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ORIGINAL RESEARCH

Occupational Exposure to Sharp Injuries Among Healthcare Workers in a Tertiary Care Teaching Hospital

[1]Dr. Snehal Dhayagude, [2]Dr. Anuradha Tolpadi, [3]Dr. Meera Modak, [4]Dr. Abhijeet Mane

[1]Assistant Professor, [2]Professor, [3]Professor and Head of Department, [4]Associate Professor, Department of Microbiology, Bharati Vidyapeeth Deemed to Be University Medical College, Pune, Maharashtra, India

Corresponding Author
Dr. Snehal Dhayagude
Assistant Professor, Department of Microbiology, Bharati Vidyapeeth Deemed to Be University Medical College, Pune, Maharashtra, India
Email: snehal.dhaygude@bharatividyapeeth.edu

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ABSTRACT

Background- Occupational sharps injuries are a serious hazard in any healthcare setting. Contact with contaminated needles, scalpels, broken glass, and other sharps may expose healthcare workers to blood that contains pathogens that pose a grave, potentially lethal risk. The cost of prophylaxis and post-exposure treatment is a significant institutional economic burden. In present study we aimed to estimate the prevalence, factors associated with sharp injuries and its cost burden on hospital. **Material and Methods-** Retrospective study of all reported cases of sharp injuries among HCWs for Jan. 2023 to Dec. 2023 in a tertiary care hospital. Direct & indirect cost was calculated as per CDC definition. **Results & Discussion-** Total 61sharp injuries were reported in last year (2023). Females were mostly affected. Doctors were affected the most. Most of the sharp injuries occurred in Emergency department. Maximum number of sharp injuries (6.39%) occurred during recapping the needle. The source was seropositive in 9 (14.75%), seronegative in 34(55.73%) and source was unknown in 18(29.51%). Total 534299 INR including direct and indirect costs. **Conclusion-** Regular surveillance and analysis of sharp injuries is very crucial in planning preventive measures and training requirements which takes care of safety of HCWs and reduces the economic burden on the institute.

Keywords: sharp injury, direct costs of sharp injury, Indirect costs of sharp injury, Occupational exposures.

BACKGROUND

A sharp injury (SI) is defined as 'an accidental penetrating wound with an instrument that is potentially contaminated with the blood or body fluid of another person.[1] Worldwide it is estimated that 3 million healthcare workers experience sharp injury every year.[2] The risk of transmission of human immunodeficiency virus (HIV) following a sharp injury is approximately 0.2%–0.5%, for hepatitis C virus (HCV) 3%–10% and 40% for hepatitis B virus (HBV).[3]

The risk of Sharp injuries increases with poor training at workplace, overwork conditions, high-stress interventional procedures and no adherence to infection prevention and control policy such as recapping of needle, use of safety devices, improper segregation of sharps. Every incident of sharp injury incurs a number of direct and indirect costs. This includes time and cost spent in post exposure prophylaxis includes cost of investigations and treatment for exposed and source if known, cost of replacing an infected staff if required, counselling of exposed staff[4]

Sharp injury is being considered as one the indicators to effective implementation of infection prevention and control guidelines.[5] This will solve the problem of under-reporting of cases globally.

With this background present study was conducted to know the incidence, risk factors and cost associated with sharp injuries so that the appropriate preventive measures can be designed to avoid it.

MATERIAL AND METHODS

Retrospective observational study was conducted. This is 1071 bedded tertiary care teaching hospital. The surveillance data of Jan. 2023 to Dec. 2023 was collected and analysed in present study after taking ethical approval certificate. All occupational exposures are managed as per the laid down hospital policy by infection prevention and control department

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in agreement with quality department. The hospital policy is based on the NACO guideline for HIV and CDC guidelines for HBV and HCV.[6] All HCWs are instructed to wash the injury site under the running water immediately after the exposure. Infection control nurse is informed and reporting is done to the ICU physician & ID physician. All the details including the demographic details, location, time of exposure, reporting time, type of injury, procedure leading to injury and source details are entered in post exposure prophylaxis form. HCW's Hepatitis B immunization status is noted. The source and exposed is tested for HIV, HBV and HCV. If the source is found to be HIV positive, then PEP for HIV as per the advice of Infectious disease consultation is given for 28 days. If exposure was from a hepatitis B positive source, then the HCW for Anti HBsAg antibody titre was tested. If the titre was found to be above 10mIU/ml, then no further treatment was given. If the titre was found to be below 10mIU/ml then Hepatitis B immunoglobulin was given as per the recommendation. Health care workers were followed up for 6 weeks, 3 months and 6 months for seroconversion. Incidence reporting of all sharp injuries is done and in-depth root cause analysis of all SIs is carried out. Corrective and preventive action is taken accordingly. Counselling of the exposed HCW is given priority considering emotional impact.

