



A cross-sectional study on prevalence, knowledge, and risk factors associated with needle stick injuries among medical interns working in tertiary care hospitals.

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Abstract:

Background: One of the most frequent occupational dangers to which a health care worker (HCW) at a hospital is exposed is needle stick injuries (NSIs). Interns are among the most susceptible members of the healthcare workers, who are likely to sustain unintentional needlestick injuries. The primary cause is believed to be inexperience, which increases the chance of exposure and 40-75 percent of these injuries go unreported. It's critical to evaluate the risk, instruct the interns, and provide a secure work environment. Objectives of this study are to determine the prevalence of needle stick injury among interns in tertiary care hospital and to assess the knowledge, awareness and risk factors contributing to needle stick injury.

Methods and Material: For the study, 79 interns volunteered to take part. A semi-structured questionnaire was used to collect the information about knowledge, behaviours, and preventative measures among interns in their workplace.

Results: Prevalence of needle stick injury among interns was 10.8%. All interns were at risk associated with needle stick injury. Among 79 interns, 71 (89.87%) were aware of general safety procedures, and 88.61% were recapping needles before discarding them. The Chi-square test indicates a strong correlation between wearing gloves and needle stick injuries. The risk of needle-related harm is 6.78 times higher for those not wearing gloves than for those wearing them.

Conclusions: The lack of knowledge among the interns suggests that training programmes are necessary to reduce the prevalence of NSI among healthcare professionals, particularly among young physicians like interns who are just starting their careers in clinical practice.

Key-words: Interns, Knowledge, Needle stick injuries, Universal precautions.

Introduction: Needle Stick Injuries (NSI) are described as needle-related injuries, including those from intravenous stylets, hypodermic needles, blood collection needles, and needles used to join

intravenous delivery system components.¹ For hospital employees who are involved in patient care at a healthcare facility, needle stick injuries are an inevitable event. In accordance with a WHO study, the yearly estimated percentages of health care workers' (HCW) global exposure to blood-borne pathogens were 2.6% for the hepatitis C virus, 5.9% for the hepatitis B virus, and 0.5% for HIV, accounting to approximately 16,000 HCW infections worldwide for the hepatitis C virus and 66,000 infections for the hepatitis B virus.²

The majority of needle stick injuries are related to giving injections, drawing blood, recapping needles, disposing needles, handling trash and soiled linen, and while transferring the blood or any other body fluid from a syringe to a specimen container. Blood-filled hollow bore needles pose the greatest risk of injury.³ Strict observance of universal precautions, hepatitis B vaccination, personal protective measures, and timely management of exposures, including post exposure prophylaxis (PEP) and post exposure actions, can all help prevent the NSI and the consequent occupational hazards. Needlestick injuries persist despite the use of newer techniques and equipment's, which in turn pose a threat to health care workers against blood borne infections.⁴

Medical students, particularly interns, are more prone to accidental exposure to blood borne pathogens and body fluids due to the nature of their work, handling of specimens, inexperience, enthusiasm to learn, and ignorance of regulations and procedures. The danger of percutaneous injury rises with further ignorance or inclination to disregard the general precautions.⁵ Hence this study was undertaken to determine the prevalence of needle stick injuries and to assess the knowledge, awareness and risk factors contributing to NSI among interns in tertiary care hospital.

Materials and Methods:

Setting

The study was conducted among the medical interns working at tertiary care hospital.

Study design

A cross-sectional observational study.

Data collection tool

Following extensive review of literature, a semi-structured questionnaire was developed. The questionnaire included both closed-ended and open-ended questions on the occurrence of NSI, instrument type, frequency, and risk factors involved in NSI. There were additional questions on reporting and actions taken post NSI in the questionnaire. In this study NSI was defined as an injury caused by a sharp instrument, such as a needle, scalpel, or piece of contaminated glass that may have come into contact with body fluids. The content and validity of questionnaire were obtained after review by experts. The interns were given the verified questionnaire using a Google Form. The

participants received the questionnaire via email. Non respondents were contacted by reminder mails and phone calls.

Ethical clearance

Ethical clearance was obtained from Institutional Ethical Committee.

