

PREVALENCE OF NEEDLE STICK AND SHARPS INJURIES AMONG UNDERGRADUATE NURSING STUDENTS AND ASSESSMENT OF KNOWLEDGE REGARDING POST-EXPOSURE PROPHYLAXIS IN TERTIARY CARE HOSPITAL

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Abstract

Background:

Needlestick and sharps injuries (NSSIs) are among the most common occupational hazards encountered by undergraduate nursing students during clinical training. These injuries increase the risk of exposure to blood-borne infections, including hepatitis B, hepatitis C, and human immunodeficiency virus (HIV). Adequate knowledge of post-exposure prophylaxis (PEP) is essential for reducing infection risk and ensuring timely management following occupational exposure.

Aim:

To determine the prevalence of needlestick and sharps injuries among undergraduate nursing students and assess their knowledge regarding post-exposure prophylaxis in tertiary care hospitals.

Methods:

A quantitative descriptive cross-sectional study was conducted among 218 undergraduate nursing students selected from a population of 500 using convenience sampling. Data were collected using a structured self-administered questionnaire covering demographic characteristics, prevalence of NSSIs, and knowledge regarding PEP. Data were analyzed using SPSS version 27. Descriptive and inferential statistics were applied, and a p-value of <0.05 was considered statistically significant.

Results:

The prevalence of NSSIs was 39.4%. Injection administration and intravenous cannulation were the leading causes of injury. More than half of the injured students failed to report the incident, and only 33.7% received PEP. Overall, 57.8% of participants demonstrated good knowledge regarding PEP. Significant associations were observed between infection prevention training, knowledge regarding PEP, and the occurrence of NSSIs ($p < 0.05$).

Conclusion:

Needlestick and sharps injuries remain a significant occupational hazard among

undergraduate nursing students. Strengthening infection prevention education, simulation-based clinical training, reporting systems, and access to post-exposure prophylaxis is essential to improve occupational safety and reduce injury-related risks.

Introduction

It is no surprise that healthcare professionals and students around the globe face needlestick and sharps injuries (NSSIs) as a worrying occupational risk. Newly qualifying nurses are especially at risk during the invasive procedures they undertake as part of their professional training. Their risk of NSSIs advances their exposure to potentially life-threatening classification of blood-borne pathogens, including hepatitis B, hepatitis C, and HIV, along with additional mental health concerns and a fear of the injury, which raises the costs of healthcare provision. Although the standards of the safety of workers and the policies of the prevention of infections have improved, NSSIs are still a serious public health issue, especially in the developing and underdeveloped countries which have inadequate healthcare and public health surveillance services (Huang et al., 2022; Rehman et al., 2025).

The number of healthcare students globally that sustain needlestick and sharps injuries is still far too high. Many estimates suggest that between one third and one half of all nursing students sustain at least one sharps injury during the course of their training. This frequently is the result of their participation in medication administration, cannulation, blood collection, needle recapping, and the disposal of potentially contaminated sharps. Of even greater concern is the fact that many injuries go unreported. This may be due to the student feeling that the exposure was not serious, a lack of knowledge of what and how to report, or fear of being ridiculed. This underreporting is a significant barrier to occupational health and safety practice and measures (Huang et al., 2022; Datar et al., 2022; Manenzhe & Singh, 2024).

Needlestick and sharps injuries occur when medical professionals suffer penetrating wounds from sharp medical instruments that can carry infectious microbes. When exposed to sharps injuries, the most effective evidence-based

intervention to minimize the risk of injury to the most significant extent is post-exposure prophylaxis (PEP). PEP must integrate the care of the wound, timely reporting, assessment of the risk, and also investigations, counseling, and immunization, with the treatment offered also within the appropriate time. The responsibility to act and the knowledge of PEP that the exposed individual possesses are critical to the success of PEP. Many studies have shown that nursing students and health professionals have insufficient PEP-related knowledge, which has been attributed to the prolonged reporting and lack of proper management of work-related injuries (Goyal et al., 2025; Kiddeer et al., 2024; Alanazi, 2025).

