

Study of needle stick injuries among healthcare providers: Evidence from a teaching hospital in India

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ABSTRACT

Background: Needle stick injuries (NSIs) are the injuries that are caused by needles, such as hypodermic needles, blood collection needles, intravenous stylets, and needles used to connect parts of intravenous delivery systems. NSIs are very common and in many instances unavoidable among healthcare providers when they are delivering patient care. Around 75% of the NSIs in developing countries are not reported. This study aimed to estimate the prevalence and other correlates and attributes of NSIs among healthcare providers in a tertiary care teaching hospital in South India. **Methods:** This is a cross-sectional study conducted in Narayana Medical College and Hospital in Nellore, Andhra Pradesh, between June 2012 and February 2013. Data using a structured questionnaire were collected among all the 1525 healthcare providers working in the teaching hospital. **Results:** Around 10.81% of the total healthcare providers in the teaching hospital were exposed to NSIs. Syringe needles (75%) were the most common devices leading to NSIs. Majority of NSIs took place in the wards of the different departments (75%). Morning shift (70%) was the most common time of the day for the occurrence of NSIs. Only 65% of the healthcare providers were wearing gloves at the time of injury. Majority (82%) took immediate treatment after NSIs. **Conclusions:** Establishment of formal reporting mechanisms, immediate reporting of NSIs, and the establishment of a comprehensive NSI prevention program will help in the reduction in the occurrence of NSIs and help in taking immediate remedial action in the form of prophylaxis and treatment.

Keywords: Healthcare providers, needle stick injuries, occupational hazard

Introduction

Needle stick injuries (NSIs) are the injuries that are caused by needles such as hypodermic needles, blood collection needles, intravenous stylets, and needles used to connect parts of intravenous delivery systems.^[1] NSIs are very common and in many instances unavoidable among healthcare providers when they are delivering patient care. In the healthcare sector, NSIs are one of the most preventable occupational hazards among healthcare providers.^[2] Centers for Disease Control (CDC) of the United States of America estimated that exposure to blood and body fluids by sharps and NSIs affect around three million health workers annually with an estimated occurrence

of six million NSIs every year.^[3] The occupational exposures to NSIs are considered to be much higher in the developing world and much of the cases are not even reported.^[4] It is expected that around 75% of the NSIs in developing countries are not reported.^[4] Globally, there is gross under-reporting of NSI with the actual incidence of NSIs being much higher than those reported.^[5] Healthcare institutions must be careful not to interpret or understand the low reporting rate as low rate of injury. Studies have shown that the NSIs that are reported through the normal hospital reporting systems are underreported to the extent of 10 times lower in many instances.^[6]

NSIs lead to a risk of developing various types of infections and healthcare providers are always under serious threat. The main problem because of underreporting of NSIs is that the people who are exposed could not be given postexposure prophylaxis (PEP) at appropriate time to prevent the development of infection in the

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person who has experienced NSI. For example, PEP for HIV is shown to be 80% effective in preventing the development of the infection.^[7] The risk of transmission of blood-borne infections, such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV), are common in NSIs, and thus, safety practices and guidelines must be practiced by all healthcare providers to protect themselves from infection.^[2] The risk of infection for different diseases varies highly. Due to NSI the risk of infection varies from 0.5% to 40% for HIV and HBV infections, respectively.^[8]

There is evidence of best practices that should be followed to avoid NSIs. However, the knowledge about them among the healthcare providers and their implementation seems to be very less. Although published evidence recommend that contaminated needles should not be recapped, but studies from developed countries, such as the United States, showed that recapping of needles is occurring commonly among the healthcare workers.^[3,9] There are no national reporting systems for NSIs in India, but a report in 2006 showed that around 63% of the 3–6 billion injections given every year are unsafe.^[10] NSIs have the potential to affect the health system both directly and indirectly. In developing countries with limited human resources for health, there are higher restrictions in the number of available doctors and nurses. NSIs and other health-related occupational injuries affect the health services provided by increasing the number of work days lost due to injuries and the emotional distress, which are caused to the healthcare providers due to NSIs.^[11]

The Ministry of Health and Family Welfare of the Government of India recommends that the healthcare providers must be made aware of the safety precautions that must be followed for the prevention of NSIs. Adequate training to the healthcare workers to handle the sharp objects is also equally vital.^[12] In addition to provision of information to healthcare providers and adequate training to them, effective reporting systems should be placed in all healthcare facilities for early reporting of cases and immediate actions to be taken to address the issue by providing adequate PEP and treatment.^[12] PEP can be initiated only if there is adequate and fast reporting of data. Some institutions in India maintain a staff health service facility, which registers all cases of NSIs and holds a record for them and have safety protocols in place to manage them and adequately monitor if the cases are being reduced.^[12] Safety protocols should be always in place in all hospitals and healthcare facilities to prevent the risk of NSIs and for the enforcement of safety precautions and immediate actions to be taken in the case of any exposures.^[12] There are limited data about the prevalence and attributes of NSIs in the different healthcare settings in India. This study aimed to estimate the prevalence, other correlates, and attributes of NSIs among the healthcare providers in a tertiary care teaching hospital in South India.

