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Original Research Article

FROM PRICKS TO PREVENTION": ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING NEEDLE STICK INJURIES AMONG INTERNS

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ABSTRACT

Background: Needle stick injuries (NSIs) are among the most common occupational hazards encountered by healthcare workers and carry a significant risk of transmission of blood-borne pathogens such as Hepatitis B virus (HBV), Hepatitis C virus (HCV), and Human Immunodeficiency Virus (HIV). Interns, being at the beginning of their clinical careers, are frequently exposed to procedures involving needles and sharps, making them particularly vulnerable to NSIs. Assessment of their knowledge, attitudes, and preventive practices is essential for designing effective educational interventions. **Aim:** To assess the knowledge, attitudes, and practices regarding needle stick injuries among MBBS interns.

Materials and Methods: A cross-sectional questionnaire-based study was conducted among MBBS interns undergoing clinical training in a medical college. A total of 206 valid responses were analyzed. Data were collected using a structured online questionnaire developed according to CDC guidelines on NSI prevention and post-exposure management. The questionnaire included items assessing awareness regarding causes, prevention, post-exposure prophylaxis (PEP), and ethical attitudes toward reporting NSIs. Statistical analysis was performed using SPSS version 2021. Chi-square test and Mann–Whitney U test were used to determine associations between gender and study variables. A p-value <0.05 was considered statistically significant.

Results: Among the participants, 146 (70.9%) were females and 60 (29.1%) were males. Most respondents demonstrated adequate knowledge regarding immediate management of NSI, common blood-borne pathogens, and preventive practices. About 75.2% correctly identified all preventive strategies for NSI, while 77.7% were aware that HIV PEP should be initiated within 72 hours of exposure. However, considerable gaps were identified in emergency eye care following blood splashes and revaccination protocols for HBV when anti-HBs titers were <10 IU/ml. Nearly 42.7% believed it was ethical to test a patient's leftover blood sample without consent after exposure. Statistical analysis revealed no significant association between gender and most study variables (p>0.05), except attitudes toward ethical testing of patient samples, which showed significant association with gender (p=0.002).

Conclusion: The study demonstrated satisfactory overall awareness regarding NSIs among interns; however, important deficiencies persist in post-exposure protocols and ethical aspects of reporting and consent. Periodic training programs, hands-on workshops, and reinforcement of institutional protocols are

necessary to improve safe practices and reduce occupational exposure among future healthcare professionals.
Keywords: Needle stick injury, interns, post-exposure prophylaxis, occupational exposure, healthcare workers, Hepatitis B, HIV.

INTRODUCTION

Needle stick injury (NSI) is defined as the accidental penetration of the skin by needles or other sharp instruments contaminated with blood, tissue, or body fluids. Among healthcare professionals globally, these injuries are acknowledged as one of the most significant occupational dangers. Hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are the most important blood-borne infections that NSIs might expose healthcare workers to.[1,2] During patient care operations including injections, intravenous cannulation, suturing, blood collection, and waste disposal, healthcare personnel routinely come into contact with sharp objects. NSIs are frequently caused by inadequate handling procedures, incorrect sharps disposal, needle recapping, a lack of training, exhaustion, and an excessive workload. These injuries cause serious psychological stress, worry, and financial strain on healthcare systems in addition to posing a danger of infectious disease transmission.[3,4]

The World Health Organization (WHO) estimates that 2 million healthcare professionals worldwide are exposed to sharp objects during work each year. According to WHO estimates, occupational exposure causes around 1,000 HIV infections, 16,000 HCV infections, and 66,000 HBV infections among healthcare workers annually. Due to weak reporting systems, low knowledge, a lack of protective gear, and restricted access to post-exposure prophylaxis, developing nations bear a disproportionately greater cost.[2,5] One particularly susceptible category in the healthcare industry is interns. Medical graduates go from academic study to hands-on patient care duties during their internship program.

