

Needles Stick Injuries in a Tertiary Care Accredited Hospital

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Abstract

Needle stick Injury (NSI) is wounds caused by needles that accidentally puncture the skin. They pose hazard to health care workers and can transmit HBV, HCV and HIV. The aim of the paper is to present the findings of operational audit in an NABL accredited tertiary care hospital in India. The incidence of NSI was highest among nursing staff and associated with the practice of recapping in most of the cases. The lancets for glucose testing were used in indoor patients; the maximum occurrence of NSI was seen in wards (50.5%). The study contributes to the paucity of existing literature studies from India pertaining to NSI. It emphasizes on the need to set up nodal center in hospitals for NSI, timely event capture and post exposure prophylaxis supplemented by increased awareness and education of health care professionals.

Keywords: Needle Stick Injury; Clinical Audit; Health Care Worker

Introduction

Needle stick injury (NSI) is a ubiquitous phenomena seen in health care Workers (HCW) especially nursing staffs who are always at risk of needle stick injury (NSI) and infection with blood borne pathogens: like Hepatitis B and C viruses (HBV,HCV) and human immunodeficiency virus (HIV) [1]. The estimated proportion of health care workers exposed to blood - borne pathogens globally were 2.6% for HCV, 5% for HBV and 0.5% for HIV corresponding to 1600 HCV infections and 66,000 HBV infection in HCW worldwide [2], the proportion might be higher up in developing countries. What constitutes NSI? NSI is defined as a percutaneous exposure caused due to breach of skin by needle or any sharp object contaminated with blood or body fluid due to an accidental prick [3]. NSI is under reported in developing country partly attributed to unawareness, increased work pressure and due to unavailability of active surveillance system. It is well supported in literature studies by Pirwitz., *et al* [4] and Holodnik and Barkauskos [5] who estimated underreporting rates between 64% and 96% respectively. The data from India in 2006 suggested that of the 3 - 6 billion injections given per year nearly 2/3rd of injections were unsafe [6,7]. Globally the WHO report suggests that 2.5% of healthcare workers around the globe have been infected with AIDS and 40% with Hepatitis B and C [8,9] where the average rate of infection for HBV, HCV and HIV has been 1 in 3 for HBV (6 - 33%), 1 in 30 for HCV (1 - 10%) and 1 in 300 in HIV (0.04 - 0.3%) [10,11]. WHO also recommended that every hospital should have an established functional nodal center for documentation of NSI [12,13] with availability of timely counseling to alleviate anxiety of professionals sustaining NSI. It is disheartening that most of the Indian hospitals lack dedicated Nodal center for NSI, which deprives the health care worker from receiving post exposure prophylaxis (PEP) [14].

We collected NSI data from 2015 to 2019 (June) as part of operational clinical audit conducted for needle stick injury in the tertiary care Hospital which is ISO 9002 certified Hospital and NABH accredited. The hospital has safety protocols and incident reporting mechanism in place for accidents. The hospital has standard operating procedure for providing post exposure prophylaxis to health care worker immediately after needle stick injury and is captured as a part of incident reporting mechanism. This been a clinical audit involving hospitals healthcare workers only and no patients therefore approval from institutional ethics committee was not obtained.

Method

The audit was conducted at Santokba Durlabhji Memorial Hospital and Research Centre Jaipur which is a 500 bedded tertiary care hospital. The team consisted of hospital infection control team members, quality managers, nursing floor supervisors, junior doctors, data collection team and statistician. The data was collected from documentation related to NSI and to ensure that there are minimal miss outs as the staff has been sensitized over the years and series of training sessions are also in place for NSI reporting, documentation, prevention and PEP. An exploratory analysis was done describing nature of events, situations, persons involving NSI. The incidence of NSI was estimated by calculating the ratio of NSI events during the year with total number of patients treated in the hospital. The data was tabulated in Microsoft excel version. Descriptive statistics was applied without any statistical tests.

