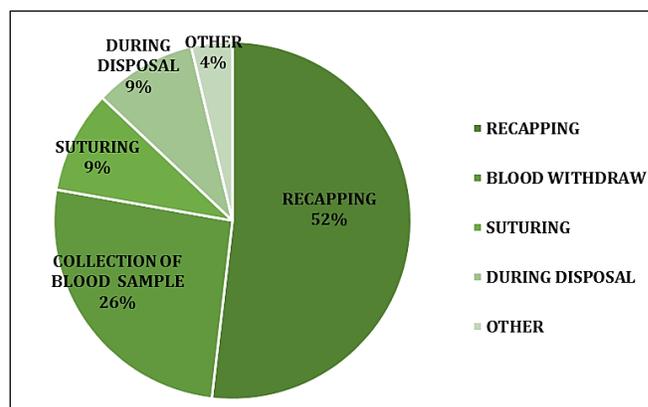
Category of HCWs	Needle Stick Injuries (NSIs)	Splash of Blood and Body Fluid	Total (%)
Residents	28	07	35 (26.92)
Interns	22	04	26 (20)
Staff nurses	54	10	64 (49.23)
Technicians	04	01	05 (3.85)
<b>Total</b>	<b>108 (83.07%)</b>	<b>22 (16.93%)</b>	<b>130 (100)</b>

**Table-3:** Distribution of NSIs Notification to Concerned Authority after Accidental Exposure

Category of HCWs	Notified to Concerned Authority (%)	Not Notified to Concerned Authority (%)	Total (%)
Residents	30 (85.71)	05 (14.29)	35 (100)
Interns	20 (76.92)	06 (23.08)	26 (100)
Staff nurses	20 (31.25)	44 (68.75)	64 (100)
Technicians	00	05 (100)	05 (100)
<b>Total</b>	<b>70 (53.85)</b>	<b>60 (46.15)</b>	<b>130 (100)</b>

**Table-4:** Distribution of Hepatitis B Vaccination among the HCWs

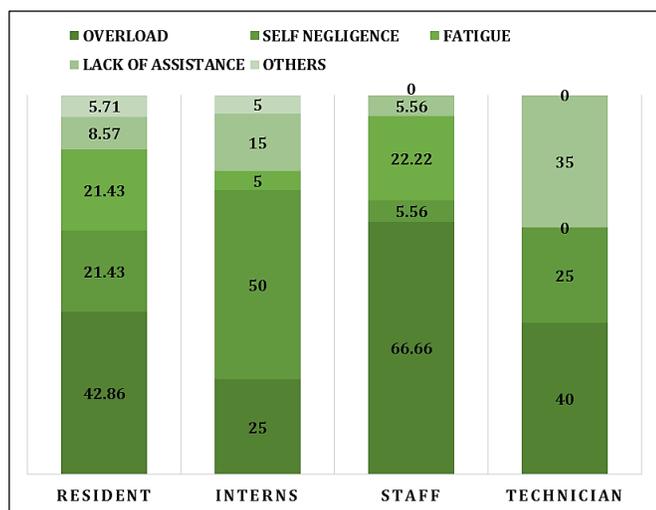
Category of HCWs	Vaccinated with Hepatitis B	Not Vaccinated with Hepatitis B	Total (%)
Residents	66	04	70 (31.82)
Interns	30	10	40 (18.18)
Staff nurses	40	50	90 (40.91)
Technicians	08	12	20 (9.09)
<b>Total</b>	<b>144 (65.45%)</b>	<b>76 (34.55%)</b>	<b>220 (100)</b>



**Figure-1:** Procedures during which NSIs occurred among Health Care Workers

Procedure wise distribution of occupational exposure to blood and the body fluid is as shown in the figure 1. Overall, the recapping of needle was the most common procedure among the health care workers responsible for the occupational exposure; followed by collection of the blood sample; suturing and injury during the disposal.

Majority of needle stick injuries were from the hollow bore type needle followed by solid bore needle and these injuries were commonly occurred in ward (70 %) and followed by emergency room (20%) and remaining in operating rooms. Figure 2 shows various risk factors responsible for the needle stick injuries among the health care workers. According staff nurses and resident doctors, work overload was major risk factor for such injuries, while most of the interns think that self-negligence responsible for majority of injuries.



**Figure-2:** Distribution of Risk Factors Responsible for NSIs among the HCWs

## Discussion

The present study revealed certain aspect of needle stick injuries in rural tertiary care hospital. A total of 220 health care workers participated in the study, similar types of studies were also carried out at other hospitals.<sup>[5-9]</sup> The analysis of needle stick injury data showed that incident of needle stick injuries was highest among the staff nurses as compared to other health care workers. Several other studies had also shown high occurrence of NSIs among nurses.<sup>[4-6,8,10,11]</sup> This may be attributed to patients overload in wards and different working conditions like administration of injection, venipuncture etc. Gerberding in 1991 stated that reason that increased vulnerability of injuries among nurses is due to the greater amount of time nurses spent in direct contact with patient.<sup>[12]</sup>

In the present study most of the events of NSIs occurred while recapping a needle (52%) and followed by blood collection procedures (26%) while 9% of injuries occurred during the disposal of needle. Several studies have shown recapping to be an important cause of NSIs.<sup>[5,6,8,13,14]</sup> The recapping of needles has been prohibited under the Occupation Safety and Health Administration (OSHA) blood-borne pathogen standard.<sup>[15]</sup>

A hollow bore needle was responsible for majority of needle stick injuries. The United States national surveillance system for health care workers identified six devices that are responsible for the majority of NSIs and other sharp related injuries, these are hypodermic needles (32%), suture needle (19%), winged steel needle (12%), scalpel blades, intravenous catheter stylets and phlebotomy needles (3%).<sup>[16]</sup>

In our study the most common places for exposure to NSIs were wards followed by emergency rooms. This is comparable to the data from the National Health Services in the Scotland where 53% injuries occurred in hospital wards, 16% occurred in operation theatre and 3% occurred in emergency rooms, also the study by Smith and Leggat found wards and bedside places were common sites for NSIs.<sup>[17,18]</sup> Patient overload and fatigue due to long hours of working was the commonest reason for causing the needle stick injury similar observations were also made by Sharma et al<sup>[4]</sup> and Norsayani et al<sup>[14]</sup>.

Also our study shows that rate of reporting of NSIs and immunization with Hepatitis B vaccine significantly higher among resident doctors and interns as compared to staff nurses, which indicates that need for awareness about Hepatitis B vaccination among the nurses. Study about the awareness and hepatitis B coverage also shows vaccination coverage more among doctors compared to nurses.<sup>[19-22]</sup>

## Conclusion

Overall the prevalence of NSIs among health care workers was 49.09%, out of which maximum among staff nurses (50%) and recapping was the most common procedure during which most of injuries occurred. Also our study concluded that patient overload and self-negligence was common factor responsible for causing such type of injuries. Such NSIs were common occurrence in medical community and were unreported. So there is need for development of effective surveillance system and use of preventive practices like vaccination with Hepatitis B, use of devices that decrease the risk of NSIs and establishing post exposure prophylaxis (PEP) centre which gives appropriate treatment, psychological support and counselling of affected HCWs.

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