Section: General Medicine

Original Research Article

RETROSPECTIVE ANALYSIS OF OCCUPATIONAL NEEDLE STICK INJURY IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Approximately two million healthcare workers worldwide experience accidental needle stick injury (NSIs) annually. Awareness of needle stick injury (NSI) prevention and treatment is vital. It helps prevent infections, encourages reporting, improves safety protocols, and safeguards healthcare workers and patients. Therefore present study is formulated to understand pattern of needle stick injury (NSIs) and its outcome over last five years.

Materials and Methods: We documented and analysed the data of occupational needle stick injury (NSI) among health care workers from January 2017 to December 2022. We used a predetermined questionnaire to analyse the pattern of needle stick injuries (NSI's) which included type and source of injury, Hepatitis B immunization status of healthcare workers, source serology status and need for post exposure prophylaxis treatment in a tertiary care centre.

Results: Total of 379 needle stick injury was observed during our study period. Maximum number of NSI's were seen in Category IV [137 (36.16%)] followed by Nursing Staff [119 (31.40%)]. These injuries predominantly occurred in General wards [167 (44.06%)] and ICU set-up [79 (20.84%)] within the hospital. Amongst the NSI, source serology was unknown in 21.9 %. Further of all NSI 6.06% happened to be HBsAg positive source while 2.12% were seropositive for HIV.

Conclusion: On the basis of outcomes of the study, we stated that the class IV workers and nursing staff experienced the most needle stick injuries. These injuries were predominantly observed in ward areas and the ICU setup within the hospital. To reduce needle stick injury (NSIs), providing focused teaching programs and implementation of standard operating protocols by the institute for categorical workers with high injury rates and a routine review of policies in areas with high injury rates should be executed.

Keyword: Intensive care unit, Needle sticks injury, Human immune deficiency virus.

INTRODUCTION

Needlestick injuries (NSIs) present a significant hazard to healthcare personnel, making them vulnerable to bloodborne pathogens and related diseases. These NSI's carry a potential menaceof transmitting several blood-borne infectious diseases, notably Hepatitis B (HBV), Hepatitis C (HCV) as well as Human Immune deficiency Virus (HIV).[1] Despite efforts to prevent sharp injuries through measures like equipment design improvements and employee training, these incidents persist during the use, disassembly or disposal of sharp devices. According to the US Occupational Health and Safety Administration (OSHA), 5.6 million healthcare workers (HCWs) are still at danger of being exposed to several bloodborne pathogens at work as a consequence of NSIs.[2]

Needlestick and sharp injuries (NSSIs) have a significant global impact. The Centres for Disease Control and Prevention (CDC) estimates that hospital staff members in the US sustain about 385,000 sharp

injuries yearly.[3] According to the World Health Organization (WHO), around 3 million healthcare workers become exposed to the skin fluids that have been infected with hepatitis B, HIV as well as hepatitis C each year.[4] The prevalence and frequency of NSI in India ranged from 61 % to 79.5% and 2.3 to 4.5 per HCW per year respectively. Incidence density was 228.57 per 100 person days. 79.5% to 90.5% HCWs reported having at least one NSI in their career.[5]

Therefore we decided to analysed the past hospital records of five years to understand the pattern of needlesticks injury, the immunization status of the employees, the adherence to protocol of hospital infection control committee and outcome of NSIs.[6]

MATERIALS AND METHODS

Our tertiary medical centre is a busy medical college setup with approximately 2000 beds in Marathwada region of Maharashtra, India. A retrospective analysis was conducted on all reported cases of NSIs that occurred between January 2017 and December 2022at the Mahatma Gandhi Mission Medical College and Hospital, Aurangabad. The reports contained essential details, including job category, injury timing, department of occurrence, the specific sharp device involved, vaccination status of affected healthcare workers as well as another pertinent evidence concerning NSIs. This study involved 379 healthcare professionals, including doctors (consultants, specialists, residents and interns), nurses, other healthcare staff and housekeepers. All HCWs who experienced sharp damages were required to report these occurrences to the hospital's infection control nurse, under the hospital infection control committee. The infection control office staff diligently documented comprehensive information for each NSI case. Prior to analysis, proper consent for data assortment was obtained from the Institutional Ethics Committee. To protect the privacy and dignity of healthcare workers, all participant identities were anonymized in the dataset used for analysis. In this study, a variety of medical tools and instruments, including disposable syringes, hypodermic needles, phlebotomy needles and many other types of needles, scalpels, scissors, razor blades, and similar sharp objects, were included in the definition of sharp devices.

