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## Occupational Exposure to Needle Stick Injuries among Health Care Workers in a Teaching Hospital in Mangalore, Karnataka

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### Abstract

*Introduction:* Needle stick injuries (NSI) pose a significant occupational risk for transmission of blood borne diseases among health care workers. As a result, these workers are at much higher risk of occupational acquisition of blood borne diseases like HIV, hepatitis B and C. Further, needle stick injuries are often under reported. In USA 6,00,000 to 10,00,000 health care workers receive NSIs from conventional needles and sharps every year, while in UK it is 1,00,000 HCWs/year. In India, authentic data on NSI is not available. It is known that around 3-6 billion injections are given per year, of which 2/3rd injections are unsafe (62.9%) and the use of glass syringe is constantly associated with higher degree of un-safety. The average percutaneous transmission rates for hepatitis B (HBV) and C (HCV) are 33.3 (6-33%) and 3.3 per cent (1-10%), respectively, while the sero-conversion risk for HIV is 0.31 percent. Therefore, preventing NSI is an essential part of any blood borne pathogens prevention programme in the work place. The present study was undertaken to determine the incidence of NSI among various categories of health care workers (HCWs), the causal factors, the circumstances under which these occur in order to make necessary recommendations to prevent NSIs. *Material and Methods:* The study group comprised of 378 HCWs of various categories in present teaching hospital in Mangalore. Available records for last three years (2013-2015) were analysed specifically to identify various factors associated with NSIs. *Results:* A total of 378 HCWs were included in the study comprising of 49 resident doctors, 98 interns, 195 staff nurses and 36 technicians. During the period of study, a total of 96 cases of NSI were reported with an overall incidence of 25.39%. Recapping of needle was the most common procedure among the health care workers

responsible for 55 (57.29%) of the occupational exposure. Highest incidence of NSI was found among nurses i.e. 41.66% while the technician had lowest incidence i.e. 08.33%. Hepatitis B vaccination status was found to be highest among residents i.e. 77.55%, while it was lowest 54.87% among staff nurses. Wards were the most common site for NSIs i.e. 54.16%. *Conclusions:* Needle stick injuries comprise an important occupational hazard for HCWs. While no NSI can be regarded as 'could not have been prevented' it is practically not feasible to avoid their occurrence altogether. However, their incidence can be minimized to a large extent. It is recommended that every hospital should develop a multi-pronged strategy to deal with NSIs. Besides health promotion and regular training; there should be a surveillance mechanism in every hospital and also the facilities for prompt response and treatment of NSIs.

**Keywords:** Needle Stick Injuries (NSI); Hepatitis B; Occupational Exposure; Occupational Hazard.

### Introduction

Health-care workers (HCWs) are at increased risk of infection with blood borne pathogens because of occupational exposure to blood and other body fluids due to percutaneous injuries with needles and other sharp objects contaminated with blood or body fluids [1-2]. More than twenty diseases can be transmitted due to needle stick injuries including Hepatitis B, Hepatitis C and HIV. According to World Health Organisation (WHO), out of 35 million health-care workers, 2 million experience percutaneous exposure each year; accounting for 37.6% of Hepatitis B, 39% of Hepatitis C and 4.4% of HIV infections around the world [3]. More than 90% of these infections occur in developing countries while majority of them

remain unreported. The occupational risk of needle stick injuries not only affects the quality of health care but also the safety and well-being of the providers. The HCWs who are employed in Operation Theatres, Labour and emergency rooms have even higher risk of exposure causing significant fear, anxiety and emotional distress [4]. However, needle stick injuries are completely preventable by observing strict universal precautions, immunization against Hepatitis B, provision of personal protective measures and the prompt management of exposures. In India, the data about occupational exposure to needle stick injuries is scarce [5].

In the backdrop of above, the present study was planned to determine the incidence of needle stick/sharp injuries among HCWs and the circumstances under which these occurred so as to evaluate and further enhance preventive measures.

## Material and Methods

A record-based observational study was undertaken at a teaching hospital in Mangalore, Karnataka; to determine total number of reported needle stick/sharp/splash injuries among selected categories of HCWs and the circumstances under which these occurred during a period of past three years i.e. from 01 Jan 2013 to 31 . Available relevant records were retrieved from the hospital and subsequently analysed. However, the study had the limitation of non inclusion of unreported cases.

## Results

A total of 378 HCWs were included in the study comprising of 49(12.96 %) resident doctors, 98 (25.39 %) interns, 195(51.58%) staff nurses and 36 (9.52%) technicians (Table 1). During the period of study, a total of 96 cases of NSI were reported among the

selected HCWs leading an overall incidence of 25.39 %. Out of these; 40 NSIs were reported during 2013 ; 22 during 2014, while remaining 34 NSIs were reported during 2015.

