

Original Article

EPIDEMIOLOGY OF NEEDLE STICKS INJURIES AMONG THE HEALTH CARE WORKERS OF A RURAL TERTIARY CARE HOSPITAL -A CROSSSECTIONAL STUDY

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ABSTRACT

Background: Health care workers are entitled to safe working conditions and the organizations have the responsibility to provide the same for their employees (HCW). In this direction the epidemiological data on sharps injury events, becomes an essential pre-requisite.

Objectives: 1) To study the prevalence and associated factors of Needle Stick Injuries (NSI) among the health care workers of our hospital. 2) To assess the level of awareness of the health care workers regarding NSI.

Materials and methods: A cross-sectional study was conducted and data was collected using a anonymous pre-tested structured questionnaire among the respondents (441) of the health care workers of a tertiary care rural hospital. Statistical analysis was done using chi square test in Open Epi version 2.

Results: About 57% (252 out of 441) of the Health Care Workers (HCW) had at least one episode of NSI in the preceding 12 months .Majority were Nurses (81%).The commonest devices involved was suturing needle (41%) and hypodermic needles (44%).Majority of the NSI (46 %) occurred during use of needle on the patient. About (85%) of the HCW didn't report the injury. Hepatitis B vaccination rate was very low among HCW other than doctors. Doctors had better knowledge on all counts compared to other categories of HCW. A majority of the HCW (92%) were not aware of the reporting system existing in their hospital.

Conclusions: The present study showed a high occurrence of NSI in HCWs especially among nurses followed by doctors and a high rate of ignorance and apathy among other categories. These issues need to be addressed, through appropriate education and other interventional strategies by the hospital infection control committee.

Keywords: NSI (needle stick injuries), HCW (Health care workers), awareness, PEP (post exposure prophylaxis)

INTRODUCTION

Needle stick injuries (NSI) are wounds caused by sharps such as hypodermic needles, blood

collection needles, IV cannulas or needles used to connect parts of IV delivery systems. The causes include various factors like type and design of needle, recapping activity,

handling/transferring specimens, collision between HCWs or sharps, during clean-up, manipulating needles in patient line related work, passing/handling devices or failure to dispose of the needle in puncture proof containers.¹

Because of the environment in which they work, HCWs are vulnerable for NSI and carry very high risk for occupational transmission of blood borne pathogens. The most important of these pathogens are Hepatitis B, C, and HIV. The CDC estimates that each year 385,000 needle sticks and other sharps-related injuries are sustained by hospital-based healthcare personnel; an average of 1,000 sharps injuries per day.² EpiNet data on Sharp-Object Injury and Blood and Body Fluid Exposure Reports a rate of 20.1 needles stick injuries per 100 beds in teaching hospitals.³ There are few reports on NSIs from India,^{4,5,6,7} and with limited data, it is not possible to estimate an annual incidence.

The situation is worsened by gross under-reporting of such injuries among the HCW. Surveys of healthcare personnel indicate that 50% or more do not report their occupational percutaneous injuries.⁸⁻¹⁴ In addition, the emotional impact of a needle stick injury can be severe and long lasting, even when a serious infection is not transmitted. This impact is particularly severe when the injury involves exposure to HIV.

NSIs can be regarded as preventable if a needle was used unnecessarily; a safer work practice could have prevented the NSI; a device was disposed of improperly.¹⁴ Accepting the fact that NSIs are preventable can have a positive impact on the attitudes of HCWs thereby improving the safety culture in handling the sharps. A comprehensive program that addresses institutional, behavioural, and device-related factors that contribute to the occurrence of needle stick injuries in health care workers can be the best strategy to tackle this problem.

Epidemiological data on sharps injury events becomes an essential pre-requisite for initiating successful injury prevention programme in any health care set-up. This study was undertaken to estimate the burden of the needle stick injuries and to determine risk factors for injury and potential interventions for prevention in our health care set-up. Also awareness regarding universal precautions (UP), appropriate disposal of sharps and avoidance of recapping or bending of sharps among the HCW can result in

the modification of hazardous work practices, thereby creating a safe working place for them. Hence an attempt has been made in this rural medical college hospital to assess the awareness among our HCW (Doctors, Nurses, Lab-technicians and sanitary staff) about the NSI.