Results

The four and a half year trend shows rise in NSI from 16% in 2015 to 21.7% and thereafter a slight decline to 17.6% in 2019 (Table 1 and 2). Among the various categories of staff affected by NSI the nursing staff had highest occurrence of cases each year 76.6% (2015), 67% (2016), 55.2% (2017), 65.5% (2018) and 70.4% (2019) (table and Figure 1). Large majority of sources were non reactive (Table 3) 72.04% in 2018, 77.08% in 2017 and 60.1% in 2016. (Figure 2) Hollow bore needle were involved in most cases of NSI 76.08% in 2018, followed by Lancets 11.9%, cannula 4.34% and suture needle 3.28% (Table 4) (Figure 3). However, there has been decline in lancet induced NSI from 30.98% in 2015 to 17.14% (2016), 8.33% (2017), 11% (2018) and 4.65% (2019). On further screening it was found that the lancet use during glucose charting was most common procedure that resulted in NSI - 60% in 2016, 62.5% in 2017, 90% in 2018 and 100% in 2019 (Table 4). The lancets for glucose testing were used in indoor patients; the maximum occurrence of NSI was seen in wards (50.5%) followed by ICU (31.1%) and later in OT (6.4%), pathology (3.2%) and biomedical waste department (4.36%) (Table 5) (Figure 4). Fingers were the most common site of injury 77.9%, followed by hand 12.9%, foot (6.5%) and arm (2.8%) (Table 6) (Figure 5).

S.No	Category of staff	Number of injuries									
		2015	%	2016	%	2017	%	2018	%	2019	%
1	Doctors	05	6.9	01	1.4	06	6.2	05	5.3	03	6.8
2	Nursing staff	55	76.3	48	67	53	55.2	61	65.5	31	70.4
3	Housekeeping staff	02	2.7	19	26.7	31	32.2	24	25.8	07	15.9
4	Technical staff	10	13.8	03	4.2	06	6.2	03	3.2	03	6.8
Total		72		71		96		93		44	

Table 1: Needle stick injuries Category wise (2015 - July, 2019).

Year	2015	2016	2017	2018	2019
NSI	72	71	96	93	44
Beds	450	450	450	500	500
Incidence NSI/100 Beds	16%	15.8%	21.3%	18.6%	17.6%

Table 2: Incidence of NSI per 100 hospital beds.

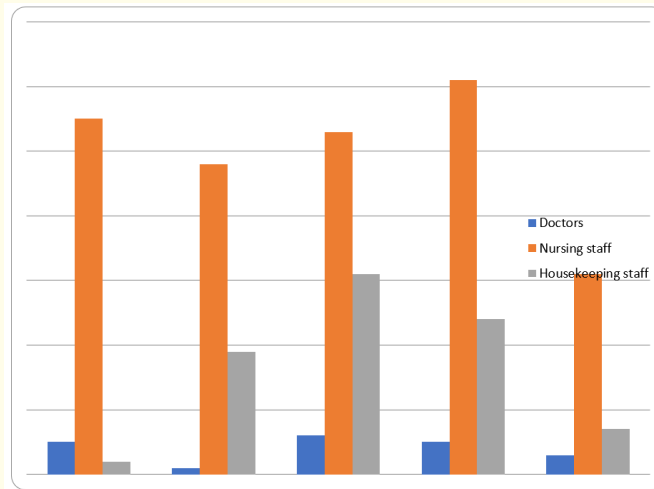


Figure 1

S. No	Status of the source	Number of cases							
		2016	%	2017	%	2018	%	2019	%
1	Positive for -HIV	01	1.48	04	4.16	02	2.15	01	2.27
2	Positive for HCV	04	5.63	04	4.16	00	0	00	0.1
3	Positive for HbsAg	02	2.81	02	2.08	04	4.30	03	6.81
4	Non reactive	49	60.1	74	77.08	67	72.04	36	81.81
5	Source not Known	15	21.12	12	12.5	20	21.5	04	9.09
Total		71		96		93		44	

Table 3: Statues of the source.

