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Original Research Article

The study of prevalence of needle stick and sharp injuries among healthcare workes in tertiary care hospital, Navi Mumbai

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ABSTRACT

Introduction: Needlestick injuries (NSIs) as defined by accidentally puncture the skin by needles. The occupational exposures to NSIs are considered to be much higher in the developing world and multiple risk factors eg. improper use of protective equipment (like failure to use suitable-sized gloves), working in surgical or intensive care units, insufficient work experience, young age, needle recapping, unsuitable needle disposal, intravenous cannulation may contribute to NSIs.
Aim: To determine the occurrence/ prevalence of needle stick and sharp injuries (NSIs) among healthcare workers working in a tertiary care hospital and the factors responsible for NSIs.
Materials and Methods: A cross-sectional study was conducted in a tertiary care hospital among HCws in the hospital over a period of one year Jan 2020-December 2020.
Results: Nursing staffs are most frequently reported NSI. Among the groups, most common cause of NSIs was found to be recapping of needle followed by cleaning, HGT and procedure. The most common cause of NSI among housekeeping staffs found to be needle lying on the floor and accidental mixing of sharp biomedical waste with other waste. The HCWs from critical care unit eg. ICUs are the most commonly reported NSIs.
Conclusions: HCWs are always at high risk of attaining NSIs. The nursing staffs followed are the most vulnerable group who gets the sharp/NSI and require extra attention. As a preventive measures regular training and education of nursing staffs and all other categories of health care workers to be ensured in healthcare settings.

1. Introduction

Needlestick injuries (NSIs) as defined by accidentally puncture the skin by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and needles used to connect parts of IV delivery systems. These injuries can occur at any time when people use, disassemble, or dispose of needles. (OSHA Guidelines) When not disposed of properly, needles can hide in linen or garbage and injure other workers who encounter them unexpectedly Whereas, Sharps" include needles, as well as items such as scalpels, lancets, razor blade, scissors, metal wire, retractors, clamps, pins, staples, cutters, and glass items. [1]

Percutaneous exposure occurs as a result of a break in the skin caused by a needlestick or sharps contaminated with blood or body fluids. Mucocutaneous exposure occurs when body fluids come into contact with open wounds, nonintact skin such as found in eczema, or mucous membranes such as the mouth and eyes. Health care workers (HCW) are at an increased risk of accidental needle stick and sharp injuries (NSI). This been recognized as a source of exposure

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to blood-borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) among HCWs and responsible for a significant proportion of HBV, HCV, and HIV infections in this group.[2]

It has been estimated by the CDC that every year more than three million HCWs are exposed to blood and body fluids via sharp and mucocutaneous injuries in the United States alone with an annual estimated 6 million NSIs.[3]

According to a WHO study, the annual estimated proportions of health-care workers (HCW) exposed to blood-borne pathogens globally were 2.6% for HCV, 5.9% for HBV, and 0.5% for HIV, corresponding to about 16,000 HCV infections and 66,000 HBV infections in HCW worldwide.

The risk of infection following needle stick exposure is 1.9% to greater than 40% for HBV infections, 2.7% to 10% for HCV infections and 0.2% to 0.44% for HIV infections. It is estimated that NSIs cause approximately 66,000 HBV infections, 16,000 HCV infections and 200 to 5000 HIV infections among health care workers annually.[4] Among the HCWs nurses are at high risk to occupational hazards and injuries in the course of their day-to-day activities in the health care environment.[5]

Multiple risk factors have been proposed in different studies for NSI incidents such as improper use of protective equipment (like failure to use suitable-sized gloves), working in surgical or intensive care units, insufficient work experience, young age, needle recapping, unsuitable needle disposal, intravenous cannulation.[6]

The occupational exposures to NSIs are considered to be much higher in the developing world and it is expected that around 75% of the NSIs in developing countries are not reported.[7]

Keeping these all factors as frontrunner, this study was undertaken to determine the occurrence/ prevalence of needle stick and sharp injuries (NSIs) among healthcare workers working in a tertiary care hospital and the the factors responsible for needle stick injuries.

2. Materials and Methods

A cross-sectional study was conducted in a tertiary care hospital among all healthcare workers in hospital. The study was conducted over a period of one year Jan 2020-December 2020.

The study population include doctors including residents and inters, nurses and nursing students from second to fourth year, house-keeping staffs working in the hospital were eligible to participate in the study. Those who were not willing to participate or refused and those who could not be contacted for three consecutive visits as a follow up for NSIs were excluded from the study. Ethical approval was obtained prior to the study from Institutional Ethics Committee and confidentiality of the participants was maintained.

The participants were told that participation in the study was strictly voluntary, and refusal would not affect their employment status and also assured that this survey is only for research purposes. All the participants were informed verbally about the study.