Direct and indirect costs of SI's for a healthcare facility was evaluated by using the CDC operative definitions:1. Direct cost: Baseline and follow-up laboratory testing, PEP, and other treatment eventually provided, including PEP side-effect management2. Indirect cost: These include time and wages diverted to receiving or providing exposure-related care.[7]

RESULTS

Females (37) were affected more than males (24).

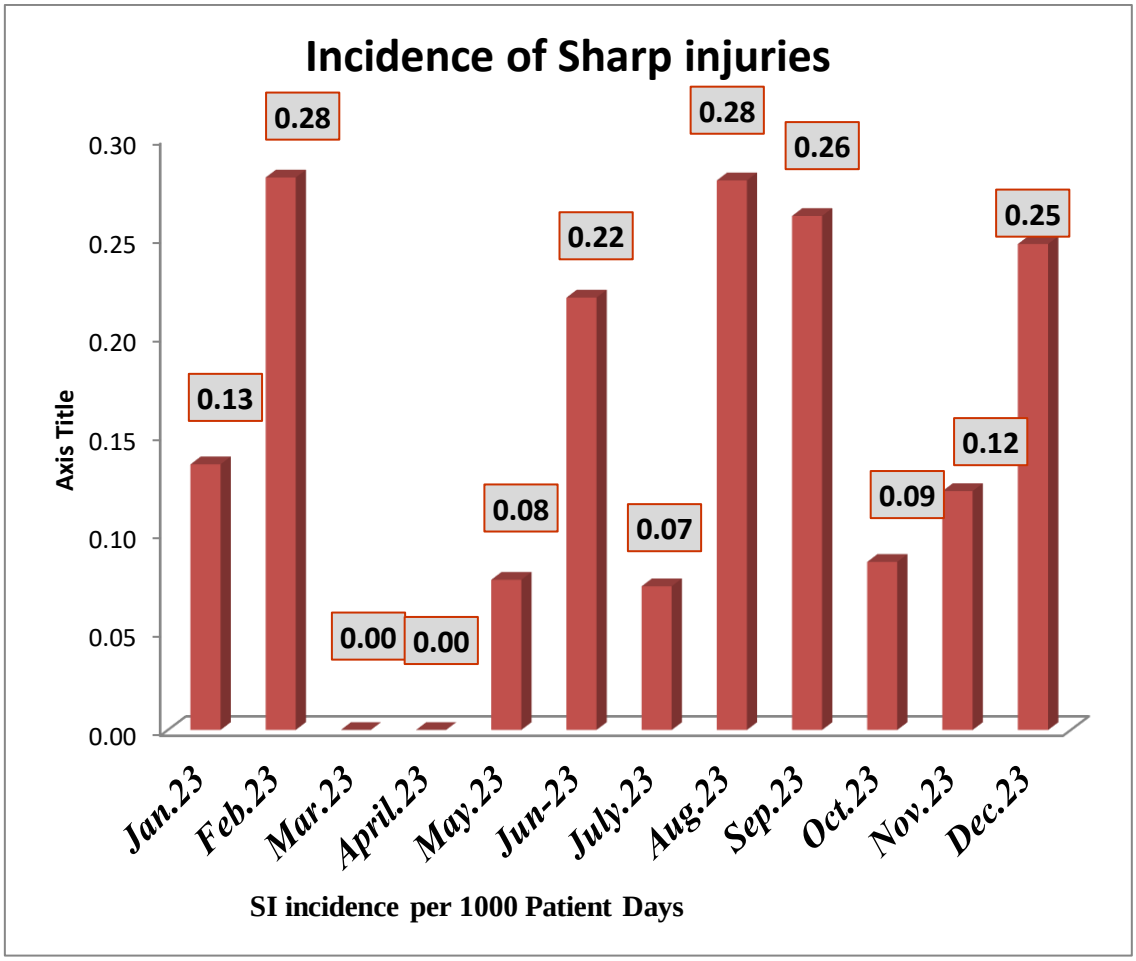

Figure 1:-Distribution of Sharp Injuries month wise in 2023

Sharp injuries were common in month of February and August

Doctors were affected more than other healthcare categories.