Sample size and study population

A total 79 interns participated in the study.

Inclusion criteria

All interns working in the hospital for more than 6 months were included in the study.

Exclusion criteria

Interns not willing to participate in the study and incompletely filled questionnaire.

Data collection

After taking an informed consent, the questionnaire was administered to the interns using a Google forms.

Statistical analysis

The results were tabulated and expressed as frequency and percentage. Data is analyzed using R software version 3.6.1. Chi-square test was done to compare the categorical variables and < 0.05 was considered as significant.

Results:

Among 120 interns, 79 responded to the questionnaire. Eight (10.1%) interns reported at least one incident of accidental exposure to blood or body fluids. 7(87%) males had a higher proportion of NSI than 1(12.5%) female. Odds of getting needles stick injury is 8.5 times more for males compared to females. (Table 1)

In this study, 61 (77.22%) subjects received training related to sharp disposal. All subjects were aware of risk associated with needle stick injury and 76(96.1%) were aware that Hepatitis B and HIV can be transmitted by needle stick injury and while only 27(34.2%) were aware of Hepatitis C transmission. 67(84.7%) were vaccinated for Hepatitis B. (Figure 1)

Out of 79 subjects, 60 (75.95%) used gloves while using syringes or needles for handling blood and body fluids. Among the subjects who don't use gloves, major reason of not using gloves was non-availability of gloves, lack of time, a greater number of patients and inconvenience in use of gloves. As shown in Table 2, 71 (89.87%) interns had knowledge of universal precautions and were aware that NSI can be prevented by adhering to universal precautions. Among 79 interns, 73 (92.41%) were aware of post exposure prophylaxis and 88.61% of the interns were recapping the needles before disposing.

Figure 2 summarizes the procedures causing injury. Most NSI took place during recapping of needle (25%), during withdrawal of blood (25%) and while suturing (25%). Out of 8 subjects, only 3(37.5%) interns reported needle stick injury other 5 did not report. Reasons for not reporting is summarised in the table 5. After needle stick injury 7 (87.5%) subjects washed their hands with soap and water and one of them dressed the wound. Risk factors that led to NSI among interns were mainly lack of skill and training 3 (37.5%), stress/ physical exhaustion 2 (25%), and lack of time/ during emergency (25%) were the leading causes of NSI as shown in Table 4.

Odds ratio is mentioned only for which Chi-square test is significant. By Chi-square test, there is no association between recapping of needles, disassembling used needles or sharps with hand and attending training about disposal of sharps with needle stick injury. But there is significant association between usage of gloves and needle stick injury by Chi- square test. Odds of getting injury from the needle is 6.7857 times more for the subjects who don't use gloves compared to the subjects who use gloves. (Table 3)

Table 1: Distribution of needle stick injury among male and female interns

Variable	Sub-category	Gender		p-value OR (CI)
		Male	Female	
Needle stick injury	No	36(45%)	43(54%)	0.03398
	Yes	7(87%)	1(12.5%)	8.5312 (1.0193-73.0061)

Table 2: Intern's knowledge and awareness of Needle stick injuries

Variables	Sub-category	Number of subjects (%)
Received training related to sharps disposal	Yes	61 (77.22%)
	No	18 (22.78%)
Awareness of risk associated with needle stick injury	Yes	79 (100%)
Followed universal precautions	Yes	71 (89.87%)
	No	8 (10.13%)
Vaccinated against Hepatitis B	Yes	67 (84.81%)
	No	12 (15.19%)
Awareness of post exposure prophylaxis	Yes	73 (92.41%)
	No	6 (7.59%)

Usage of gloves while using syringes or needles for handling blood and body fluids	Yes	60 (75.95%)
	No	19 (24.05%)
Disassembles used needles or sharps with hand	Yes	43 (54.43%)
	No	36 (45.57%)
Re-capping of needles	Yes	70 (88.61%)
	No	9 (11.39%)
Needle stick injury in last 6 months	Yes	8 (10.13%)
	No	71 (89.87%)
Reporting of needle stick injury	Yes	3(37.5%)
	No	5(62.5%)