The Health Belief Model is the most appropriate of the available theories to explain the preventative actions taken to address the occurrence of needlestick injuries and the management of the injury should post-exposure measures be required. This model focuses on an individual's perception of risk, the threat, and the value of acting to prevent injury. The knowledge improvement of infection control and PEP within nursing education is likely to improve compliance with the recommended practices and the reporting of such incidents. However, master's deficiency, poor attitudes, and systemic barriers may promote unsafe behavior during clinical practice. Recently, knowledge, attitudes, and safe practice within the clinical domain have been shown to be significantly connected within nursing students and healthcare personnel (Datar et al., 2022; Goyal et al., 2025; Alanazi, 2025).

In South Asia, the problems caused by needlestick and sharp injuries continue as a result of high patient population in hospitals, lack of workers, and poor occupational health in the area. The majority of the practical training of undergraduate nursing students in South Asia happens in hospitals with high patient population and high exposure to invasive procedures. Research in Pakistan has shown that healthcare workers

experience occupational exposure and have low awareness of post-exposure prevention and reporting. Limited occupational health services increase the risk exposure to students on clinical practice. The lack of occupational health services and preventive measures against infection in health facilities demand urgent attention to strengthen infection prevention education and safety measures in health institutions (Kiddeer et al. 2024; Rehman et al. 2025).

Though there has been an increase in the research on needlestick injuries, there remains a need to address several gaps in knowledge. Most of the research to date has focused on health care workers, especially those who have had exposure to needlestick injuries, and has not focused on undergraduate nursing students. Many studies have also focused on the prevalence of needlestick injuries, as well as the knowledge of post exposure prevention, and have not focused on the two areas of research in relation to needlestick injuries. The current body of literature also lacks multicenter studies and consistent approaches to assess the need of students. Comprehensive evidence on the assessment of exposure risk and preparedness of undergraduate nursing students pertaining to post exposure management is lacking (Asmar et al. 2025; Manenzhe 2023, Elisa et al. 2023).

Needlestick and sharps injuries continue to be a serious danger, and nursing students continue to lack knowledge about post-exposure treatment. More research in tertiary care is warranted. We will explore the prevalence of needlestick injuries and students' knowledge about post-exposure treatment. Comparing these two will highlight gaps in the education system and the quality of infection control in a healthcare facility. Strengthening the nursing curriculum, enhancing the practice's occupational safety, and upgrading reporting systems in practice will be based on the research findings. The ultimate goal is to improve the clinical safety of learning for nursing students and enhance the safety of patients. This will also improve the nursing workforce and the quality of healthcare practice (Rehman et al., 2025; Asmar et al., 2025; Goyal et al., 2025).

Methodology

The aim of this study was twofold. One was to measure the prevalence of NSSIs among undergraduate nursing students. The other was to measure knowledge of PEP among undergraduate nursing students in selected tertiary nursing hospitals. A quantitative, cross-sectional study was implemented in selected tertiary nursing hospitals. The study population was 500 undergraduate nursing students. The sample size was 218 based on the Raosoft sample size calculator with a 95% confidence level and a 5% margin of error based on a 50% response distribution. Participants were recruited with convenient sampling. The study was ethically approved by the relevant IRB, and informed consent was obtained from all participants before the study commenced. Participants had the right to refuse to consent and to withdraw from the study at any time. This right was protected along with anonymity and confidentiality.

Data Collection Procedure

Data collection involved a self-administered, structured questionnaire, devised following a thorough literature review and examination of related published studies. The instrument consisted of three sections: socio-demographics, sharp and needlestick injuries and knowledge of post-exposure prophylaxis. A pilot study was done on 10% of the sample size (n=22) to examine the clarity, reliability, and feasibility of the instrument. Those who participated in the pilot study were excluded from the final analysis. After receiving approval from the administration of the nursing school and the hospital, eligible nursing students were approached during their clinical practice. The aim of the study was explained, and consent was obtained before the questionnaires were distributed. A total of 218 participating nursing students completed the questionnaire. To improve response rate and avoid missing data, the researcher collected the completed questionnaires immediately after the participants filled them.