Analysis of NSIs based on procedure revealed, that recapping of needle was the most common procedure among the health care workers responsible for 55(57.29%) of the occupational exposure; followed by collection of the blood sample 18(18.75%), suturing 14(14.58 %) while the disposal of sharps was responsible for remaining 09(9.37 %) cases Figure-1).

In the present study, out of the affected HCWs, the highest incidence of occupational injury was found among nurses i.e. 40(41.66%, followed by residents 16(16.66 %), interns 32(33.33%) and lastly the Technician 08 (08.33 %) (Table 2).

Hepatitis B vaccination status among the HCWs under study was found to be highest among residents 38(77.55%), followed by interns 68(69.38%), technicians 25(69.44%) while the vaccination status was found to be lowest 107(54.87%) among staff nurses (Table-3).

Wards were the most common site for NSIs i.e. 52(54.16%) followed by emergency room 14(14.58%), operating rooms 11(11.45 %) while remaining 19( 19.79%) NSIs accounted for the remaining cases (Figure-2).

Majority of needle stick injuries i.e. 69 (71.87 %) were from the hollow bore needle followed by solid bore needle 19 (19.79 %) while remaining injuries 08 (08.33%) were caused by other objects. (Figure-3)

As regards observance of personal protective measures, in the present study only 41(42.70%) of the health care workers were found to be using gloves at the time of injury. Further 63(65.62%) of the HCWs practiced hand hygiene i.e. washed their hands after NSI wound with soap and water while 81(84.37%) applied an antiseptic lotions/creams after hand wash. Out of 96 NSIs, 11 (11.45 %) HCWs

**Table 1:** Distribution of health care workers according to category (n=378)

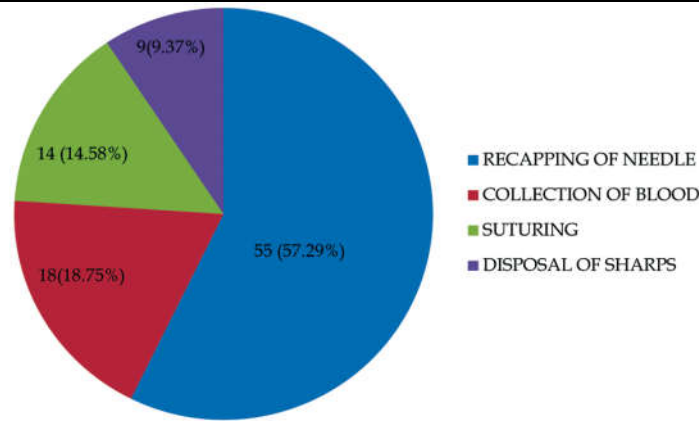
Category of HCWS	Total HCWS	Percentage (%)
Residents	49	12.96
Interns	98	25.39
Staff nurses	195	51.58
Technicians	36	09.52
Total	378	100

**Table 2:** Distribution of occupational exposure among health care workers (n=378)

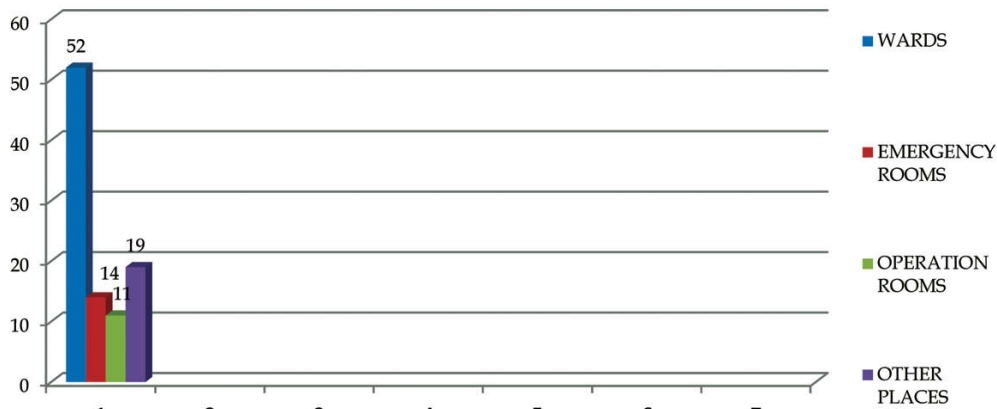
Category of HCWS	Total HCWS	NSIs	SPLASH	Total (%)
Residents	49	14	02	16(16.66%)
Interns	98	29	03	32(33.33%)
Staff nurses	195	35	05	40(41.66%)
Technicians	36	08	-	08(08.33%)
Total	378	86	10	96(100%)