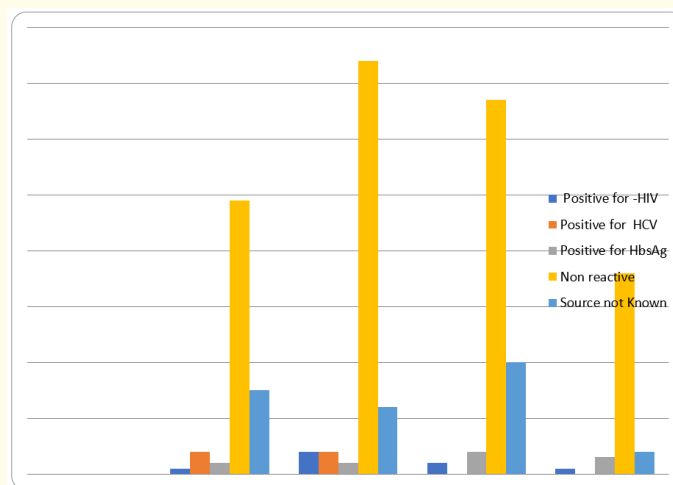


Figure 2

S. No	Status of the source	Number of cases									
		2015	%	2016	%	2017	%	2018	%	2019	%
1	Hollow bore needle	39	54.92	50	71.42	74	77.08	70	76.08	28	65.11
2	Lancet	22	30.98	12	17.14	08	8.33	11	11.9	02	4.65
3	Suture needle	03	4.22	00		02	2.08	03	3.28	02	4.65
4	Scalpels	00		00		02	2.08	00		00	
5	Cannula stiller	07	9.85	05	7.14	04	4.16	04	4.34	09	20.9
6	From surgical blade	00		01	1.4	02	2.08	00		00	
7	Glass piece	00		00		01	1.04	00		00	
8	Knife	00		01		01	1.04	00		01	2.32
9	Blade	00		00		01	1.04	02	2.17	01	2.32
10	Blood Splash	00		01	1.4	01	1.04	02	2.17	00	
Total		71		70		96		92		43	

Table 4: Type of Object.

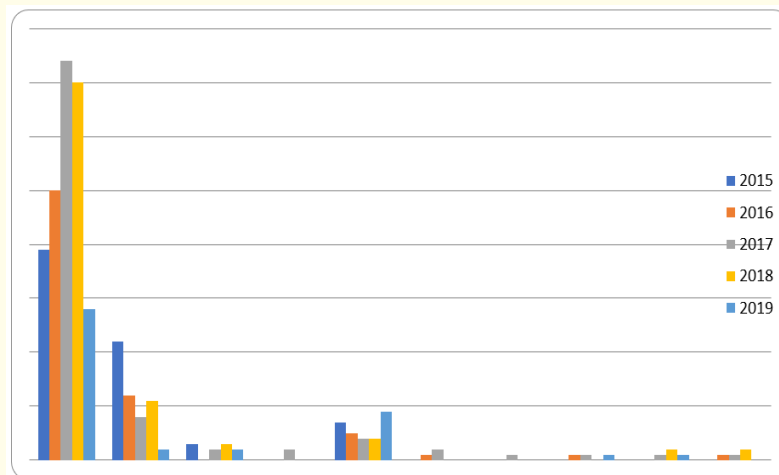


Figure 3

S. No	Status of the source	Number of cases									
		2015	%	2016	%	2017	%	2018	%	2019	%
1	OT	06	8.3	07	9.8	13	13.5	06	6.4	05	11.3
2	ICU	20	27	15	21.1	18	31.1	29	31.1	12	27.2
3	Ward	36	50	37	52	39	40.6	47	50.5	19	43.1
4	Pathology	06	8.3	03	4.2	07	7.2	03	3.2	04	9
5	Biomedical waste Dipo	02	2.7	05	7	09	9.3	04	4.3	00	
6	Others	02	2.7	04	5.6	10	10.4	04	4.3	04	9
Total		72		71		96		93		44	

Table 5: Area wise distribution.