We analyzed the data of all the HCWs who voluntarily reported injuries by needlestick, sharps such as cannulas, broken vials and splashes on cuts, and mucous membranes by potentially infectious materials such as blood and other body fluids. Scratches with a minute 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 administered a questionnaire to all self-reporting HCWs. The exposed HCWs were asked to fill up a self-reporting 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 or splashes, what type of work the HCWs does, the severity of the injury, emergency/routine health care, hepatitis B vaccination status, immediate postexposure measures taken like washing of hands, status of source of exposure, and if the HCW was knowing his/her status of HIV, HBV and HCV positivity.

We have an active PEP program with an integrated approach to prevention including awareness raising, teaching, training, protective equipment like heavy duty gloves, banning of recapping, needle cutter at every ward, sharps containers, colored-coded waste bins, vaccination as well as round the clock sharps and splashes reporting and blood testing facility based on the guidelines of the National AIDS Control Organization of India (NACO).[8] Regular classes as a part of study curriculum are conducted separately for each group of by interactive lectures, audio–visual aids and hands-on practice, especially among newly inducted staff at least once a year. The standard pro forma for tests as prescribed in the NACO guidelines for each occupational exposure was followed. Hospital infection control nurses, clinical microbiology residents, and trained technical staff were actively involved in follow-up and counseling of each exposed HCWs in our PEP program.

HCWs who got exposed to HIV seropositive patients were immediately referred to the antiretroviral therapy clinic at our hospital. For seroconversion, all HCWs under investigation were counseled and advised to get tested again after 3 weeks, 3 months, and finally after 6 months. The serum samples of patients from whom the HCWs got exposed, if known, were also tested for HIV, HBV, and HCV with viral load, if screening tests were positive. The outcomes of such exposed HCWs and rate of seroconversion were noted.

2.1. Data analysis

Data thus collected were entered into a computer-based spreadsheet for analysis using SPSS statistical software (version 20) (IBM Corp., NY, USA).

3. Results

In the present study one hundred six incidents of NSI were reported among housekeeping staffs, nursing staff, doctors, laboratory technicians. (Figure 1). Intensive care units (ICUs) staffs got highest number of NSI among other hospital area staffs. (Table 1).

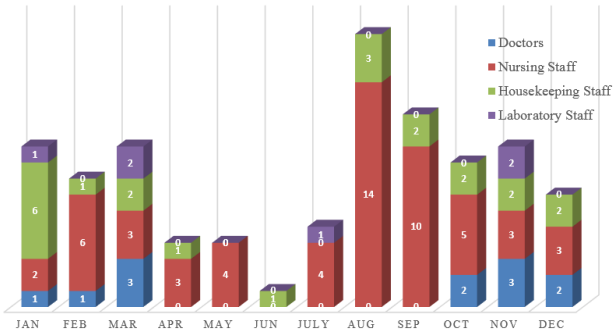

Fig. 1: Prevelance of NSI among HCWs during Jan 2020-Dec 2020

Table 1: Location wise distribution of NSI

Location	No. of sharp/NSI
Intensive care unit	42
Operation Theatre	14
Other Inpatient departments	26
OPDs	15
Laboratory	9

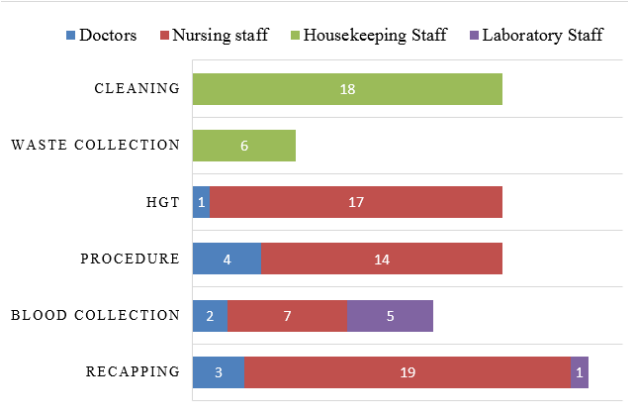

Fig. 2: Causes of NSI among HCW

Most common cause of NSIs was found to be recapping of needle followed by cleaning, HGT and procedure. The most common cause of NSI among housekeeping staffs found to be needle lying on the floor and accidental mixing of sharp biomedical waste with other waste. (Figure 2)

The HCWs are vaccinated against Hepatitis B virus vaccination either with full 3 doses (97,88.8%) or 2 doses (9, 8.4%). The serological test was performed in completed vaccine candidates to confirm their protective titre.

Among the NSI cases no one got pricked from any HIV, HBV and HCV seropositive patients.