They are required to carry out a variety of invasive treatments, frequently under pressure and with little real-world experience. The risk of unintentional needlestick injuries is increased by their inexperience, severe workloads, and extended job hours. Despite this risk, many interns still lack sufficient knowledge on post-exposure prophylaxis, reporting procedures, urgent care, and preventative measures.[6,7] Research from throughout the world has revealed that healthcare professionals have differing degrees of knowledge and adherence to infection control protocols. Doctors and nurses' views and compliance about blood-borne illnesses differed significantly, according to a survey done in Birmingham teaching hospitals. It was discovered that doctors experienced more NSIs than nurses, highlighting the necessity of targeted training interventions for medical students.[8]

Another significant issue is the underreporting of NSIs. Fear of stigmatization, worries about confidentiality, ignorance of reporting procedures, or the false belief that reporting is not required if the source patient tests negative are some of the reasons why many healthcare professionals neglect to report exposure episodes. Failing to disclose injuries raises the risk of avoidable infections and delays the start of post-exposure prophylaxis. Additionally, healthcare organizations continue to face moral conundrums pertaining to patient consent for testing following unintentional exposure.[9] Reducing infection transmission after NSI requires knowledge of post-exposure prophylaxis. Essential elements of exposure management include prompt wound cleaning, prompt reporting, risk assessment, laboratory testing, vaccination status evaluation, and PEP initiation. While HBV prophylaxis mostly depends on vaccination and anti-HBs titer monitoring, HIV PEP is most effective when started within 72 hours of exposure. Regretfully, a lot of healthcare professionals don't fully comprehend these procedures.[3,10] The occurrence of NSIs is greatly decreased by preventive measures include avoiding needle recapping, utilizing puncture-resistant sharps containers, using safety-engineered devices, properly disposing of biomedical waste, and holding frequent training sessions. Prevention measures are further strengthened by institutional support in the form of accessible PEP services, free diagnostic facilities, counseling services, occupational safety policies, and ongoing medical education.[1,7]

There are still few studies in India that explicitly evaluate interns' knowledge, attitudes, and behaviors addressing NSIs. It is crucial to assess interns' understanding and pinpoint any gaps given the growing burden of occupational exposure and their growing clinical duties. Comprehending these shortcomings can aid in developing focused solutions meant to enhance safe procedures and reduce workplace risks.[4,5] Thus, the current study was carried out to evaluate MBBS interns undertaking clinical training in a tertiary care teaching institution's knowledge, attitudes, and behaviors regarding needle stick injuries. Additionally, the study sought to assess the relationship between gender and a few factors pertaining to NSI awareness and attitudes.

Aim and Objective

Aim

To assess the knowledge, attitudes, and practices regarding needle stick injuries among MBBS interns undergoing clinical training in a tertiary care teaching hospital.

Objectives

1. To evaluate the level of knowledge among interns regarding causes, prevention, and immediate management of needle stick injuries.
2. To assess awareness regarding post-exposure prophylaxis and management protocols for blood-borne infections following needle stick injuries.
3. To evaluate the attitudes of interns toward reporting needle stick injuries and ethical practices related to occupational exposure.
4. To identify gaps in awareness and preventive practices regarding needle stick injuries among interns.
5. To determine the association between gender and awareness-related variables regarding needle stick injuries using appropriate statistical tests.

MATERIALS AND METHODS

Study Design

A cross-sectional observational study was conducted among MBBS interns undergoing clinical training in a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of three months.

Study Population

The study population included MBBS interns (house surgeons) involved in clinical postings and patient care activities.

Inclusion Criteria

- MBBS interns undergoing clinical training.
- Participants willing to provide informed consent.

Exclusion Criteria

- Incomplete questionnaire responses.
- Participants involved in the pilot study.

Sample Size

A total of 206 valid responses were included in the final analysis.

Ethical Consideration

Institutional Ethics Committee approval was obtained before commencement of the study. Participation was voluntary, and informed consent was obtained electronically from all participants. Confidentiality and anonymity of responses were maintained throughout the study.

Data Collection Tool

Data were collected using a structured online questionnaire developed through Google Forms. The questionnaire was prepared after reviewing CDC guidelines and standard protocols regarding NSI prevention and management.