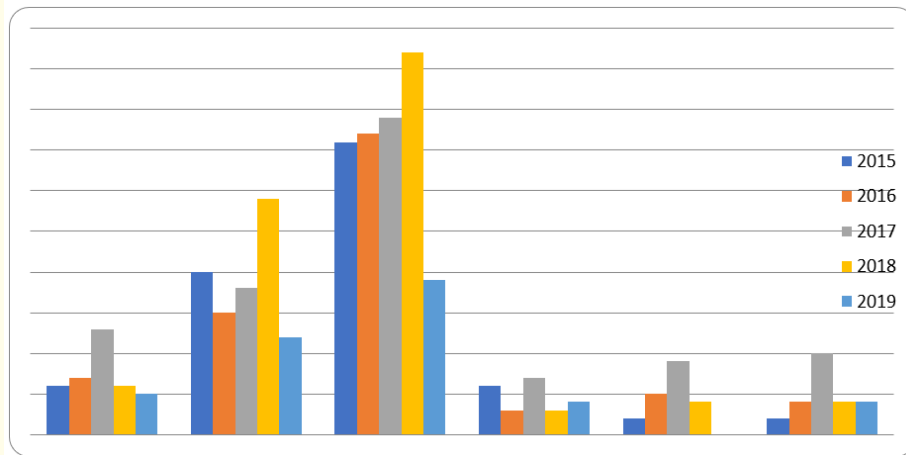


Figure 4

Nsi Incident Location Of Injuries					
Year	Location				
	Hand	Foot	Finger	Arm	
2017	8 (8%)	6 (6.5%)	74 (81.3%)	3 (3.2%)	96
2018	15 (18.1%)	5 (5.9%)	62 (74.7%)	1 (1.2%)	93
2019	5 (11.6%)	3 (6.5%)	33 (76.8%)	2 (13.9%)	44
	12.9%	6.5%	77.9%	2.8%	

Table 6: NSI Incident Location of Injuries.

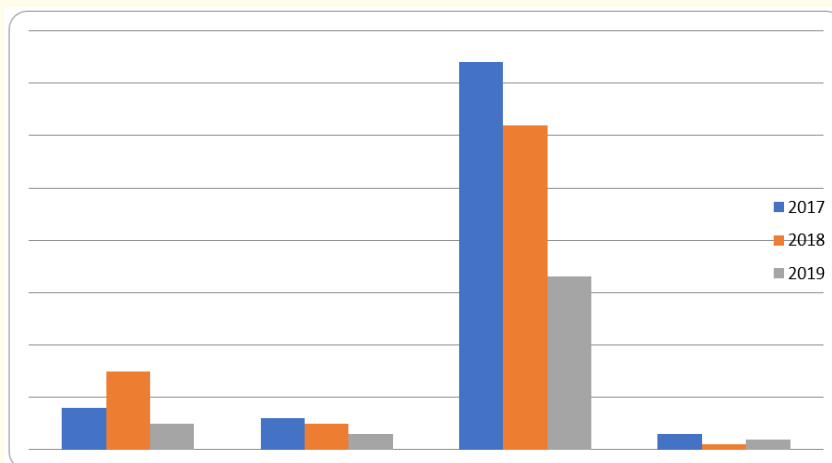


Figure 5

Discussion

The 4^{1/2} year date analysis at tertiary care hospital shows that the incidence of NSI per 100 beds has been from 16% to 17.6% in current year. In between these years there was an increase in NSI incidence that was attributed to the strike in hospital that prompted hospital to recruit new employees in short stretch of time to continue services of hospital going uninterrupted. The newly appointed staff took time in settling down and as the recruitment took place in November 2017 the impact was evident on NSI incidence for both year 2017 and 2018 stood at 21.3% and 18.6%.