MATERIALS AND METHODS

The study hospital is a 600 bed tertiary care hospital that serves as the teaching hospital for colleges of medicine and nursing located in a rural area. The total population of health care workers (484) include the doctors (300), nurses (132), lab technicians (22) and sanitary staff (30).

A cross-sectional study was under taken and data was collected using anonymous, self reporting pretested structured questionnaire and informal consultations among the study population from October 2011 to December 2011. The questionnaire had 3 parts; **part one** demographic information and work related aspects (years of experience, department, single/mixed shift, rotation in various departments, hepatitis B vaccine status etc: **part two**-history of NSI in last 12 months and circumstances associated with the injury (23 questions). **Part three**-12 questions regarding awareness about NSI.

A total of 441 HCW returned the completed forms. The data was scrutinized for adequacy and Statistical analysis was performed using EpiInfo 6. Associations between categorical variables were assessed using Chi-square tests. A P -value less than 0.05 was considered statistically significant.

RESULTS

Response rate was 91 % (441 out of 484). Doctors 280(93%), nurses 115 (87%), lab technicians 22(100%), sanitary staff 24(80%).

A total of 252 HCW sustained NSI in previous 12 months; Doctors 143(51%), Nurses 93(81%), lab technicians 6(27%), sanitary staff 10(41.6%).

Overall circumstances involved in NSI among doctors: A majority of 83 % (n=143) of the doctors were vaccinated for hepatitis B, 51% (n=143/280) of them experienced NSI in the past 12 months of which only 7% (n=143) of them reported the incident (Table 1). The status of the device reported to be contaminated/known exposure to patient was 92%(132/143); majority

of the NSI 84% of them occurred in operation theatres and minor procedures room and the procedure involved was suturing, during disposal and recapping the needle.90% of them were wearing hand gloves at the time of injury and 89% of them washed the injured site with soap and water immediately after the injury (Table 1).

Nurses: The Percentage of nurses who were vaccinated for hepatitis B was only 8% (n=93), A 81% (n=93/115) of them experienced NSI in the past 12 months of which only 3% (n=93) of them reported the incident. The status of the device reported to be contaminated/known exposure to patient was 83%(78/93); Majority of the NSI 89% of them occurred in wards and casualty and the procedure involved was manipulating disposable syringes in patients (injection, restraining the patient, access iv line, collision with another worker/sharp and recapping the needle) and others include during disposal and transfer of specimens. Only 18% of them were wearing hand gloves at the time of injury and

67% of them washed the injured site with soap and water followed by spirit immediately after the injury, 26% used spirit/betadine.

Lab technicians: A 27% (n=6/22) of them experienced NSI and none reported the incident. The status of the device reported to be contaminated/known exposure to patient was 100%(6/6); Almost all the injuries occurred during drawing blood, FNAC/BIOPSY in laboratories and during disposal of sharps, 18% of them were wearing hand glove at the time of injury 50% of them washed with soap and water and a 33% applied spirit immediately after the injury. None of them were vaccinated for hepatitis B.

Sanitary staff: Sanitary staff accounted for about 41.6% (n=10/24) of the NSI and none reported the incident. All the injury occurred during collection, transport and laundry.12.5% of them were wearing hand glove at the time of injury and 50% of them washed the injury immediately. None of them were vaccinated for hepatitis B.

Table: 1.Distribution of study subjects based on the events following the Needlestick injuries

Events following needle stick injuries	Doctors (n =143)	Nurses (n=93)	Lab. Tech (n=6)	Sanitary staff (n=10)	Overall (n=252)
First aid taken immediately after the injury					
Washed with soap and water followed by spirit	127 (89)	63 (67)	1 (16)	Nil	191 (76)
Washed with spirit/betadine	13 (9)	26 (28)	2 (33)	Nil	41 (16)
Washed with only water	Nil	2 (2)	3 (50)	5 (50)	10 (4)
Ignored	Nil	Nil	Nil	5 (50)	5 (2)
Unknown	3 (2)	2 (2)	Nil	Nil	5 (2)
Reporting of the injury	10(7)	28(30)	Nil	Nil	38 (15)
Avoidable/inevitable incident	38 (26.5)	74 (79.5)	2 (33)	2 (20)	116 (46)
Post injury reaction					
Stress/anxiety following the incident	125 (88)	34 (36.5)	2 (33)	Nil	161 (64)
Became cautious after that	135 (94)	81 (87)	6 (100)	2 (20)	224 (89)
Indifferent	8 (5.5)	12 (13)	Nil	8 (80)	28 (11)
Proportion of HCW put on PEP	2 (1.3)	4 (4.3)	Nil	Nil	6 (2.3)