Methods

This is a cross-sectional study conducted in Narayana Medical College and Hospital in Nellore, Andhra Pradesh, India, between

June 2012 and February 2013. A structured questionnaire was developed for the study and it was pretested before the study. The questionnaire was distributed among all the 1525 healthcare providers working in the teaching hospital in various locations of the hospital, namely, wards of the different medical and surgical departments, intensive care units (ICUs), operation theatres, outpatient departments, and in the outpatient sample collection center. Healthcare providers included the physicians, staff nurses, operation theater personnel, and other support healthcare personnel. The study included both the full-licensed physicians, nurses, other support personnel working in the hospital, and also the medical, nursing, and other interns who were working under the supervisory advice of a fully licensed medical provider. A data enumerator was used to collect the data from the healthcare providers working in the hospital. Data regarding injuries by needle stick injuries including sharps such as cannulas, broken vials, and splashes on cuts, and mucous membranes by potentially infectious materials such as blood and other body fluids were collected. For the study, NSI was defined as “any cut or prick to the respondents by a needle previously used on a patient is work related and sustained within the hospital premises.”^[11] Data were entered into computer-based spreadsheets and analyzed using SPSS software.

Results

The results of the study showed that around 10.81% of the total healthcare providers in the teaching hospital were exposed to NSIs at work as shown in [Table 1]. The area of the hospital where most of the NSIs took place were the ward and bedside of the different medical and surgical departments (75%), followed by the emergency department (9%), outpatient departments of various specialties (7%), ICU (5%), and followed by the procedure rooms of the different departments (4%). No NSI was observed in the operation theaters as shown in [Table 2].

NSIs were caused by several different devices. Syringe needles (75%) were the most common devices leading to NSIs, followed by ampoule (12%), intravenous canula (10%), and suture needle (3%) [Table 3]. The time of occurrence of NSIs were before procedure (30%), during procedure (40%), and after procedure (23%) [Table 4]. The most common part of the body experiencing NSIs were fingers (93%), other parts of the hand without fingers (5%), and other parts of the arm except the hand (2%) [Table 5].

The most type of injury was pricks (98%), followed by cut (2%) [Table 6]. Morning shift (70%) was the most common time

Table 1: Needle stick injury (NSI) reported by healthcare providers

Criteria studied	Yes		No		Total Frequency
	Frequency	Percent	Frequency	Percent	
Ever had an NSI at work	165	10.81	1360	89.19	1,525

of the day wherein NSIs are taking place, followed by evening shift (15%), and night shifts (5%) having the lowest number of NSIs [Table 7]. The knowledge about NSIs and the preparedness and prophylactic measures for NSIs were studied using several

Table 2: Area of the hospital where the needle-stick injury takes place

Area of injury	Frequency (n=165)	Percent
Outpatient Departments	11	7
Procedure Room	7	4
Ward/bedside	124	75
Intensive Care Unit	8	5
Emergency Department	15	9
Operation Theater	0	0

Table 3: Device leading to injury

Devices	Frequency (n=165)	Percent
Syringe needle	124	75
Intravenous cannula	16	10
Suture needle	5	3
Scissors	0	0
Ampoule	20	12
Blade	0	0

Table 4: Time of occurrence of needle stick injuries

When did it happen	Frequency (n=165)	Percent
Before procedure	50	30
During procedure	66	40
After procedure	38	23
Not related to any procedure	11	7

Table 5: Parts of the body experiencing needle stick injuries

Body parts	Frequency (n=165)	Percent
Arm (but not hand)	4	2
Hand (but not fingers)	8	5
Fingers	153	93
Leg/foot	0	0
Torso	0	0

Table 6: Nature of the injury

Nature of injury	Frequency (n=165)	Percent
Prick	161	98
Cut	4	2
Others	0	0

Table 7: Work shift and needle stick injuries

Shift	Frequency (n=165)	Percent
Morning	115	70
Evening	25	15
Night	8	5
Do not remember	17	10

criteria. Around 65% of the health workers were wearing gloves at the time of injury, but only 18% of the health workers stopped procedure immediately to take care of the injury, and majority 58% of them informed superiors regarding the incident, and most of them (82%) took precautions and treatment after NSIs. Around 90% of them immune status checked after the injury, and most of the healthcare providers (90%) were aware of the steps to be followed after injury. Around 17% of the healthcare providers left work immediately after the injury as shown in Table 8.

