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Original Research Article

Occurrence and Analysis of Needle Stick Injuries among Health-Care Workers in a Tertiary Care Hospital

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Abstract

Background: Needle stick injuries (NSIs) are the major occupational hazards among health care workers (HCWs). Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency virus (HIV) are the most common blood borne viruses (BBVs) that are transmitted by NSIs. The present study was conducted to know the prevalence and factors responsible for the NSIs.

Objectives:

- To know the occurrence of NSIs among Health care workers
- To know the risk factors and analysis of NSIs

Materials and Methods: As a routine practice, we have needle stick injury reporting form to all self-reporting health care workers. The exposed HCWs were asked to fill up a questionnaire. The Infection control nurse then follows up with the HCW regarding the required blood investigations and post exposure prophylaxis to be given.

Results: Between December 2019 and January 2021, 56 NSIs were reported. Staff nurses reported the maximum injuries 32 (57.1%) followed by doctors 11 (19.6%). Injuries were commonly seen from emergency and ICU. Almost 20 (35.7%) of the percutaneous injuries occurred during giving injections and during IV cannulation. Recapping and detachment of the needle after use were responsible for 08 injuries (14.2%) only.

Conclusion: Our study showed that the overall incidence of NSIs were decreased. Improved training, greater use of safety devices, increased education and awareness may have led to decrease in NSIs incidence.

Keywords: Needle stick injury, sharp injury.

Introduction

Needle stick, sharp and splash injuries (NSIs) are the major occupational hazards among healthcare workers(HCWs). Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency virus (HIV) are the most common blood borne viruses (BBVs) that are transmitted by NSIs. The risk of transmission of HBV, HCV and HIV following NSIs is about 3-10%, 3% and 0.3% respectively. [1]

Every year, globally more than 35 million HCWs are at risk of acquiring NSIs. [2] On an average every HCW contracts four NSIs per annum, especially in developing countries. [3] It is estimated that nearly 2 million NSIs per year are reported globally, the majority were being reported from developed countries. [1] This estimate is very low as majority of exposure (40%-75%) particularly those from developing countries are underreported. [1] This may be due to unavailability of active surveillance system, lack of awareness or lack of time resulting from increased work pressure.

In the year 2000, the World Health Organization estimated that 16,000 Hepatitis C virus, 66,000 Hepatitis B virus and 1,000 Human Immunodeficiency virus(HIV) infections occurred globally among HCWs due to sharp injuries. [4] Additionally NSIs result in significant economic impact directly(e.g., laboratory tests and post exposure prophylaxis) and indirectly (e.g loss of work productivity). [5]

The key to the NSIs problem is prevention and there have been many interventions and innovations aimed at reducing NSIs. There are mainly derived from root cause analysis of NSIs, thus delineating the importance of understanding the risk factors of NSIs and continual surveillance of NSIs incidence. The majority of sharp injuries are needle stick injuries. [6,7,8] Major risk factors include recapping of needles and multistep procedures [6,9], giving rise to preventive counter measures such as staff education, retractable needles and needleless intravenous(IV) connectors. [10,11]

The present study was conducted to know the prevalence of NSI and factors responsible for NSI and also to understand the post exposure measures taken by the HCWs in our tertiary care teaching hospital in India.

Materials and Methods

The study was conducted for 2 years from January 2019 to December 2021 at Dr Chandramma Dayananda Sagar Institute of Medical Education and Research, Harohalli, Ramanagara. The Hospital Infection Control Committee (HICC) was made the central nodal center for reporting of NSIs. A designated infection control nurse (ICN) was appointed for NSIs management.

We analyzed the data of all the HCWs who voluntarily reported injuries by needle stick, sharps such as cannulas, broken vials. Minor Scratches or no blood oozing following the injury were classified as superficial injury and injuries penetrating through the skin or leading to bleeding wound as deep injury. As a routine practice, we have needle stick injury reporting form to all self-reporting HCWs. The exposed HCWs were asked to fill up a questionnaire which included information regarding the type of injury, the source of injury (known/unknown), use of personal protective equipment at the time of injury, what type of work the HCWs does, the severity of the injury, emergency/routine health care, hepatitis B vaccination status, immediate post exposure measures taken like washing of hands, status of source of

exposure, if the HCW was knowing his/her status of HIV,HBV and HCV positivity. The infection control nurse then follows up with the HCW regarding the required blood investigations done and any post exposure prophylaxis to be given.