The questionnaire consisted of:

- 20 questions assessing knowledge and awareness regarding NSIs.
- 5 questions assessing attitudes, ethical practices, and preventive suggestions.

A pilot study was conducted among five participants to validate the questionnaire and improve clarity.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS software version 2021. Categorical variables were expressed as frequencies and percentages. Chi-square test and Mann–Whitney U test were used to determine associations between gender and selected variables. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Distribution of Participants According to Gender

Gender	Frequency	Percentage (%)
Male	60	29.1
Female	146	70.9
Total	206	100

Table 1 shows the gender distribution of the study participants. Of the 206 interns that were part of the study, 60 (29.1%) were men and 146 (70.9%) were women. The majority of research participants were female, suggesting that female interns were more likely to participate in the survey.

Table 2: Knowledge Regarding Prevention and Immediate Management of Needle Stick Injuries

Variable	Correct Response Frequency	Percentage (%)
Immediate management after NSI	144	69.9
HBV carries highest transmission risk	135	65.5
Prevention methods – all correct	155	75.2
HIV PEP initiated within 72 hours	160	77.7
Repeated training reduces NSI risk	168	81.6

Table 2 demonstrates the knowledge of interns regarding prevention and immediate management of needle stick injuries (NSIs). The immediate management actions after an NSI were properly indicated by 144 participants (69.9%). After NSI, about 135 participants (65.5%) correctly identified Hepatitis B virus (HBV) as the blood-borne pathogen with the greatest transmission risk. The majority of interns—155, or 75.2%—were aware of all suggested precautions against NSIs, such as using safety equipment, avoiding recapping, and disposing of waste properly. Additionally, 160 participants (77.7%) correctly identified the need to start HIV post-exposure prophylaxis (PEP) within 72 hours of

exposure. 168 participants (81.6%) thought that repeated training was useful in lowering NSIs, underscoring the need of ongoing educational initiatives.

Table 3: Awareness Regarding Post-Exposure Management and Ethical Issues

Variable	Correct/Preferred Response	Percentage (%)
PEP unavailable for HCV	100	48.5
Follow-up not needed if immune to HBV	141	68.4
Immediate PEP if reports delayed	141	68.4
Severe exposure includes all listed conditions	127	61.7
Reporting NSIs essential	133	64.6

Table 3 presents the awareness of interns regarding post-exposure management protocols and ethical aspects related to needle stick injuries (NSIs). Out of 206 participants, 100 interns (48.5%) correctly identified that post-exposure prophylaxis (PEP) is not available for Hepatitis C virus (HCV), indicating comparatively lower awareness regarding HCV exposure management. A total of 141 participants (68.4%) correctly answered that healthcare personnel who are already immune to the Hepatitis B virus (HBV) typically do not need follow-up or prophylaxis. Similarly, 141 interns (68.4%) knew that when the source patient's infection status updates are delayed, it is advised to start PEP right away. In terms of occupational exposure severity assessment, 127 participants (61.7%) accurately recognized every scenario as a severe exposure condition in line with conventional criteria. Furthermore, 133 interns (64.6%) concurred that prompt medical action and adequate care depend on the reporting of NSIs. Overall, the results show that interns have a reasonable level of understanding about post-exposure protocols; nonetheless, knowledge gaps were found, especially with regard to HCV prophylaxis and some ethical elements of NSI care.

Table 4: Association Between Gender and Variable 22 (Ethical Testing of Patient Samples Without Consent)

Response	Male n (%)	Female n (%)	Total	p-value
Yes	37 (61.7)	51 (34.9)	88	
No	12 (20.0)	45 (30.8)	57	
Maybe	11 (18.3)	50 (34.2)	61	0.002*

Table 4 shows the association between gender and attitudes regarding ethical testing of patient blood samples without consent following NSI exposure. Only 51 female participants (34.9%) agreed that testing the patient's sample without consent was appropriate, compared to 37 male participants (61.7%). It was discovered that there was a statistically significant correlation (p=0.002) between gender and this ethical trait. This implies that there were notable differences in the opinions of male and female participants about ethical testing procedures.