**Table 3:** Status of hepatitis B vaccination among health care workers (n=378)

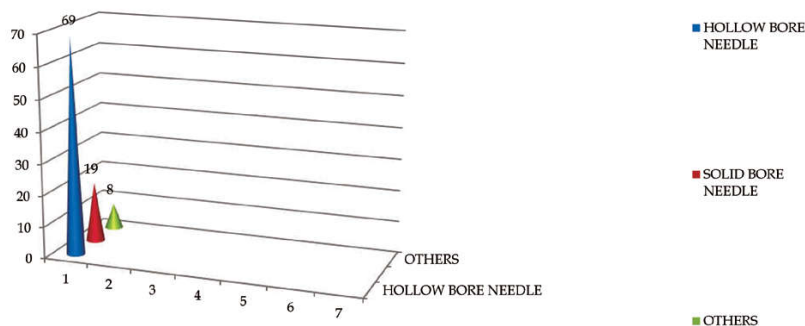
Category of HCWS	Total HCWS	Vaccinated	Not vaccinated
Residents	49	38 (77.55%)	11 (22.44%)
Interns	98	68(69.38%)	30 (30.61%)
Staff nurses	195	107(54.87%)	88(45.12%)
technicians	36	25(69.44%)	11(30.55%)
total	378	238 (62.96%)	140(37.03%)



**Fig. 1:** Analysis of nsis based on procedure



**Fig. 2:** Incidences of nsis according to site of injury (n=96)



**Fig. 3:** Incidences of nsis according to type of needle (n=96)

were placed on post exposure prophylaxis for HIV. In present study, work overload and self-negligence were found to be the major risk factors for NSIs among HCWs.

### Discussion

Health Care Workers are at increased risk of contracting blood borne infections due to their

occupational exposure to blood and other body fluids. The present study was undertaken to assess the proportion of needle stick injuries among HCWs in a tertiary care hospital. A total of 378 health care workers were included in the study. The analysis of data on NSIs revealed that the staff nurses were most vulnerable to NSIs and sustained nearly two times more injuries as compared to any other category of HCWs. Several other studies have also shown high occurrence of NSIs among nurses [6-11]. This may be directly attributed to work overload in wards and shortage of staff which multiplies their patient load [12]. Ramos-Gomez F et al 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 [13].

Recapping was responsible for most of the injuries 55(57.57%), followed by collection of the blood sample (18.75%) while suturing accounted for 14 (14.58%) of the case. Several studies have shown recapping to be an important cause of NSIs [14-18]. However, recapping of needles has been prohibited under the Occupation Safety and Health Administration (OSHA) blood-borne pathogen standard [19].

The hollow bore needles were responsible for majority 69 (71.87 %) of needle stick injuries. Similar observations have also been made by many researchers in their studies [16]. The United States national surveillance system for health care workers has identified six important devices that are responsible for the majority of NSIs and other sharp related injuries and these are hypodermic needles (32%), suture needle (19%), winged steel needle (12%), scalpel blades, intravenous catheter stylets and phlebotomy needles (3%) [20].

In the present study wards were the most common site for NSIs 52 (54.16%) followed by emergency room 14(14.58 %). Similar findings have also been reported by the National Health Services in the Scotland where 53% injuries occurred in hospital wards, while 16% and 3% occurred in operation theatre and in emergency rooms respectively [21-22]. In our study work overload and self negligence were the major risk factor for NSIs among HCWs. Similar observations were also made by Sharma et al and Norsayani et al [10,17].

The study revealed poor observance of personal protective measures i.e. only 41(42.70%) of the health care workers were found to be using gloves at the time of injury. Further only 63(65.62%) of the HCWs washed their hands after NSI wound while 81(84.37%) applied an antiseptic lotions. Rambha Pathak et al in their study at Mullana. also reported

a low observance of PPE by interns (45%), junior residents (42%), staff nurses (71%), student nurses (60%) and laboratory technicians(62%)[23].

In present study immunization status with Hepatitis B vaccine was found to be significantly higher among resident doctors and interns as compared to staff nurses, This shows the requirement of awareness about Hepatitis B vaccination among the nurses [24-27].

## Conclusion

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. While no NSI can be regarded as 'could not have been prevented' it is practically not feasible to avoid their occurrence altogether. However, their incidence can be minimized to a large extent. It is recommended that every hospital should develop a multi-pronged strategy to deal with NSIs. Besides health promotion and regular training; there should be a surveillance mechanism in every hospital and also the facilities for prompt response and treatment of NSIs. Issues requiring attention include use of safety engineered devices (SED), recording and reporting of incidents, training of all HCWs in handling and disposal of sharps, establishing a staff student health service and inculcating a responsible attitude among HCWs.

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