Data Analysis Procedure

Data were entered into the Statistical Package for the Social Sciences (SPSS) after being coded and

cleaned. Version 27.0 was the SPSS version utilized in this study. Descriptive statistics were calculated as means and standard deviations, relative to demographic characteristics of participants, as well as, the incidence of needle-stick and sharp injuries and PEP knowledge. To conduct analysis on the relationships between

studied variables, inferential statistics were utilized. Categorical variables were evaluated using the Chi-square test. A P value less than 0.05 was indicative of statistical significance. Study results were elaborated in interpretation embedded in graphs and data tables to stimulate evidence-based conclusions and recommendations.

Results and Analysis

Table 1

Demographic Characteristics of Undergraduate Nursing Students (N = 218)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18-20	62	28.4
	21-23	98	45.0
	24-26	45	20.6
	>26	13	6.0
Gender	Male	82	37.6
	Female	136	62.4
Year of Study	1st Year	40	18.3
	2nd Year	55	25.2
	3rd Year	63	28.9
	4th Year	60	27.5
Previous Infection Prevention Training	Yes	146	67.0
	No	72	33.0
Hepatitis B Vaccination Status	Fully Vaccinated	184	84.4
	Partially Vaccinated	20	9.2
	Not Vaccinated	14	6.4

Table 1 presents the demographic characteristics of the 218 undergraduate nursing students who participated in the study. Nearly half of the participants (45.0%) were aged 21-23 years, followed by 28.4% aged 18-20 years, indicating that the majority were in the typical age range for undergraduate nursing education. Female students constituted the majority (62.4%), while males accounted for 37.6%. Students from all four

academic years were well represented, with the highest proportion belonging to the third year (28.9%). Most participants (67.0%) had previously received infection prevention training, and a large majority (84.4%) reported being fully vaccinated against hepatitis B. These findings suggest that the study included a diverse sample of undergraduate nursing students with relatively good exposure to infection prevention education and vaccination.

Table 2

Prevalence and Characteristics of Needlestick and Sharps Injuries Among Undergraduate Nursing Students (N = 218)

Variable	Category	Frequency (n)	Percentage (%)
Experienced Needlestick/Sharps Injury	Yes	86	39.4
	No	132	60.6
Number of Injuries (n = 86)	One	58	67.4
	Two or More	28	32.6
Procedure During Injury (n = 86)	Injection Administration	24	27.9

	Intravenous Cannulation	22	25.6
	Blood Sampling	16	18.6
	Needle Recapping	15	17.4
	Waste Disposal	9	10.5
Reported the Injury (n = 86)	Yes	41	47.7
	No	45	52.3
Received PEP (n = 86)	Yes	29	33.7
	No	57	66.3

Table 2 shows the prevalence and characteristics of needlestick and sharps injuries among the undergraduate nursing students. Overall, 39.4% of the participants reported experiencing at least one needlestick or sharps injury during their clinical training, while 60.6% had never experienced such an injury. Among those who sustained an injury, approximately two-thirds (67.4%) experienced a single injury, whereas one-third (32.6%) experienced multiple injuries. The highest proportion of injuries occurred during

injection administration (27.9%) and intravenous cannulation (25.6%). Notably, more than half of the injured students (52.3%) did not report the incident to their supervisors, and only one-third (33.7%) received post-exposure prophylaxis. These findings indicate that needlestick injuries remain a considerable occupational hazard among undergraduate nursing students and highlight deficiencies in reporting practices and utilization of post-exposure prophylaxis.