Improper handling, disposal and lack of adherence to standard procedures are key factors responsible for the majority of NSI. The number of events over past 5 years in our institute varied from 72 (2015), 71 (2016), 96 (2017), 93 (2018) and 44 (2019). As per API net data [15] and equivalent number of injuries for 500 bedded teaching Hospital like our shall be much higher. The study is by Mehta, *et al* [16] from Hinduja Hospital Mumbai reported 380 NSI cases between 1998 to 2003, CMC Vellore [17] reported 347 cases 1993 - 1999 and LTM Hospital [18] Mumbai 34 cases 2000-2001. The number of HCW experiencing NSI at some point of time is other studies from India - Delhi 17.5% by Sharma, *et al* [19], 80.1% in Delhi by Muralidhar, *et al* [20], 57% in Karnataka by Radha and Khan [21], 61.4% in Kolkata by Jerdal, *et al* [22] and 34% in Goa by Salelkar, *et al* [23]. The incidence of NSI at our institute has been 15% in 2015, 15.7% in 2016, 21.3% 2017, 18.6% 2018 and 17.6% (midyear data) in 2019.

A lot of emphasis has been given on self reporting of the incidents by Health Care Worker (HCW) as there are literatures reports of gross under reporting of accidental exposure and NSI in hospitals. The yearly follow-up showed zero conversion for HIV, HBV and HCV which is similar to other Indian studies [15-17]. In India two cases of seroconversion of HIV have been reported from Chandigarh [24]. The current study also showed that all health care workers were vaccinated for Hepatitis B. This high rate of vaccination is indicative that hospital had paid attention to immunization of its health care professionals. However vaccination alone is not sufficient rather employees should regularly check and control their antibody levels of dangerous levels.

The result of the study showed that the incidence of NSI among nursing workers was 70.4% during their working period. NSI among nurses was reported more than the other at risk groups similar to previous studies [20] and study from teaching hospital in Mumbai [25]. The findings were consistent with previous studies from other low-middle income countries [26-29]. The incidence of NSI from other studies from South Africa [30] was 46.7% and from Australia [31] 63.5%. Long duty hours, heavy workload and lack of awareness pertaining to NSI are major factors that result in high incidence of NSI among nursing staff [32, 33].

The results revealed that needle recapping was the most common procedure responsible for greatest number of injuries. The practice of recapping results in high chances of NSI. This practice of recapping has been condemned in literature studies and several remedial measures been suggested [34,35]. Our findings are consistent with earlier studies by Sharma, *et al* [19] and Murlidhar, *et al* [20] who reported that recapping was mostly responsible for NSI in 34% and 39%. Similarly Russi, *et al* [36] reported 62% of NSI in their study attributed to hollow borne needles. It is recommended to discard the habit of recapping of needle to reduce NSI. Lack of availability of needle destroyer (due to inadequate supply), carelessness (with needle lying on floors and beds) and improper segregation of BMW while handling or transportation of bags is risk factors for injuries. The BMW should be periodically audited to improve waste disposal practices. There should be used of heavy-duty gloves by BMW disposal personal and complete abandonment of re segregation practices at disposal site. Lancet was used for glucose estimation, bleeding time and clotting time. Recapping of lancets was associated with high incidence of NSI. It is ironical that WHO has strictly recommended that all health care professionals should avoid recapping needles or bending, breaking or manually removing needles before disposal but still NSI are quite common.

The wards 43.1% and ICU's 27.2 were the most common areas for NSI occurrence partly due to high stress level, turbulence and direct maximum patient contact. It is essential that hospital derived policies and procedures to minimize burnout of its staff as tired staff is more likely to commit error. Junior and new staff whether at any level needs to be trained as it helps in preventing NSI in developing countries. Telali., *et al* [37] in their study from South India have emphasized that as work experience increases the incidence of needle stick injuries decreases.