Table 5: Association Between Gender and Awareness Variables

Variable	Statistical Test	p-value	Interpretation
Follow required and post exposure requirement if the exposed person is immune to HBV	Chi-square test	0.094	Not significant
Role of repeated training in preventing NSIs	Chi-square test	0.342	Not significant
Statements reflecting the attitudes of healthcare students towards reporting NSIs	Chi-square test	0.763	Not significant
Frequency of training required for healthcare students to prevent NSIs	Chi-square test	0.455	Not significant
Statement indicating the correct answer when an intern's anti HBs titer was <10IU/ml after completing the vaccination schedule	Chi-square test	0.221	Not significant
Overall knowledge score	Mann–Whitney U test	0.143	Not significant

The relationship between gender and several awareness-related characteristics is shown in Table 5. Gender and Variables 11, 19, 20, 21, and 23 did not statistically significantly correlate, according to chi-square test analysis, as all p-values were higher than 0.05. Similarly, there was no statistically significant difference between male and female participants in the Mann-Whitney U test for total knowledge score (p=0.143). These results show that both genders had similar levels of general awareness and understanding of NSIs.

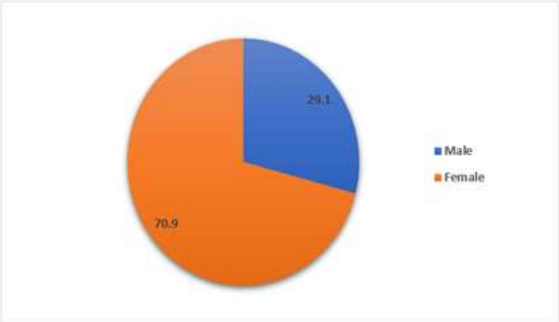


Figure 1: Gender distribution

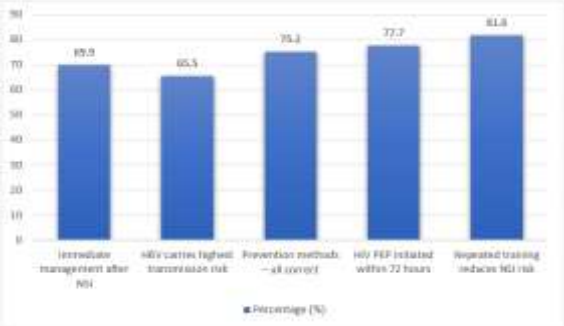


Figure 2: Knowledge Regarding Prevention and Immediate Management of Needle Stick Injuries