Figure 1: Knowledge regarding the infections transmitted by needle stick and sharp injury

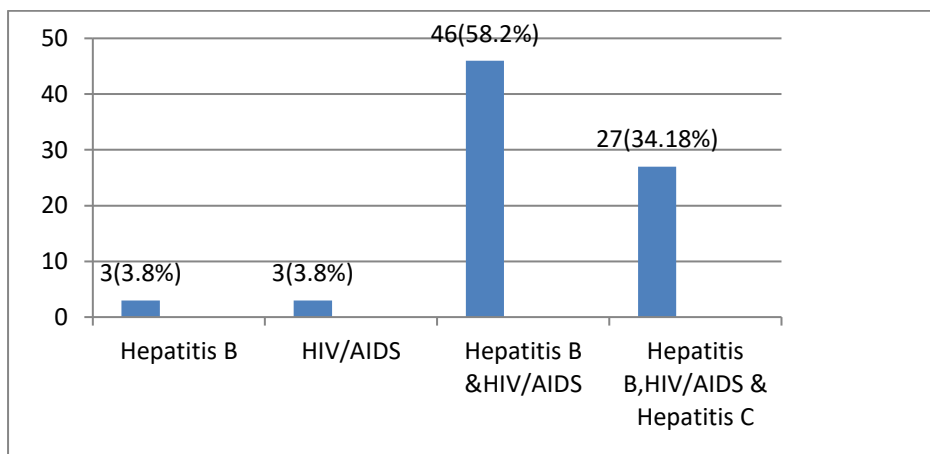


Table: 3 Associations between study variables.

Variable	Sub-category	Needle stick injury		p-value OR (CI)
		No	Yes	
Recapping of needles	No	9	0	0.5952 ^{MC}
	Yes	62	8	
Usage of gloves	No	14	5	0.01649 ^{MC} 6.7857 (1.4458-31.8476)
	Yes	57	2	
Disassembling used needles or sharps with hand	No	32	4	1 ^{MC}
	Yes	39	1	

Attended training about disposal of sharps	No	15	5	0.3583 ^{MC}
	Yes	56	2	

(Abbreviations: MC: Monte-Carlos simulation used to obtain p-value)

Figure 2: Procedures causing needle stick injury

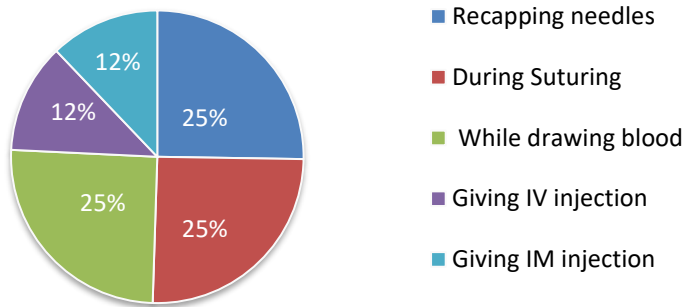


Table 4: Risk factors leading to needle stick injury

Risk Factors	Frequency N=8 (%)
Lack of skill and training	3(37.5%)
Emergency	2(25.6%)
Stress and physical exhaustion	2(25.6%)
Accidental	1(12.5%)
Increase work load	1 (12.5%)

Table 5: Reasons for not reporting needle stick injury

Reason for not reporting NSI	Frequency n (%)
Do not know to whom or where it should be reported	3(37.5%)
Do not know it should be reported	2(25.6%)
The patient has low risk of HIV/Hepatitis B/Hepatitis C	3(37.5%)

Discussion:

HCWs especially in the beginning of the professional carrier like interns face stressful clinical situations putting them at increased risk of NSI at their work place. The incidence of NSI was common occupational hazards among HCWs and it's showing an upward trend.