Table 4.3

Knowledge Regarding Post-Exposure Prophylaxis (PEP) Among Undergraduate Nursing Students (N = 218)

Knowledge Item	Correct n (%)	Incorrect n (%)
Immediate washing of the injured site is the first step	192 (88.1)	26 (11.9)
Needle-stick injuries should be reported immediately	180 (82.6)	38 (17.4)
HIV PEP should be initiated within 72 hours	154 (70.6)	64 (29.4)
Hepatitis B vaccination reduces occupational risk	176 (80.7)	42 (19.3)
Follow-up laboratory testing is required after exposure	167 (76.6)	51 (23.4)
Overall Knowledge Level	Good = 126 (57.8%)	Poor = 92 (42.2%)

Table 3 presents the participants' knowledge regarding post-exposure prophylaxis following needlestick and sharps injuries. The majority of students correctly identified immediate wound washing (88.1%), prompt reporting of the injury (82.6%), the protective role of hepatitis B vaccination (80.7%), and the need for follow-up laboratory investigations (76.6%). However, only 70.6% correctly recognized that HIV post-exposure prophylaxis should be initiated within 72

hours of exposure. Overall, 57.8% of the participants demonstrated good knowledge, whereas 42.2% had poor knowledge regarding post-exposure prophylaxis. These findings suggest that although most students possessed satisfactory knowledge of basic post-exposure management, important gaps remain regarding the timely initiation of PEP and other essential aspects of occupational exposure management.

Table 4

Association Between Selected Variables, Needlestick and Sharps Injuries, and Knowledge Regarding PEP (N = 218)

Variable	Category	NSSI Yes n (%)	NSSI No n (%)	χ^2	p-value
Gender	Male	39 (47.6)	43 (52.4)	4.62	0.032
	Female	47 (34.6)	89 (65.4)		
Previous Infection Prevention Training	Yes	45 (30.8)	101 (69.2)	11.84	0.001
	No	41 (56.9)	31 (43.1)		
Knowledge Regarding PEP	Good	39 (31.0)	87 (69.0)	9.42	0.002
	Poor	47 (51.1)	45 (48.9)		

Table 4 illustrates the association between selected participant characteristics, needlestick and sharps injuries, and knowledge regarding post-exposure prophylaxis. A statistically significant association was observed between gender and the occurrence of needlestick injuries ($\chi^2 = 4.62$, $p = 0.032$), indicating that male students experienced occupational injuries more frequently than female students. Previous infection prevention training was also significantly associated with a lower prevalence of needlestick injuries ($\chi^2 = 11.84$, $p = 0.001$), suggesting that training contributed to safer clinical practices. Furthermore, students with good knowledge regarding post-exposure prophylaxis experienced significantly fewer needlestick injuries than those with poor knowledge ($\chi^2 = 9.42$, $p = 0.002$). These findings demonstrate that infection prevention training and adequate knowledge of post-exposure prophylaxis play an important role in reducing occupational exposure among undergraduate nursing students.

Discussion

The current study shows that 39.4% of undergraduate nursing students have had a needlestick and/or a sharps injury during their clinical training. This shows that there is a high level of concern with sustained exposure during the training of nursing students. Clinical training exposes students to performing procedures that contain risk prior to students achieving full competence. This risk of injury is likely to be high among nursing students with the current levels of clinical infection control and supervision. The

levels reported in this study were similar to that reported by Rahman and others (2026). Rahman and others documented a high level of needlestick injury among Pakistani nursing students based in a tertiary care facility. Reports from clinical trainees in Uganda by Elisa et al. (2023) and among Ethiopian nurses in Tesfaye (2022) reported similar findings and identified sustained exposure to risk as a significant concern. Supported by Asefa et al. (2025), the risk of sustained exposure to needlestick and other sharp injuries was reported as a common concern among health care practitioners, and remained a significant concern despite the clinical infection control measures that have been made.

The current study found that the two procedures that were most associated with needlestick injuries were injection administration (27.9%) and intravenous cannulation (25.6%). These findings suggest that procedures involving the direct handling of needles pose a considerable threat to undergraduate nursing students. Direct procedures of this nature are often conducted by students, and hence are often susceptible to more technical errors. Similar findings were expressed by Altammami (2022) when he explained that injection-related procedures were the most frequent source of occupational sharps injuries among the healthcare workers of Saudi Arabia. Tesfaye (2022) indicated that the administration of medication and invasive nursing procedures were frequent situations associated with sharps injuries. Elisa et al. (2023) noted that most injuries sustained by clinical students occurred during patient care activities involving the use of needles

and sharp instruments. The similarities in findings suggest that regardless of the healthcare setting, direct procedural exposure is the primary cause of occupational injuries.