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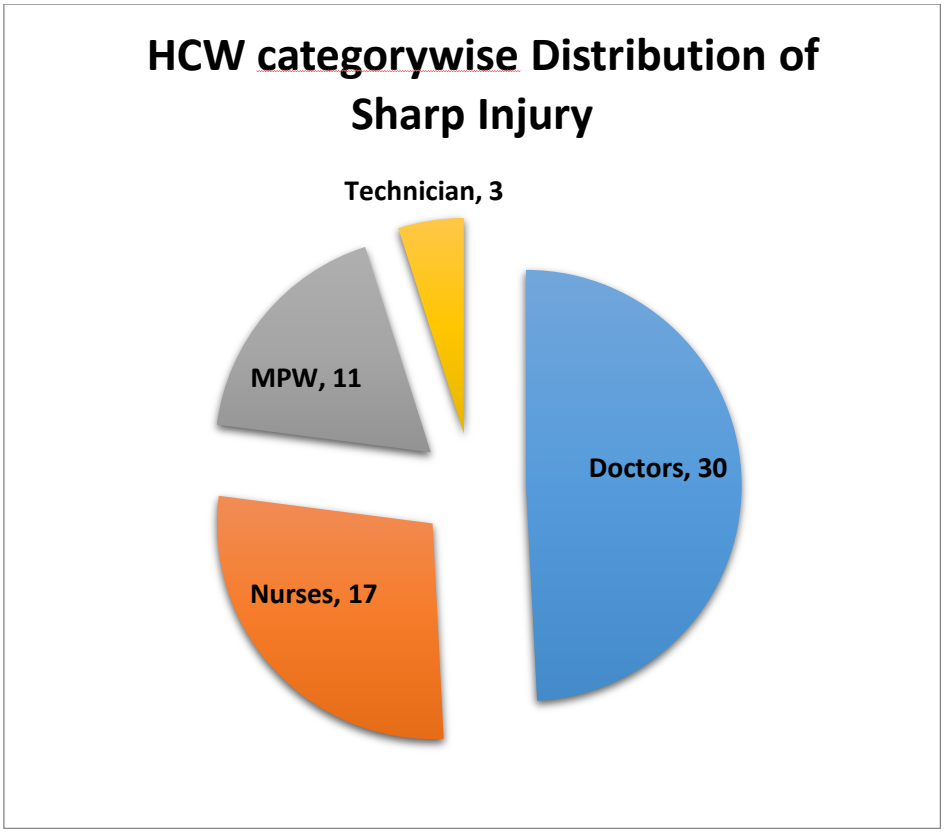

Figure 2: - Healthcare category wise distribution of Sharp Injuries

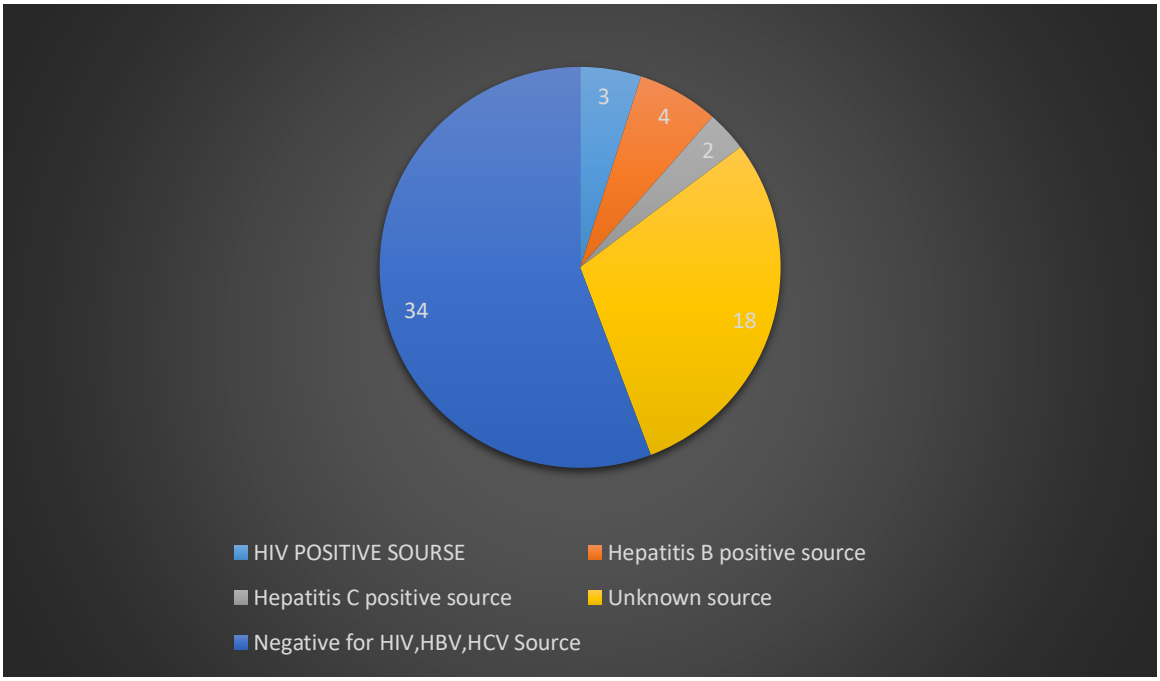

Figure 3 Serology Status

Table 1: -Root Cause analysis of Sharp injuries

Sr.No	Reasons of getting sharp injury	No.of Sharp Injury
1	Wrong segregation of needle into yellow bag	21
2	Recapping needle	19
3	No gloves	5
4	Patient movement	4
5	Needle disposed into far away container	4

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6	Rush	2
7	Segregation from puncture proof container	2
8	Suturing	3
9	Loose gloves	1
Total -		**61**

Wrong segregation was the most common cause for sharp injuries followed by recapping of needle.