Results

A total of 56 cases of accidental exposures were reported during the period with majority them due to needle prick injury (Table 1). The mean age of study group was 28.4 years (range of 17-59 years) and seen predominantly in male gender (59.8%).

Table 1: Needle prick injury reported by health care workers(n=56)

Total episodes of Needle prick	56
Distribution according to the category	
Staff Nurses	32 (57.1%)
Doctors	11 (19.66%)
Hospital waste disposal staff	04 (7.14%)
OT/Hospital Attendants	06 (10.7%)
Laboratory staff	03 (5.3%)
Place of occurrence	
Emergency and ICUs	23 (41.0%)
General ward	17 (30.3%)
Operation theater	06 (10.7%)
Labour room	07 (12.5%)
Others	03 (5.3%)
Procedure during which injury occurred	
Giving injections	20 (35.7%)
IV cannulation	13 (19.6%)
Blood sample collection	11 (23.2%)
Recapping needle after use	08 (14.2%)
Surgery	04 (7.14%)
Immediate actions undertaken by HCW following exposure	
Washed with soap and water	38 (67.8%)
Cleaned with disinfectant like spirit	12 (21.4%)
Squeezed the affected part	06 (10.7%)

Prevalence and nature of exposures

A large number of the reported incidents were staff nurses 32 (57.1%) followed by doctors 11 (19.6%). 04 (7.14%) of the exposed HCWs were hospital waste disposal staff, not involved directly in patient care or surgical procedures (Table 1). Most of the percutaneous injuries were superficial. Most common site of injury was hands mainly fingers (94.8%). Most of the HCWs 47 (83.9%) reported the exposure on the same working day, while rest 9 (16%) reported to us on the next morning if the exposure happened during the night duties.

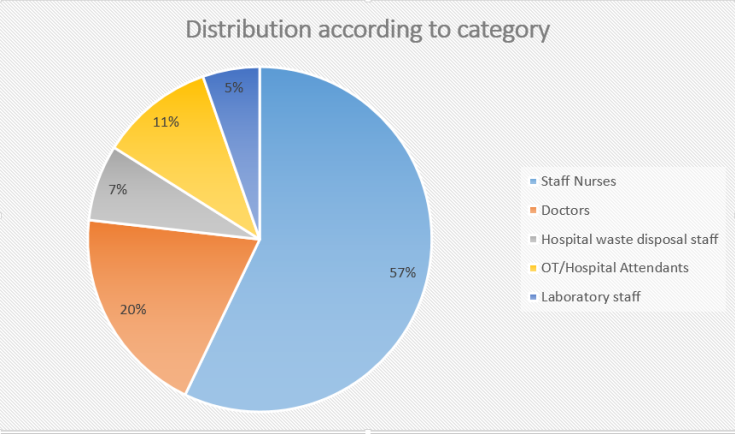

Figure 1: Distribution according to category

Factors associated with exposures

Staff nurses were more commonly exposed to percutaneous injuries. More than one-third of the NSIs were seen in young staff aged below 25 years. Injuries were most commonly reported from emergency and ICU. Almost 20 (35.7%) of the percutaneous injuries occurred during giving injections and during IV cannulation 13 (19.6%). Recapping and detachment of the needle after use were responsible for 08 injuries (14.2%) only.

