

NEEDLESTICK INJURY AMONG HEALTHCARE WORKERS IN A TERTIARY CARE HOSPITAL, KERALA

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ABSTRACT

BACKGROUND

Needlestick Injury (NSI) is a major occupational health and safety issue among Healthcare Workers (HCWs). In India, incidence of NSI is high, but surveillance is poor with scarce authentic data.

The aim of the study is to determine the occurrence of NSI, its associated factors and assessment of knowledge and practice of preventive measures and post exposure prophylaxis among HCWs in a tertiary care hospital in Kerala.

MATERIALS AND METHODS

A cross-sectional study was conducted among 515 HCWs who included doctors, house surgeons, final year medical students, nurses, student nurses and lab technicians of a government sector tertiary care hospital in Kerala. All HCWs of the institution present during the study time were included and only those unwilling to participate excluded. Ethical clearance and administrative permission was obtained along with informed consent from subjects after ensuring confidentiality. Content validated, structured questionnaire consisting of questions regarding demographic data, incidence and prevalence of needlestick injury, circumstances leading to it, response of subjects to NSI and knowledge of study subjects on post exposure prophylaxis was administered to the study subjects. The technique of data collection was self-reporting by the study subjects. Data collected was analysed using statistical software Epi Info 7.

RESULTS

Overall, 55.7% HCWs had sustained at least one NSI in this hospital, while 35% of them had a NSI during the current year. NSIs were sustained during blood withdrawal (34%), injections (20.5%), suturing (20.2%) and cannula insertion (12%). Recapping the needle (26%) was the most frequent cause followed by collision with others (24%), manipulation of needle in patient (23%) and during/in transit to disposal (10%). Majority (84%) did not report the incident, 8.4% underwent post exposure follow up, 82% of the HCWs were fully hepatitis B vaccinated, 44% had received training, 62% used gloves, 49% recapped needles and 55% followed proper sharp disposal. Significant association was found between NSI and male gender ($p < 0.001$), designation ($p < 0.001$) and years of experience ($p < 0.05$) with interns and those with less than one year's experience at greater risk.

CONCLUSION

The study warns significant workplace risk for the HCWs and calls for proactive interventions along with constant surveillance. In the light of the present study findings, it is evident that NSI poses a significant risk in a HCWs' workplace. The risk is higher when we consider the lack of adequate personal protective equipment, standard protocol and proper reporting authority, which is compounded by inadequate training and experience, lack of awareness and negligence of safety conscious behaviour of HCWs.

KEYWORDS

Healthcare Workers, Needlestick Injury, Kerala.

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BACKGROUND

Needlestick Injury (NSI) has been defined as a percutaneous piercing wound by a needle point or other sharp instrument contaminated with blood or body fluids.¹ Percutaneous injuries caused by needlesticks pose a significant occupational risk of transmission of blood-borne pathogens. The fraction of infections with HCV, HBV and HIV in HCWs attributable to occupational exposure to percutaneous injuries reaches 39%, 37% and 4.4%, respectively.¹ EPI net data reports a rate of 20.73 NSIs per 100 occupied beds in

teaching hospitals and 16.51 NSIs per 100 occupied beds in non-teaching hospitals.¹ There are few reports on NSIs from India, and with limited data, it is not possible to estimate an annual incidence.

In developed countries, with rules and standard policies and protocols in the work place to address this problem, the risk of a NSI and subsequent infection is relatively reduced. However, in a developing country like India where many of the hospitals are overcrowded, understaffed and infrastructure less than desirable, the risk is more. Improper methods of sharp disposal also contribute to the risk of a NSI.² Moreover, with many HCWs working without following proper universal precautions and a large number of them not being fully vaccinated against a preventable infection like HBV, the risk of a NSI and possibility of a subsequent infection increases. Inadequate surveillance along with absence of proper reporting, post exposure treatment and follow up places, the HCW at high risk for occupational health hazards.² Authentic data on this regard from our settings is scarce and is needed to plan and implement appropriate preventive measures.

The study aimed at determining the occurrence of NSI, its associated factors, the HCWs who are at more risk, the circumstances during which they occurred, the action taken by HCWs who sustained a NSI, the proportion of HCWs who reported a NSI, and the knowledge and compliance of HCWs to post exposure prophylaxis and preventive measures for NSIs.