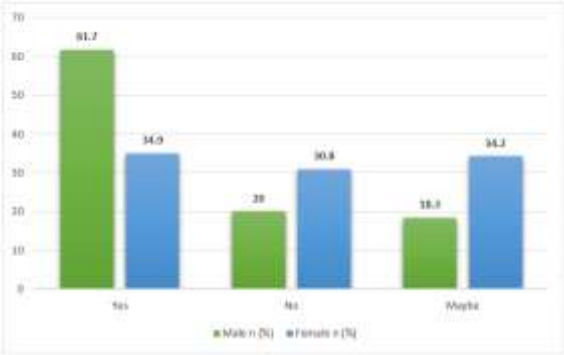


Figure 4: Association Between Gender and Variable 22

DISCUSSION

Needle stick injuries (NSIs) remain one of the most significant occupational hazards among healthcare workers, particularly among interns and medical trainees who are frequently exposed to invasive clinical procedures during the early phase of their professional careers. Blood-borne infections including the Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV), and Hepatitis C virus (HCV) are more likely to spread when people are exposed to infected sharp objects.[11] Therefore, reducing occupational risk and enhancing healthcare safety procedures require adequate knowledge of prevention, reporting, and post-exposure management. The current study evaluated MBBS interns' knowledge, attitudes, and behaviors related to NSIs and found both awareness gaps and strengths. With 70.9% of those surveyed being female and 29.1% being male, female participants made up the bulk of the research population (Table 1). Previous research evaluating occupational exposure among healthcare trainees have shown similar demographic patterns, which reflect the growing number of female students enrolled in medical education programs. In their study on needle stick injuries and infection control measures among healthcare professionals, Saadeh et al. found that female healthcare workers predominated.[7] Therefore, the current gender distribution among interns in teaching hospitals may be reflected in the study's preponderance of female participants. The current study showed adequate understanding of immediate care after NSIs. About 69.9% of interns correctly recognized every action that should be taken right away following a needlestick injury (Table 2). Critical elements of post-exposure management include risk assessment, rapid reporting, washing with soap and water, and immediate wound care. Sharma et al. found similar results, noting that most healthcare professionals understood the significance of prompt first aid and early reporting after occupational exposure.[10] The necessity for ongoing educational reinforcement is shown by the fact that approximately one-third of participants in the current study still lacked comprehensive knowledge on standard management methods, although having relatively excellent awareness. 65.5% of participants correctly recognized HBV as the virus associated with the highest risk of transmission after NSI when asked about their understanding of blood-borne pathogen transmission (Table 2). It has been demonstrated that HBV is far more contagious than HIV and HCV, particularly among uninfected people. Bouya et al., in their comprehensive analysis on needle stick injuries among healthcare professionals, also noted that HBV remained the most prevalent occupationally transmitted infection following sharps exposure.[2] Because vaccination and post-vaccination antibody surveillance can dramatically lower occupational infection rates, awareness of the danger of HBV transmission is especially crucial.

Additionally, the current study showed promising knowledge of NSI prevention measures. Approximately 75.2% of interns correctly recognized every preventative strategy, such as utilizing safety-engineered equipment during operations, avoiding recapping needles, and disposing of sharps in receptacles resistant to punctures (Table 2). Similar findings were reported by Khabour et al., who found that healthcare professionals had sufficient understanding of preventative methods but that their actual use of these measures was occasionally uneven in standard clinical settings.[6] Preventive measures continue to be the mainstay for lowering occupational exposure, and interns who regularly carry out invasive operations under supervision need to be repeatedly reminded of safe work standards.

In the current study, participants' knowledge of HIV post-exposure prophylaxis (PEP) was similarly good, with 77.7% correctly recognizing that HIV PEP should be started within 72 hours of exposure (Table 2). It has been demonstrated that starting

antiretroviral medication early significantly lowers the probability of HIV seroconversion after occupational exposure. Hanif et al. observed similar levels of awareness, finding that healthcare professionals typically knew enough about the significance and timing of HIV PEP.[3] However, a small percentage of research participants still showed insufficient knowledge of prophylactic measures, which might negatively impact prompt treatment start in real-life exposure scenarios.

81.6% of participants in the current study thought that repeated training and educational programs were effective (Table 2). This result emphasizes the value of skill-based workshops and ongoing medical education in raising awareness and lowering occupational injuries. Repeated training sessions considerably increase adherence to infection control standards and lower the frequency of NSIs among healthcare professionals, according to prior research.[8,9] Regular training programs are crucial for teaching safe practices and standard precautions since interns regularly rotate across several departments and are exposed to a variety of clinical contexts.

The understanding of post-exposure care and ethical concerns related to NSIs was also evaluated in this study (Table 3). The fact that there is presently no effective PEP for HCV infection was accurately identified by about 48.5% of participants. This result suggests that over half of the interns did not have sufficient knowledge about managing HCV after occupational exposure. Similar shortcomings were noted in research by Saadeh et al., where medical professionals showed little comprehension of the lack of specialized prophylaxis for HCV exposure.[11] Increasing knowledge about follow-up procedures and early identification is crucial since HCV infection can result in long-term consequences and chronic liver disease.