Figures in parenthesis indicate percentage

Overall circumstances of injuries due to only hollow bore needles among the HCW:

A total of 111 out of 252 NSI was due to hollow bore needles among which a 31%(78/252) of NSI occurred during manipulation of needle in patients; 24% (60.4/252) during sharps disposal; trying to bend/recapping the needle 11% (27.7/252); accessing iv line 9% (22.6/252); restraining the patient 3%(7.5/252); collision with worker or sharps 8% (20/252); transfer/process specimens 7% (17.6/252); others 7% (17.6/252).

Table 2: Distribution of circumstances associated with NSI due to hollow bore needles only among the HCW (n=252)

Circumstances	Frequency
Manipulation of needle in patients	78 (31)
During sharps disposal	60.4 (24)
Trying to bend/recapping the needle	27.7 (11)
Accessing iv line	22.6 (9)
Restraining the patient	7.5 (3)
Collision with worker or sharps	20 (8)
Transfer/process specimens	17.6 (7)
Others	17.6 (7)

Figures in parenthesis indicate percentage

Table 3: Awareness of health care workers regarding the needle sticks injuries

NSI awareness	Doctors (n = 280)	Nurses (n = 115)	Others (n =46)	χ^2 (df), p value
NSI are preventable	262(94)	98(85)	20(43)	83.3 (2), 0.001
NSI transmits infection	274(98)	109(95)	23(50)	125.4 (2), <0.001
Hepatitis B vaccine prevents contracting hepatitis B infection	257(92)	64(55)	16(35)	108.5 (2), <0.001
The universal precautions decreases the risk in NSI	269(96)	109(95)	21(46)	119.9 (2), <0.001
Avoiding recapping of needles prevents NSI	68(24)	76(66)	16(35)	61.67 (2), <0.001
Use of medical devices with safety feature reduces the risk of NSI	236(84)	89(77)	15(33)	59.76 (2), <0.001

Figures in parenthesis indicate percentage; *Others includes Paramedic and supportive staff

The above table shows that the doctors had comparatively better knowledge regarding NSI and the differences in awareness observed across the 3 categories of HCW was statistically highly significant.

DISCUSSION

About 57% (252 out of 441) of the HCW had at least one episode of NSI in the preceding 12 months. According to EPI net data,¹⁶ an equivalent number of injuries for a 600-bed teaching hospital such as the Adichunchanagiri institute of medical sciences would be 120 reports in a year. These figures are nearly twice the figures of Exposure Prevention Information Network (Epi net) data¹⁰. This may be attributed to the patient overload and organizational problems existing in developing country like India. In the present study, the majority of the HCWs who had NSIs were nurses (81%), followed by doctors (51%). Similar findings were seen in other studies also.^{11,12}

Majority of the NSI occurred in operation theatre and minor procedure room (55%), which is in contrast to the surveillance data from NaSH and Epi net where majority of NSI occur in inpatient units.¹⁵ This may be because road traffic injury patients form the major case load to the hospital which requires frequent suturing of the wound.

In the EPI net study¹⁰, 38 per cent of NSI occurred during needle use, while 42 per cent occurred after use of needle and before its disposal. The comparative figures in the present study were 46% and 33%, respectively. The commonest type of device involved in NSI was the suturing needle (41%) and hollow bore needles (44%) equally. Comparative figures in NaSH data is 20% and 56%.¹⁵

Wearing gloves is known to be an important line of defence but several of the HCWs (39%) had not been wearing them at the time of their injury, higher proportions among the nurses

(82%) and the sanitary staff (92%). Informal consultations revealed logistical issues in providing hand gloves and also apathy among these HCW.