Objectives

1. To determine the proportion of healthcare workers who sustained a Needlestick Injury (NSI) in a Government Sector Tertiary Care Hospital, Kerala.
2. To identify the associated factors in needlestick injuries in this study setting.
3. To assess the knowledge and practice of preventive measures and post exposure prophylaxis for NSIs among study subjects.

MATERIALS AND METHODS

A cross-sectional study was conducted among 515 HCWs who included doctors, house surgeons, final year medical students, nurses, student nurses and lab technicians of a government sector tertiary care hospital in Kerala. All HCWs of the institution present during the study time were included and only those unwilling to participate excluded. Ethical clearance and administrative permission was obtained along with informed consent from subjects after ensuring confidentiality. Content validated, structured questionnaire consisting of questions regarding demographic data, incidence and prevalence of needlestick injury, circumstances leading to it, response of subjects to NSI and knowledge of study subjects on post exposure prophylaxis was administered to the study subjects. The technique of data collection was self-reporting by the study subjects. Data collected was analysed using Statistical Software Epi Info 7.

RESULTS

A total of 515 healthcare workers participated in the study, of which 72.4% were females. The mean age of the participants was 26.87 and standard deviation 7.70, ranging from 18 to 58 years. In the study sample, there were 125 (24.27%) nursing students, 108 (20.9%) junior residents, 94 (18.25%) staff nurses, 68 (13.2%) house surgeons, 50 (9.7%) UG medical students, 37 (7.1%) senior doctors, 22 (2.1%) laboratory staff and 11 (2.1%) others.

Out of the 515 subjects, 287 (55.7%) HCWs had sustained at least one NSI in this hospital and 179 (35%) respondents had sustained a NSI in the preceding year. Among the NSIs, which occurred during the preceding year, 25.1% NSIs were sustained by house surgeons followed by 23.5% NSIs among nursing students, 20.6% NSIs among junior residents and 17.4% NSIs among staff nurses. No NSIs were reported among laboratory staff.

Variable	Characteristic	Frequency	Percentage
Place of occurrence of NSI	Casualty	101	35
	Ward	160	56
	Operation theatre	8	3
	ICU	2	0.5
	Laboratory	0	0
	Others	16	5.5
	Total	287	100
Department of occurrence of NSI	Medicine	118	41.1
	Surgery	77	26.8
	Gynaecology	25	8.7
	Paediatrics	9	3.1
	Others	58	20.3
	Total	287	100

Table 1. Frequency Distribution of Place of Occurrence of NSI

Maximum number of NSIs, 160 (56%) were sustained in the ward followed by 101 (35%) in the casualty. 118 (41%) NSIs were sustained in the medicine department followed by 77 (27%) in surgery and 25 (9%) in Gynaecology.

Activity	Frequency	Percent
Blood withdrawal	98	34
Injection	59	20.5
Cannula insertion	34	11.8
Suturing	58	20.2
Fluid tapping	6	2
Others	32	11
Total	287	100

Table 2. Frequency Distribution of Activity at which NSI Occurred

Cause	Frequency	Percent
Recapping	75	26.1
Manipulation of needle in patient	67	23.3
Bending after use	7	2.4
Patient aggressiveness	18	6.5
Collision with colleague/others	69	24
Improper sharp disposal	8	2.8
During/in transit to disposal	29	10.1
Others	14	4.8
Total	287	100

Table 3. Frequency Distribution of Cause of NSI

NSIs frequently occurred during rush hours (73%), with 48% during morning shift, 30% during afternoon and rest 22% during night shift. Hollow needle was involved in 64% of injuries and 80% of them were wearing gloves at the time of injury.