Approximately 68.4% of interns correctly said that if source patient reports are delayed, urgent PEP should be started (Table 3). Prophylaxis must be administered as soon as possible since therapy efficacy might be seriously jeopardized by delays. Sharma et al. observed similar findings and stressed the significance of starting PEP as soon as possible, regardless of delays in test confirmation of infection status. A reasonable level of awareness about exposure severity assessment was demonstrated in the current study, where 61.7% of participants correctly identified all stated circumstances as severe exposure categories requiring immediate evaluation and management.[10]

The current study also assessed opinions about ethical issues and reporting procedures. Reporting NSIs is crucial for prompt medical care, according to about 64.6% of individuals (Table 3). Even with this positive result, some participants continued to think that reporting would not be required in some circumstances, which could lead to underreporting of occupational exposures. Underreporting of NSIs has been extensively established in prior research and is frequently linked to concerns about confidentiality, fear of stigmatization, ignorance, and heavy workload. Despite the presence of institutional reporting mechanisms, Voide et al. found that healthcare professionals in a university hospital context significantly underreported sharps injuries.[9]

Gender and opinions on the ethical testing of patient blood samples without consent after NSI exposure were shown to be statistically significantly correlated ($p=0.002$) (Table 4). Compared to female participants, men individuals were more likely to favor testing patient samples without consent. This result raises the possibility of gender-based variations in ethical judgments and choices made in scenarios involving occupational exposure. In healthcare practice, ethical issues pertaining to patient autonomy and informed consent are becoming more and more important. The ethical challenges faced by healthcare professionals in striking a balance between patient autonomy and confidentiality and workplace safety were also covered by Hanif et al.[3]

In contrast, no statistically significant association was observed between gender and overall awareness variables related to NSIs (Table 5). Chi-square analysis and Mann–Whitney U testing demonstrated comparable levels of knowledge between male and female interns. Similar findings were reported by Stein et al., who observed that although attitudes toward infection control may vary slightly between genders, overall knowledge levels regarding NSI prevention and management were generally comparable.[4] This suggests that educational interventions should be uniformly implemented among all interns irrespective of gender.

Overall, the current study showed that interns had a reasonable level of awareness about the prevention and prompt care of NSIs; nevertheless, significant shortcomings in reporting procedures, ethical decision-making, and post-exposure management protocols still exist. To increase safe behaviors and reduce occupational exposure among aspiring healthcare professionals, regular seminars, simulation-based training, institutional guidelines reinforcement, and better access to occupational health services are crucial.

CONCLUSION

The present study assessed the knowledge, attitudes, and practices regarding needle stick injuries among MBBS interns and demonstrated an overall satisfactory level of awareness regarding prevention and immediate management of NSIs. The majority of participants understood the need of starting HIV post-exposure prophylaxis within the advised time frame, common preventative measures, and urgent post-exposure procedures. The majority of interns also acknowledged repeated training programs as a successful tactic for lowering occupational exposure and enhancing safe clinical procedures.

Notwithstanding the generally high level of awareness, significant shortcomings were found in a number of areas, including the treatment of Hepatitis C exposure, Hepatitis B revaccination procedures, and ethical issues surrounding the testing of patient samples without consent. The majority of awareness indicators did not significantly correlate with gender, according to statistical analysis, suggesting that male and female participants had comparable levels of knowledge. However, there were notable gender differences in beliefs regarding ethical testing procedures.

The study's conclusions highlight the necessity of frequent educational seminars, practical training sessions, reinforcement of infection control protocols, and bolstering of institutional occupational health services. To raise awareness, guarantee prompt reporting, and lessen the burden of needle stick injuries among aspiring medical professionals, ongoing training and monitoring are crucial.

Limitations of the study

1. **Single-center study design:** The study was conducted in a single medical institution, which may limit the generalizability of the findings to interns from other institutions or regions.
2. **Cross-sectional nature of the study:** Since the study was cross-sectional, it assessed awareness and attitudes at a single point in time and could not evaluate changes in knowledge or practices over time.
3. **Self-reported responses:** The study relied on self-administered questionnaires, which may be associated with recall bias and socially desirable responses from participants.
4. **Limited assessment of practical skills:** Although knowledge and attitudes were assessed, actual clinical practices and compliance with infection control measures were not directly observed.
5. **Unequal gender distribution:** Female participants constituted the majority of the study population, which may have influenced certain comparisons between genders.
6. **Lack of prior exposure assessment:** The study did not evaluate the previous history of needle stick injuries or prior training experiences among participants, which could influence awareness levels

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