Commonest Circumstance associated with injuries due to hollow bore needles include, 31% occurred during manipulation of needle in patients. Similar finding was seen in NaSH data (26%). A majority (76%) of them washed the injury with soap and water immediately, 16% washed with spirit/betadine. Similar findings (66%) were seen in another study.¹⁷

A 85% of the HCW didn't report the injury, reporting was 7% among doctors and 30% among nurses. This was because majority of them were not aware about the formal reporting system existent in the hospital. This problem could be solved by including these issues in the job description of these employees and by regular monitoring by the management.

A 86% of them felt the injury was avoidable, and 47% of them blamed self for the injury (esp. doctors). a figure similar to earlier findings.¹⁸ A 39% of them blamed the management. The reason quoted in the informal discussions was that majority of the times many casualties arrive due to high way crashes and most of them require suturing. It is usually the interns and post graduates who do the suturing who have minimum expertise and are often overwhelmed by the casualties. Also, the HCW felt, the management was not providing sufficient number of needle cutters, hand gloves and devices with safety features. In the present study 64% (n=161/252) of the HCW felt stress/anxiety following the incident and majority 89% (n=143/252) became cautious after that. Other studies showed similar statistics of stress (55% in EPI net study).¹⁰

Vaccination is one of the best ways to protect HCWs from infections, but vaccination is only available for HBV. In the present study, the number of vaccinated HCWs ranged from 83%

in Doctors to 8% in nurses. Similar data were found in a Swedish university hospital.¹⁹ Due to this low vaccination rate, a greater awareness of the HBV vaccination is required.²⁰ The high vaccination rate among doctors in the present study may be because the organization makes provisions for HBV vaccination only for the students (post graduates and interns) every year.

Only 6 (2.3%) of the HCWs took post-exposure prophylaxis (PEP) against HIV/AIDS after their injury who knew their NSI to be from a "high risk" patient. Less than 20 per cent HCWs knew about the availability of PEP services in the hospital. This was higher than the figures in a study by Chacko and Isaac (31.6%).²¹

Regarding the awareness of HCW, Doctors had better knowledge on all counts except being ignorant about the existence of formal reporting system (99%); also only 24% of them felt avoiding recapping prevents NSI. This stresses the need for providing awareness and standard operating procedures (SOPs) for handling the sharps. The paramedic and supportive staff (lab technicians and sanitary staff) had poor knowledge regarding NSI.

Informal consultations with the HCW revealed, most of them were of the opinion that education, training, better safety devices, decreased patient load per HCW, positive work environment and following standard precautions can help prevent NSI. According to a CDC report, use of safety engineered devices would reduce NSIs by 76 percent.²² The best way to protect against needlestick injuries is use of safety devices. These devices are suitable and important tool in the reduction of needlestick injuries, and the implementation of safety devices should result in an improvement in medical staff's health and safety.^{23 - 26} The safety devices need to fulfil National Institute for Occupational Safety and Health (NIOSH) criteria as a recognized technical standard (e.g., safety devices should be easy to activate, intuitive to use, can be activated with one hand, do not hinder use, have clear awareness of activation, etc.).¹⁵

There is much room for improvement in protecting the HCWs from NSI, which can be accomplished through a combination of comprehensive programmes, including stress on institutional behaviour and device related factors that contribute to the occurrence of these injuries, seeking alternatives to use of needles wherever possible, using newer devices with safety features, ensuring adequate training in

safe use and disposal of needles, putting in place a culture of accident reporting, especially sharps-related, and following preventive practices like vaccinations for hepatitis B, as also stressed by several others.^{22, 23, 27}

CONCLUSIONS

NSIs were observed in all the 4 categories of HCWs. There is a definite scope for improvement in safety protocols; it may not be practically feasible to avoid the occurrence of NSI altogether, undoubtedly but their occurrence can be minimized to a larger extent. Prevention of NSI is the best way to prevent blood borne pathogens due to sharps in the health care workers. The training of HCWs and regular monitoring of safety practices indispensably needs to be an ongoing activity at the hospital. Self reporting of NSI needs to be emphasized and made mandatory in all the health care setup.

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