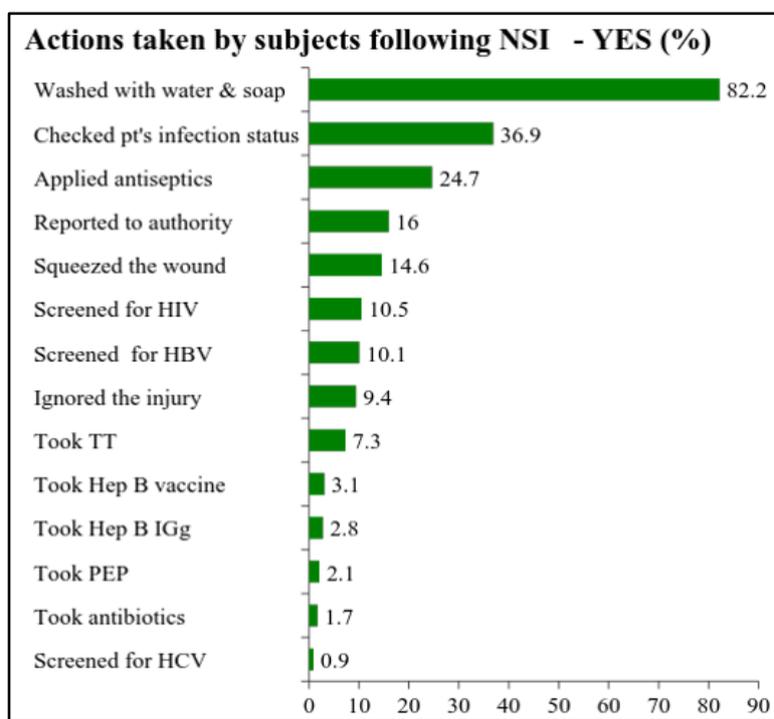


Figure 1. Post Exposure Measures taken by HCWs

Study showed that 82% of the respondents who sustained NSI washed the wound with soap and water which is the proper first aid for a NSI. Only 37% of the respondents who sustained NSI checked the patient’s infection status and 10.5 % of the respondents screened themselves for HIV and 10.1% for HBV infection. The study found out that 9.4% of respondents ignored the injury.

Majority of respondents (84%) who sustained NSI did not report the incident to any authority. Only 7.4% reported the incident to medicine duty MO, 2.8% to the ART nodal officer and 2.4% to the HOD of the respective departments. The most common reasons for not reporting were low-risk incident (47.5%), lack of time (17.11%) and ignorance about how and where to report (11.7%). Out of 241 respondents who did not report NSI 54 respondents (22%) did not give any reason for not reporting. None of the respondents were

aware of the role of hospital infection control committee. No training or surveillance activities were conducted by infection control committee in the recent past.

Regarding infection status of source patients, among the 36.9% of NSIs in which screening was done, 5 (2.1%) were HIV positive and 13 (4.6%) were HBV positive with none positive for HCV. Only 8.4% of the respondents who sustained NSI performed a 6 month follow up.

Among the 515 respondents, 82% were fully vaccinated against hepatitis B, 13% had taken incomplete course and 5% were unvaccinated. Only 44% of respondents had received training on prevention of NSI.

Regarding practice of precautions, 62% of respondents had the habit of wearing gloves while handling needles. Alarmingly, the practice of recapping and bending needle after use was found among 51% and 11% of HCWs.

Variable	Characteristics	NSI sustained Frequency %	NSI Not sustained Frequency %	Total	χ^2 -value	p-value
Gender	Male	98 68.3	46 31.7	144	12.555	0.000
	Female	189 50.9	182 49.1	371		
	Total	287	228	515		
Experience in years	<1	97 40.9	140 59.1	237	9.713	0.021
	1-5	51 37.9	86 62.1	137		
	5-10	17 24.3	57 75.7	74		
	>10	14 19.4	53 80.6	67		
	Total	179	336	515		
Designation	Senior doctor	13 42.9	24 57.1	37	47.537	0.000
	Junior resident	37 37.4	71 62.6	108		
	House surgeon	45 74.6	23 25.4	68		
	UG med. students	11 24.4	39 75.6	50		
	Staff nurse	31 35.3	63 64.7	94		
	Nursing students	42 36.4	83 63.6	125		
	Laboratory staff	0 0	22 100	22		
	Others	0 0	11 100	11		
	Total	179	336	515		