Discussion

The results of our study showed that around 10.81% of the total healthcare providers were exposed to NSIs at work. Studies done in India showed that the prevalence of NSIs among healthcare workers was between 57% and 73%.^[13,14] Various studies done internationally showed different prevalence of NSIs. A study in Pakistan showed that the prevalence of NSIs was 54.2%,^[15] 63.3% in Iran,^[16] and 74% in Saudi Arabia.^[17] This shows that the prevalence of NSIs in our study was much lesser compared with other studies done both in India and internationally. In our study, the area of the hospital where most of the NSIs took place were the ward and bedside of the different medical and surgical departments, followed by the emergency department, outpatient departments of various specialties, ICU, and followed by the procedure rooms of the different departments. No NSIs were observed in the operation theaters. A study done in North India showed that the most common area where NSIs occurred were the emergency wards and ICUs.^[4] Some studies showed that operation theaters were the most common areas where NSIs occurred.^[11,18] Another study showed findings consistent with the findings of our study that medical and surgical wards were the common areas where NSIs occurred.^[19]

NSIs were caused by several different devices. In our study, the common type of devices causing NSIs are syringe needles, followed by ampoule, intravenous canula, and suture needle. Other studies showed that the most common device causing NSIs was the hollow bore needles, followed by suturing needle.^[13,20,21] Some studies showed that majority of NSIs occurred during sharps disposal.^[21] The findings of our study are consistent with the findings of other studies. In our study, majority of the healthcare providers were wearing gloves at the time of injury. A study in Iran showed that around 74% were using gloves when they experienced NSIs.^[22] Another study in India showed that around 39% were not wearing gloves at the time of NSIs.^[13] Although the findings of our study show that significant number of healthcare providers were wearing gloves at the time of NSIs, still the proportion is lesser compared with the studies done in other countries. In our study, 58% of healthcare providers informed superiors regarding the occurrence of NSI. Another study in India showed that around 85% of the health workers did not report NSIs and the reporting was lowest among doctors.^[13] Another study showed that around 32% of the health workers reported NSIs to their superiors in the hospital.^[21] Another study in Iran showed that around 82% of all NSIs went unreported.^[23]

Table 8: Knowledge, Prophylactic measures and Preparedness to tackle Needle Stick Injuries

Knowledge, Prophylactic measures and Preparedness	Frequency (n=165)	Percent
Wearing gloves at the time of injury	107	65
Stopped procedure immediately to take care of the injury	30	18
Informed superiors regarding the incident	96	58
Left from work due to needle/sharps injury	28	17
Taken treatment after the sharps/needle stick injury	135	82
Infection/immune status checked after injury	148	90
Knowledge of the steps to be followed after sharp injury	148	90

A study in Malaysia showed that only 40.8% of NSIs were reported.^[24] Although the proportion of healthcare providers who reported the NSIs to their superiors were relatively higher compared with other studies done in different parts of the world, but still huge gaps exist in the reporting of NSIs with around 42% of the NSIs going unreported.

In our study, the majority (82%) of healthcare providers took prophylaxis and treatment after NSIs. A study in India showed that only around 3% of healthcare providers experiencing NSIs took PEP for HIV,^[21] while another study in India showed that around 21.6% of healthcare providers took PEP for HIV after having an NSI.^[25] Another study from India showed that around 62.8% the doctors working in a hospital did not have information about the availability of HIV PEP in the hospital.^[26] The results of our study show that the high proportion of the healthcare providers in the study hospital took PEP after NSIs and this was higher compared with other studies done in India.

Conclusions

Prevention of NSIs is vital for the practice of family physicians including primary care providers who provide injections in their clinics and other outpatient services. Evidence obtained from this study will be particularly useful for them in their area of work and protect them NSIs if they take the adequate precautions. Preventing NSIs is the most effective way to protect healthcare providers including family physicians from the infectious diseases that are transmitted by accidents due to injury by needle sticks. The prevalence of NSIs in our study was relatively lesser compared with other studies done in India and internationally, but steps needed to be taken to prevent the occurrence of NSIs and early prophylaxis and treatment of every single case of NSI. Adequate preventive care protocols need to be established in the medical and surgical wards where most of the NSIs are taking place. Specific information should be provided to all healthcare providers regarding the care that should be taken during provision of injections and recapping of needles, since they constitute the highest proportion of NSIs in the hospital. Protocols for immediate formal reporting of NSIs need to be established in the hospital and this will address the gaps in reporting of NSIs. Immediate reporting of NSIs will help in the early initiation of post-PEP and treatment. It is important to have a comprehensive NSI prevention program in the hospital that includes employee training, safe recapping procedures, and effective surveillance.

Limitations

Primary data for the study were collected from the individual healthcare providers in the hospital. There are possibilities of recall bias and social desirability bias.

Ethical approval

The study was approved by the Institutional Ethics Committee of Narayana Medical College, Nellore, Andhra Pradesh, India, and the Tamil Nadu Open University, Chennai, India.

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Conflicts of interest

There are no conflicts of interest.

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