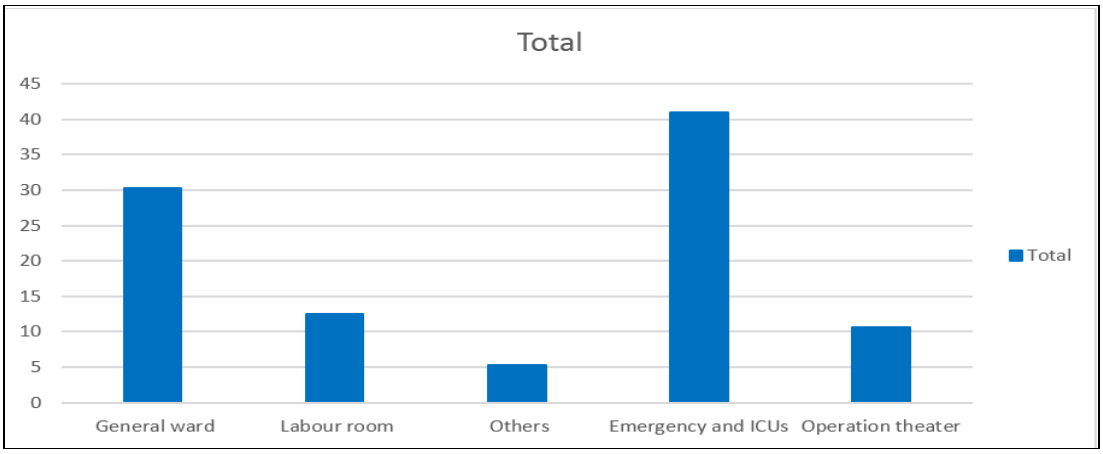

Figure 2: Place of occurrence

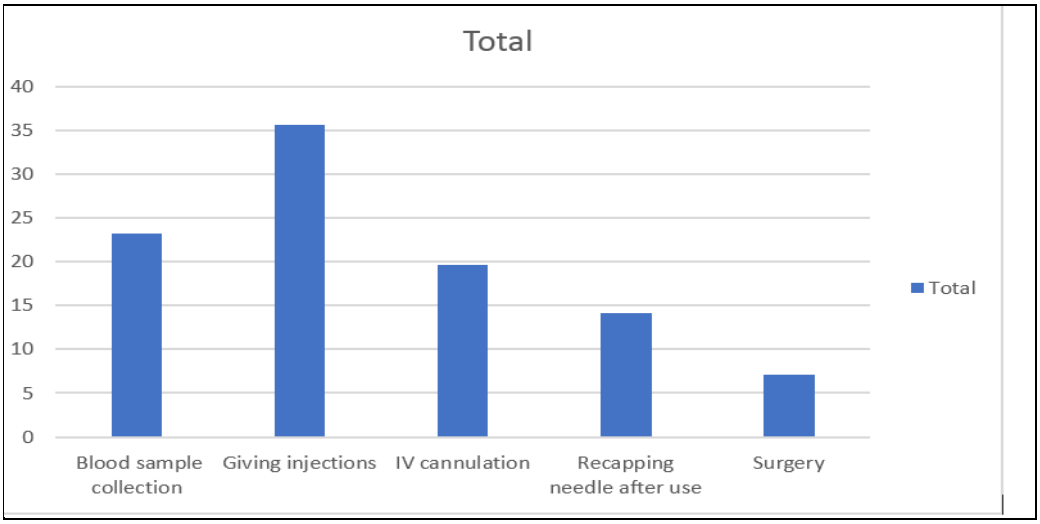

Figure 3: Procedure during which injury occurred

Vaccination status of health care workers

Most of the HCWs 41 (73.2%) were vaccinated against hepatitis B virus and 15 (26.7%) were not vaccinated against HBV. Most of the unvaccinated HCWs were student nurses and a few doctors who had joined recently. Of the vaccinated, 24 (58.5%) had completed three doses of the vaccine within 1 year, while 17 (41.4%) were vaccinated more than 10 years back.

Evaluation of source

Source patient could be identified in 56 exposures. However, serological status in majority of the sources (56) was known prior to the injury. Overall, these exposures occurred from 17 sources known to be positive for HIV, HCV or HBV. Thus, the total number of HBV positive was 05, HIV positive was 08 and HCV positive was 04. PEP for HIV exposure was recommended in 08 HCWs (14.2%) who sustained percutaneous injuries. Of the 05 HCWs exposed to HBV positive sources, 02 were did not receive the HBV vaccination. Therefore, they were administered hepatitis B immunoglobulin along with the first dose of vaccination for HBV. Remaining 03 had complete their vaccination and had protective titers of anti-HBs antibodies. The sources of 04 HCWs were HCV positive patients and no immediate action was taken.