Table 4. Determinants of Needlestick Injury among Healthcare Workers

DISCUSSION

Although, the proportion of HCWs who had ever sustained a NSI (55.7%) obtained in our study is alarming, the rates are comparatively lower than similar Indian studies. In a study conducted by Muralidhar et al among various tertiary care hospitals in New Delhi, 80% of respondents sustained NSI.³ According to a study done by Sharma et al in a tertiary care hospital in Delhi, 79.5% of HCWs reported having had one or more NSIs in their career.⁴ Ashat et al conducted a study among 107 HCWs providing medical care in two government tertiary level hospitals of Chandigarh, India, and found the prevalence of needlestick injury to be 68.2%.⁵ In this study, 35% respondents had sustained a NSI in the preceding year. According to a study conducted by Tetali et al on NSI among healthcare professionals in three tertiary care hospitals in Kerala in 2004, 74.5% of the respondents were exposed at least once in the previous year.⁶ The study conducted by Amira et al showed 24.5% staff to have suffered NSI in the last 12 months and 40.2% in their entire working career.⁷ Another study by Joardar G.K. et al on a sample of 228 nurses in two medical college hospitals of West Bengal showed that 61.4% of them sustained at least one NSI in last 12 months.⁸

In a multicentric study conducted by Chakravarthy et al, the incidence of NSIs was the highest among nurses (55%).⁹ In the study conducted by Mehta et al, 45% NSIs were sustained by nurses.¹⁰ Study by Chakravarthy et al found patient's room followed by operation theatre to be common locations.⁹ Maximum accidents occurred during emergency care (30.1%) according to the study by Ashat et al.⁵ The present study shows that maximum number of NSIs, i.e. 34% NSIs were sustained during blood withdrawal followed by 20.5% NSIs during injections. The commonest clinical activity to cause the NSI in study by Chakravarthy et al was blood withdrawal (55%).⁹ Tetali et al found injection needles responsible for 68% NSIs.⁶ Study finding indicates recapping of needle (26%) as the main cause. Similar findings are reported by Amira et al (45%),⁷ Sharma et al (34.0%)⁴ and Jayanth et al (8.5%).¹¹

In the current study, majority of respondents (84%) who sustained NSI did not report the incident to any authority. In a study by Amira et al, only 37% respondents reported their NSI.⁷ In another study by Sharma et al only about one in four (27.5%) of the HCWs reported their injury to a supervisor or senior.⁴ Only 50% of the affected individuals reported the occurrence to concerned hospital authorities in the study by Singru et al.¹²

The current study found 82% of respondents were fully vaccinated against hepatitis B, 13% had taken incomplete course and 5% were unvaccinated. Similarly in a study by Tetali et al, 90% subjects were immunised against hepatitis B.⁶ However, the study by Sukriti et al shows that only 55.4% of the 2162 HCWs screened had been vaccinated and 44.6% were not vaccination-status conscious; of these HCWs, 27.7% had never been vaccinated and 16.4% were unaware of their vaccination status. Protective (>10 IU/mL) anti-hepatitis B surface (anti-HBs) antigen titers were seen in only 61.7%.¹³

All HCWs should be given training on prevention, first aid and management of NSI along with training on proper disposal of biomedical wastes and universal precautions. Posters and other audio-visual aids should be kept in prominent places to increase awareness and to serve as a reminder for the HCW. As incidence of NSI was highest among house surgeons and nursing students, training must be made mandatory and given during orientation before they enter professional practice and should be included in their curriculum. HCWs should be discouraged from recapping by providing adequate equipment like needle destroyers and adequate disposal facilities like nonporous sharp disposal containers with biohazard label or by alternative syringes that allow safe recapping. In cases where this is not available, they should be encouraged to adopt the one hand recapping method, which is relatively less risky than the two-hand method. The housekeeping staff who in the course of their work are exposed to hazardous biomedical wastes and contaminated devices must be given training and provided with protective equipment. A standard protocol to be followed in the event

of a NSI should be designed and the HCWs in the institution must be made aware of it. All incidences of NSI along with its follow up must be monitored regularly by an institutional surveillance system. Appropriate interventions at all stages of follow up must be done. The role of Hospital Infection Control Committee in surveillance activities, training of health workers, implementation and monitoring of preventive activities should be strengthened.

CONCLUSION

In light of the present study findings, it is evident that NSI poses a significant risk in a HCWs' workplace. The risk is higher when we consider the lack of adequate personal protective equipment, standard protocol and proper reporting authority, which is compounded by inadequate training and experience, lack of awareness and negligence of safety conscious behaviour of HCWs. Thus, the situation requires proactive intervention and active surveillance.

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