The impact of training and educations is seen among staff members with the housekeeping staff responding well with decreased NSI incidence in 2018 and further lower number in 2019. Awareness activities, training activities and regular quality control measures are needed to implemented safe practice by health care workers. A CDC report suggested that the use of safety engineered medical device (SEMD) (Figure 6) reduces incidence of NSI in health care setting [38]. We incorporate the same in routine use like safety lancet, hub cutter and sharp collector, blunt fill and filter needle help to reduce NSI in hospital setting. One of the limitations of our study was lack of complete meticulous follow up during post exposure periods, first aid measures, reaction time for first PEP for HIV were not recorded. There is much need for improvement in working conditions and safety protocols for healthcare workers for reducing the high burden of occupational injuries and NSI existing in Indian hospitals. It is essential that continuing medical education of health care worker about reporting protocols, do's and don'ts in case of NSI, post exposure prophylaxis where necessary are regularly imbibe in working for creating a safe environment.

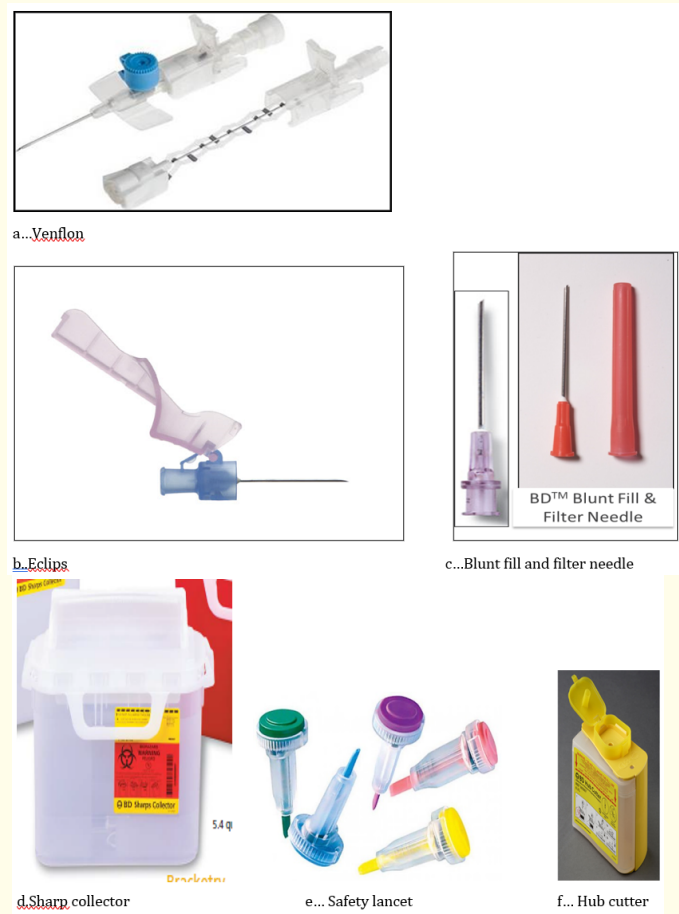


Figure 6: Safety engineered medical device (SEMD).

Conclusion

Entire hospital staff ward boy to nursing staff and doctors before joining the hospital should receive proper training pertaining to the use of sharp instrument like needles, scalpels -their disposal, first aid for needle stick injury, post exposure prophylaxis and hepatitis B vaccination. Training of health workers should be an ongoing process with greater emphasis on self reporting of NSE. Education material must be displayed at places in hospital to discourage recapping and newly employed staff should be taught correct techniques of handling and dispensing. It is the duty of policymakers and hospitals to safeguard health of healthcare workers. The need of hour is to have a clear cut written policy in each and every Hospital that explicitly mentions the procedure for reporting and the necessary protocols in case of needle stick injury.

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