Statistical Analysis

Descriptive statistics were calculated for each variable. Categorical variables were summarized by frequencies and percentages. Normally distributed data were presented as “Mean +Standard deviation (SD). Non-normally dispersed data were expressed as the median as well as interquartile range (IQR). We used the 95% confidence interval (95%CI) to indicate the level of uncertainty associated with an estimate.

RESULTS

Table 1: Distribution of needle stick injuries according to Category of workers affected

Category of worker affected	Number	Percentage
NURSING STAFF	119	31.40
INTERN AND RESIDENTS	109	28.76
CLASS IV WORKERS	137	36.16
FACULTY	6	1.58
TECHNICIAN	4	1.05
OTHERS	4	1.05
TOTAL	379	100

Table no. 1 shows, distribution of needle stick injuries according to category of worker affected, majority 137 (36.16%) of category affected was class IV workers followed by nursing staff i.e. 119 (31.40%).

Table 2: Location of needle stick Injury in hospital

WORK AREAS	Number	Percentage
WARDS	167	44.06
ICU SETUP	79	20.84
CASUALTY	63	16.63
OPERATION THEATRE	13	3.44
OBGYN/LABOUR ROOM	23	6.06
OPD	7	1.85
DIALYSIS	10	2.64
OTHERS	17	4.48
TOTAL	379	100

Table no. 2 shows, location of needle stick Injury in hospital, Majority 167 (44.06%) occurred in ward followed by ICU set up i.e. 79 (20.84%).

Table 3: Source of needle stick injuries in hospital

Source of needle stick injury	Number	Percentage
Known	252	66.50
Unknown	83	21.90

Unused needle	44	11.60
Total	379	100

Table no. 3 shows, Source of needle stick injuries in hospital, Majority 252 (66.50%) knew their source of needle stick injury followed by 83 (21.90%) were unknown about the source.

Table 4: Serology status of source of needle stick injuries

Serology status of source of needle stick injury	Number	Percentage
HIV positive	8	2.12
HBsAg positive	23	6.06
Serology Status Negative	348	91.82
Total	379	100

Table no. 4 shows, Serology status of source of needle stick injuries. Out of 379, 23 (6.06%) were HBsAg Positive and 8 (2.12%) were HIV Positive

Table 5: Hepatitis B Immunization status of HCWs with NSIs in our hospital

Immunization status of health care workers	Number	Percentage
Immunised	257	67.81
Non immunized	68	17.95
Incomplete/Partial	54	14.24
TOTAL	379	100

Table no. 5 shows, Hepatitis B Immunization status of HCWs in hospital, out of 379 health workers, 257 (67.81%) were immunized.

Table 6: Analysis of Hepatitis B positive Needle Stick Injury

Hepatitis B related Immunization from 2017-2022	No. of HbsAg Positive Pricks.	Anti-HBsAg titre > 10	Anti-HBsAg titre < 10	Non-Immunized	HepatitisB immunoglobulin recipient
Number	23	13	10	5	15
Percentage	6.06	3.42	2.63	1.31	3.95

Table no. 6 shows, Hepatitis B related Immunization and the percentage distribution of individuals with Anti-HBsAg titre and the number of Hepatitis B immunoglobulin recipient.

Table 7: Analysis of HIV positive Needle Stick Injury

Parameters	Number	Percentage
HIV positive prick	7	1.84
ART received	3	0.79
ART refused	4	1.05

Table no. 7 shows, complete anti-retroviral therapy recipients, out of 7 seropositive pricks, 3 (0.79%) had received ART prophylaxis.

DISCUSSION

In the field of nursing and medical sciences, injuries caused by sharp medical instruments are highly prevalent as occupational hazards. This method of injury poses a significant risk for the spread of various blood-borne diseases. Therefore, the present study aims to shed light on the analysis of such injuries in regional referral centre.