Knowledge, attitude, behavior and practices of health care workers

Insufficient level of knowledge on HIV transmission and the risks after exposure was observed expectedly more in hospital waste disposal staff as compared to physicians and nurses. Only 33 (58.9%) of the HCWs were using personal protective equipment such as gloves, masks and gowns at the time of exposure. Cleaning the injury site with running water was the most frequently used first aid measure in over 38(67.8%) of the injured HCWs (Table 1). Other measures used for immediate management included cleaning with disinfectants such as methylated spirit, hypochlorite, and soap and squeezing the site. Physicians most commonly took the correct measure of washing with soap and water 11 (19.6%0 in comparison to nurses 32 (57.1%)

Discussion

Occupational injuries with a needle or other sharps are common among health care professionals. These injuries increase the risk of developing many blood borne infectious diseases. The present study was conducted from January 2019 to December 2021 at Dr Chandramma Dayananda Sagar Institute Of Medical Education And Research, Harohalli, Ramanagra. To know the prevalence of voluntarily reported the incidence of needle stick and other occupational injuries. A total of 56 incidences were reported in the study period of 2 years. This corresponds to 8.9 incidences per one hundred beds per annum. This incidence is very low when compared to 19.46 per one hundred occupied beds per annum reported in the Exposure Prevention Information Network 2011 [12]. This difference may be due to lack of active surveillance or under reporting or both since the present study is based on voluntary reporting only.

Staff nurses constituted the largest number 32 (57.1%) of the reported incidents and these data correspond with several reports from India. [13,14] However. Other studies from India, [15-17] Saudi Arabia, [18] Ireland [19] and the USA [20] reported NSI being more frequent(19.2-28.5%) among Nurses than Doctors.

Injuries were most commonly reported from emergency wards and ICUs 23(41%). In the emergency wards, most of the time HCWs carry out the procedures on an urgent basis, and the pressure of immediate patient care increases the chances of NSI. However, many studies report operation theaters are the most common site of NSI to occur up to 53.84% [21.22] In our study only 06(10.7%) of

NSI in operation theaters. This difference could be due to the good patient-doctor ratio at this institution in operation theaters.

Recapping and post use disposal of needles have been reported as the most common action during which HCW sustain NSI (34.0-65%) [23,24]. In ours study, most of the injuries occurred (85.7%) during procedures rather than recapping (14.3%). Results have reported in studies conducted at Vellore (recapping 8.5%, disposal 18.6%) [25] and Goa (recapping 6.3%, disposal 31.7%). [14] This denotes increased hazard awareness among HCWs and use of safer needle disposal methods at Dr. Chandramma Dayananda Sagar Institute Of Medical Education And Research, Harohalli, Ramanagara. In the present study, IV cannulation was the most common procedure (19.6%) during which NSI occurred. Surgical procedures like suturing contributed only 7.1% of the NSI. This is contrast to many other studies where stitching was the most common procedure (29-46%), followed by blood sample collection (19%) responsible for NSI [21,23,24]. This difference can be explained by better facilities and direct supervision by the faculty members in a surgical procedure.

Of the blood- borne diseases, Hepatitis B is not only the most transmissible infection but also the only one that is preventable by vaccination. [10] Anti- HBV vaccination coverage varies from 18% in Africa to 77% in Australia and New Zealand, according to the WHO estimates. [26,27]

Conclusion

Our study showed that the overall incidence of NSIs decreased through the decade despite an increase in HCWs. Improved training, greater use of safety devices, and increased education and awareness may have led to decrease in sharps incidence; these measures should be reinforced and continued so as to maintain the low incidence of sharps injuries. Cleaning the injury site with soap and water was the most frequently used first-aid measure following exposure and use of personal protective equipment, should be emphasized and encouraged.

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