The few unknown source like accidental NSI due to needle lying on floor was mainly observed in housekeeping group and they were given Anti-retro viral drugs after risk assessment. Staffs with h/o of NSIs were followed up after one, three and six moths of NSI. However, nine HCWs could not be followed up on six months as they have left the job.

4. Discussion

Many NSIs are reported in hospitals worldwide through out the year and are associated with risk of exposure to blood-borne pathogens such as HIV, HCV, and HBV.

There was no significant difference in incidents related to the gender of the HCWs. Among Sharp and needle stick injury is one of the greatest concerns as occupational hazards among healthcare workers. Nursing staffs are the most frequently injured by sharp and used needle followed by housekeeping staffs, doctors and laboratory technicains. The study conducted by Thiyagarajan M et al showed that nursing staffs were the most commonly reported sharp/needle stick injury (44.6%) followed by students (14.5%) and janitors (13.3%).[9] Another study by Goel V et al reported that a large number of the sharp/NSIs incidents among doctors (73.7%) followed by interns (7.4%), and faculty members (1.1%). Interestingly, only 19.1% nurses reported injuries, while 3.2% of the exposed HCWs were hospital waste disposal staff, not involved directly in patient care or surgical procedures.[10] These studies indicate that most commonly exposed healthcare worker group may vary to hospital.

In present study, the commonest area for sharp/needle stick injury was found to be ICUs (39.65), whereas operation theatre, IPDs, OPDs and laboratory reported 13.2%, 24.5%, 14.1% and 8.5% respectively. According to Goel V et al study most sharp/NSIs reported from the ICUs (48.1%) followed by general ward (29.8%), operation theatre (3.3%), labour room (8.1%), treatment room (9%).[10] Another study conducted by Rishi E et al. reported Sharp/NSI most frequently in operation theatre (67%). These studies indicate that sharp/NSIs are more common in emergency or critical care areas. The reason may be due to work load, less manpower and emergency situation round the clock in those areas.[11]

The most common reason of sharp/NSIs among nursing staffs in our study was found to be recapping (34.7%) and doing random blood sugar (6.1%). Among the housekeeping the most common reason was sharp/NSI during cleaning (69.25) and waste collection (23.1%). The doctors and laboratory staffs most commonly reported the shar/NSI during procedure (40%) and blood collection (62.5%) respectively.

The study conducted by Hada V et al showed that most common cause of NSI among nursing students was deep percutaneous at ward and procedure room.[12] Another study by Laishram J et al showed that most common cause of NSI among nursing staffs of NSI occurred by open bore needles (93%) during administration of IV and IM injections and drawing blood for laboratory tests.[13]

In our study most of the healthcare staffs (97,88.8%) are vaccinated with hepatitis B vaccine. The hospital has a policy to evaluate every staffs vaccine status at the joining and arrange 1^{st} dose of vaccination among unvaccinated staffs on day of joining only. This policy was very helpful to cover most of the staffs with hepatitis B vaccination. The Goel V et al study also showed high vaccination rate among the staffs i.e. 97.5% were vaccinated against hepatitis B virus and 12 2.5% were not vaccinated against HBV.[10] Another study by Thiyagarajan M et al also showed that 44.6% were vaccinated whereas incomplete vaccination and no vaccination was observed in 18.1% and 37.35 respectively.[9]

India is considered to have intermediate level of endemicity with regard to HBV. The point prevalence of HBV is 3.7%, which include over 40 million HBV carriers. HBV is the second most common cause of acute viral hepatitis after HEV in India, whereas chances of getting HBV infection is 5-30%. Unvaccinated and incompletely immunized healthcare workers are at higher risk of getting hepatitis-B infection in case of sharp/NSI. In addition, need of the hours is to evaluate causes of underreporting of sharp/NSI among healthcare workers.[14]

5. Conclusions

HCWs are always at high risk of attaining NSIs. The nursing staffs followed are the most vulnerable group who gets the sharp/NSI and require extra attention. As a preventive measures regular training and education of nursing staffs and all other categories of health care workers to be ensured in each hospital. Training session to be organized from 1^{st} year MBBS students under early clinical exposure programs as well as for the new joining intern and post graduate students. The standard precautions to be followed for every patient with or without available HHH investigation report. In a tertiary teaching hospital, mandatory provisions for complete vaccination against hepatitis-B helps need of immunoglobulin in staffs if an unvaccinated staffs got sharp/NSI from a sero-positive HBV patient. It also given mental assurance to staffs in case of accidental injury. To avoid under reporting of NSI every institute should implement regular counselling, training, prompt post exposure prophylaxis and follow up of HCWs who has got sharp/NSIs.

6. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

7. Source of Funding

None.

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