In our study we found that majority of individuals 137 (36.16%) affected were class IV workers followed by nursing staff i.e. 119 (31.40%). Class IV workers more effected in our study indicated decreased awareness, ignorance and need more training. The elevated risk of NSIs among nurses, mainly caused by their numerous and direct interaction with patients. This finding aligns with similar investigations conducted in different institutes world wide.[7,8,9,10] These findings underscore the critical need for heightened emphasis on the prevention of NSIs between nurses, with significant implications for the healthcare system

One significant discovery in our study concerns the location of needlestick injuries within the hospital. The majority, 167 (44.06%), occurred in the ward, followed by the ICU, with 79 (20.84%) cases. The majority of these injuries took place in patients' rooms or wards and among HCWs who were under the age of 40.[5,11,12]

Similarly, in a study conducted by Abebe et al,[10] involving 151 participants, 65% were male respondents, and 48.1% had 4 to 10 years of nursing knowledge. Notably, nurses in the emergency department had an 11-fold higher likelihood of experiencing such injuries compared to those in the outpatient department (adjusted odds ratio [AOR] =

11.511, 95% confidence interval [CI] 2.134-62.09, p = 0.004). Same findings were noted in other studies also.[13-18]

The majority (66.5%) of needle stick injuries in the hospital were caused by known sources, making it easier to manage exposure. Injuries from unknown sources accounted for 21.9%, posing a higher risk due to uncertainty about potential infections. Additionally, 11.6% of injuries involved unused needles, highlighting the importance of careful handling of all needles. In other study 80% cases injuries were caused by known sources,[11,17,19] and 13% injuries were during waste disposal.[17] Overall, the data emphasizes the need for strict safety protocols to reduce needle stick injuries and protect healthcare workers from exposure risks.

Adherence to standard operating protocols after needle stick injury was almost 98% with almost all the Needle stick injury in the hospital premises being immediately reported and documented. Health care personnel who suffered from Needle stick injury went through a systematized order of set protocol for documenting, investigating and treating Needle stick injury whenever needed.

Out of 379 individuals, source status was positive for HBsAg in 23 (6.06%) cases and source status for HIV was positive in 8 (2.12%) of cases. In other study HBsAg positive source was around 5% and HIV positive source was 4-5%.[17,19]

The study summarizes Hepatitis B immunization outcomes from 2017 to 2022, showing that 6.06% of needle stick injuries were linked to HBsAg positive pricks. Among the exposed, 3.42% had adequate immunity (anti-HBsAg titre > 10), while 2.63% had insufficient immunity (titre < 10). Additionally, 3.95% received Hepatitis B immunoglobulin post-exposure. These findings underscore the need for robust immunization programs and regular antibody monitoring for healthcare workers.

In our study examining the immunization status of HCWs at our hospital, out of 379 health workers, 257 (67.81%) were found to be immunized against Hepatitis B with additional 14.24% incompletely immunised or in the process of immunization. Other study immunisation status of HCWs was around 94%.[18]

Dhayagude et al,[19] reported that among 16 needle stick injury episodes, the source was HBsAg positive; however, none of the exposed individuals required immunoglobulin. All exposed individuals had protective anti-HBsAg antibody titers. Also, Goel et al,[20] demonstrated in their study that approximately one-fourth of vaccinated individuals had anti-HBs titers<10 IU/ml, which is below the protective level. Additionally, post-exposure prophylaxis (PEP) for either HIV or HBV was received by 3.9% of healthcare workers (HCWs).

From 2017 to 2022, only 3 individuals (0.79%) received Complete Anti-Retroviral Therapy (ART), indicating a limited uptake of this essential treatment. Study done by Goel et al,[20] showed 3.9% received complete ART. This low percentage may reflect barriers to access, late diagnosis, or other challenges within the healthcare system. The findings underscore the need for improved HIV screening, diagnosis, and treatment accessibility to ensure that more individuals can benefit from effective ART.

Awareness about risks of needle stick injury among the healthcare worker was almost 98% with each of them receiving immediate primary care according to hospital needle stick injury protocol.

CONCLUSION

Our study is a comprehensive analysis of five years of Needle Stick Injury cases in a busy tertiary care teaching hospital in Central Maharashtra. The centre has a robust immunization protocol for Hepatitis B vaccination. Also frequent training and awareness sessions regarding prevention and treatment of Needle Stick Injury are conducted. Still looking at the analysis, we found that Hep B vaccination rates can be improved with immunization.

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