In the present study, prevalence of needle stick injuries among interns was 10.8% which was less compared to the other studies. A study done in Maharashtra by Khapre et al reported the prevalence of needle stick among interns to be 11.89% which is in accordance with the present study.⁶ Interns have a higher incidence of exposure as compared to other health care workers due to lack of experience in skills.⁷ Patel et al in their study found that the possibility of a needle-stick injury had an inverse relation to years of experience.⁸

In our study 5(62.5%) needle stick injuries had gone unreported and only 3(37.5%) were reported. Unreported needlestick injuries become a major problem because injured healthcare workers do not receive timely post-exposure prophylaxis against HIV and hepatitis B. If post-HIV prophylaxis is given early, it has been shown to be 80% effective. A study in Taiwanese health care showed that 81.8% of sharp injuries go unreported.⁹ and in another study conducted at Bangalore only 36.4% reported the incident.¹⁰ Although we have an established centre in the hospital, where these needle stick injuries will be reported immediately by the health care personnel and necessary actions will be taken to prevent catastrophic consequences. Lack of knowledge about where and how to report a needlestick injury was the main reason for not reporting cases. Therefore, the reporting system should be simple and all health professionals should know where and how to report a needle stick injury.

According to USA Occupational Safety and Health Administration's (OSHA) blood borne pathogen standards has prohibited unsafe injection practices such as recapping needles; yet, this practice remains prevalent and has been found to be extremely high in several studies.¹¹ Our research revealed that those who were recapping the needles had a noticeably higher risk of needle stick

injuries. Recapping has been identified by Sharma et al.¹² and Muralidhar et al.¹³ as the most common technique that causes needle stick injuries (NSIs), accounting for 34% and 39% of NSIs, respectively. Although the orientation programme was held at the beginning of the internship, they need to conduct periodic training programmes and display of IEC material for handling sharps at workplace premises in order to ensure safety among the hospital care staff. Lack of expertise in skill training, emergencies, physical and mental stress, and an increased workload have all been identified as significant risk factors for needle stick injuries among individuals who were exposed to them. Therefore, regular, appropriate training is essential for preventing NSI, particularly among interns.^{14, 15}

The extensive vaccination against hepatitis B has contributed significantly to the recent fall in the incidence of HBV infection among HCWs. Only 67 (84%) of the interns, according to this survey, had received an HBV vaccine. Meanwhile, just 41% of medical staff members had received an HBV vaccination, according a research conducted at Dublin Hospital.¹⁶ Eighty-five percent of the students who took part in the trial had received the HBV vaccination, according to another study conducted in India by Archana et al.¹⁷ Although the seroconversion status after vaccination is not assessed in this study. Following vaccination, around 3% of individuals in a study conducted by Barone et al. tested negative for anti-HBs.¹⁸ The Centres for Disease Control (CDC) advise testing for antibodies following the administration of three HBV injections; if the results are negative, administer a second three-dose injection and repeat the anti-HBs antibody test. If there is no antibody response, no further vaccination is recommended.¹⁹

A needlestick injury can be prevented by taking general measures including washing the hands after handling sharp objects, wearing gloves, minimizing the amount of time you spend handling sharp objects by hand, and properly disposing of old sharps. It is advised to wear gloves while handling sharp objects, and failure to do so seems to be a sign of dangerous behavior.²⁰ Although wearing gloves is widely recognized as a crucial first line of defence, some trainees choose not to do so. when he sustained his injuries. We advise treating exposure situations holistically, starting with the avoidance of exposure injuries and ending with the proper care. Workplace safety, training, and the

availability of safety equipment should all be taken into account in prevention initiatives. The management team should concentrate on simple reporting systems that ensure the privacy and confidentiality of results.

Limitations:

There was only one category of healthcare professional included in the study, and the sample population was limited. As it was a retrospective research, recollection bias may have had an impact.

Conclusion:

This study shows that interns' knowledge and awareness of NSI is insufficient. NSIs can be avoided by taking "general precautions" as a safety measure. High occupational exposure to infectious diseases emphasizes the need to improve occupational health and safety to prevent the spread of blood-borne pathogens. Awareness of the risks and challenges associated with work-related exposures must be incorporated into undergraduate education. Undergraduate medical students must be provided with adequate training and confidence in the practical aspects of medicine through skill training laboratories. Senior doctors must closely monitor trainees during procedures. Thus, these findings suggest the need to implement appropriate education and training programs on infection control and acute management principles to reduce workplace exposure to bloodborne pathogens.

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