Table:-2 Cost analysis of sharp injuries

	Type of cost	Distribution	Total cost (INR)
1	Direct cost	Cost of lab testing of Source (HIV,HCV,HBsAg)	68800
		Cost of Baseline lab testing of exposed (HIV,HCV,HBsAg)	97600
		Follow up lab testing for exposed with source seropositive status	43200
		Consultation charges(ID,ICU Physician)	91500
		Treatment charges (ART for 28 days for HIV positive exposure and stat dose for all HCWs who got NSI.	112457
2	Indirect cost	Work force cost in terms of hourly wages	120742
3	Total Cost	Direct cost + Indirect cost	534299

So per incidence expenditure by hospital is 8759 INR.

DISCUSSION

Being NABH accredited hospital, surveillance of sharp injuries (SI) is an on-going process in our hospital. In this cross sectional study Total 61 Sharp injury episodes were recorded for a period of January 2023 to December 2023, comprising of 174869 inpatient days. This study reports SI incidence of 0.35/1000 inpatient days. Which is higher than other studies conducted in different parts of India. RangineniJayprada et al [3] at Tirupati Andhra Pradesh reported rate of 0.13 while Suchitra shenoy et al [5]at Mangalore reported 0.12. Study done in Saudi Arabia by Rashidov A et al which included data from 2005 to 2017 on sharp injuries had maximum rate of 57 in 2010 and lowest 32 in 2012.The sharp injury rate varies from country to country and even in different regions within same country. This highlights the importance of regular monitoring of sharp injury in a healthcare setup.

Females are most affected in present study which is in concordance with other studies in India and globally.[3,5,8,9]

Being teaching hospital, there is always floating population of resident doctors, interns, nursing students, paramedical students. Sharp injury was maximum in month of february and august 2023. February, where the new batches of post MBBS internship will start and in august, where new junior resident doctor's batches will start working. It warrants the need of training to avoid sharp injuries.

Majority Doctors were affected as more resident doctors got the Sharp injuries. Resident doctors are the main workforce in hospital. This is in agreement with study done by Sarah A et al,[9] Roshan Mathew et al[10] but studies in INDIA and globally maximum nurses were affected.[3,8] This might be because in other than teaching hospitals the nurses manpower is always more.

Improper biomedical waste disposal was the most common cause for getting sharp injuries in our study, followed by Recapping Needle. This is similar to study done in Malaysia by Santhan et al.[11]Jayprada et al[3]in her study found out recapping as the most common cause followed by improper biomedical waste disposal. Roshan Mathew et al [10] reported sampling and recapping as the most common cause for getting sharp injuries.

In our study source was seropositive in 9 (14.75%), seronegative in 34(55.73%) and source was unknown in 18(29.51%). Among 9 positive cases 3 were HIV and 4 were HBV positive source. Zero seroconversion for HIV and HBV was found in present study which is similar to other studies in India[3]. As per hospital policy while joining itself all healthcare workers are inquired about hepatitis B vaccination status, and those who are not vaccinated or partially vaccinated

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are instructed to complete the vaccination. So only 2 out of 4 HBV exposed required treatment as the antibody titer found was below10mIU/ml.This is similar with study done by Roshan Mathew et al[10], in their study majority exposed took immunoglobulins but few of the exposed took both immunoglobulin and vaccination for Hepatitis B. This shows that national policy has to be designed and implemented for uniformity.

Average cost per episode of sharp injury in our study is 8759 INR. Cost of per incident of sharp injury may vary depending on locations, type of tests performed and charges incurred for different tests and treatment. M Adil in his study done in 2017 reported that cost per episode of sharp injury ranges 1914INR – 23930INR.[12] Alice Mannocci reported that globally cost varies between 199USD TO 1691 USD.[13]

CONCLUSION

Despite having proper infection prevention and control protocols and policies along withefforts taken to prevent sharp injuries, still sharp injury incidences continue. This warrants more emphasis on targeted training to prevent sharp injuries and increase use of safety devices.

Limitations of the study

It is a single-centre study. Future studies focussing on assessing the knowledge and psychological impact sustained by healthcare workers will give moreinsights in formulating training programme for healthcare workers.

The manuscript has been read and approved by all the authors, and each author believes that the manuscript represents honest work.

Conflict of Interest- The authors declare that there is no conflict of interest.

Authors' Contribution- All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Ethics Statement -This study was approved by the ethics committee of Bharati Vidyapeeth Deemed to Be University Medical College, Pune.

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