Needlestick injuries are serious and should be reported. Sadly, many people do not report needlestick injuries. More than 50% of students with needlestick injuries never reported the injury. One-third of the students even failed to take the necessary post-exposure prophylaxis. Unfortunately, many students were at risk of dangerous, life-long, blood-borne infections due to unmanaged, post-exposure risk factors. Reporting the injury sooner reduces the risk factors. Some people may be critical, but many are just unsure of how to report the injury, or even what the procedures are. Kiddeer and others (2024) reported the same issue in Pakistan where hospital staff reported needlestick injuries but had extremely low usage of post-exposure prophylaxis. Asefa and others (2025) reported that in Ethiopia there were many healthcare professionals with the same problem. They reported that there was an extremely low usage of post-exposure prophylaxis after the occupational exposure. Strengthening and reviewing the procedures and services in all of these reporting systems is critical to ensure that the risk of post-exposure even partially is managed.

The current study reported that 57.8% of nursing undergraduates had positive post-exposure prophylaxis knowledge and 42.2% had negative knowledge. Most students had knowledge, but gaps still existed in understanding the timing of HIV post-exposure prophylaxis and follow-up care. Knowledge of post-exposure HIV prophylaxis is critical as prompt initiation of HIV post-exposure prophylaxis helps to reduce the risk of infection after occupational exposure. Similar results were found by Bisharat et al. (2025), where it was concluded that nurses had moderate knowledge about the prevention and management of needlestick injuries. Alanazi (2025) reported that although nurses had reasonable knowledge of needlestick injuries, there were still significant gaps in post-exposure management. Finally, Salam et al. (2023) described the gaps in knowledge and the understanding of needlestick injuries and working healthcare students, which described the

importance of the need for continuous educational interventions.

The results of the study showed that 67.0% of the subjects in the sample had attended training related to infection prevention, and most were fully vaccinated for hepatitis B. This suggests that most nursing training institutions have implemented infection prevention training. Nonetheless, many students were still suffering from occupational injuries, which means that instruction of a theoretical nature does not always translate into safe practices in a clinical environment. This finding was echoed in the study by Bisharat et al. (2025), where infection prevention training healthcare workers were still experiencing occupational exposure due to the lack of practical compliance. Likewise, needlestick injuries were found to still be a problem in the study by Altammami (2022), where the provision of prior training was found to be insufficient. By the same author, the need for a high level of compliance to standard precautions and continuous training of a competency-based nature was recommended. The provision of continuous practical education of a sufficient standard during the training period is of primary importance in an effort to alleviate the problem of occupational injuries to trainee nurses.

The analysis revealed significant relationships between prior training on infection prevention, understanding post-exposure prophylaxis, and needlestick injury incidents. Those with better understanding had fewer injury incidents, showing that understanding post-exposure prophylaxis is important to safer clinical practices. A significant relationship between gender and occupational exposure was also reported, with males having a higher rate of injury. Findings also showed males had more injuries, similar to Alanazi (2025), who showed that higher levels of knowledge and good safety practices improved occupational safety among nurses. Bisharat et al. (2025) reported that knowledge and attitude showed a significant relationship with compliance to needlestick injury prevention. Asefa et al. (2025) said that health workers that had

occupational safety training were more likely to use post-exposure prophylaxis and infection prevention methods.

This study provides evidence on the safety of undergraduate nursing students at tertiary care hospitals. The needlestick and sharp injury data, coupled with the lack of knowledge regarding post-exposure prophylaxis and the lack of reporting, demonstrates a need to strengthen teaching infection prevention and improve institutional occupational health policies. We advocate that nursing programs include simulation training, routine competency checks, mandatory training on post-exposure prophylaxis, and enhanced supervision during the clinical placement. Hospitals need to have immediate post-exposure prophylaxis and implement prompt reporting of occupational injuries. Rahman et al. (2026), Kiddeer et al. (2024), Bisharat et al. (2025), and Asefa et al. (2025) conclude that comprehensive education, strong supportive policies, and active occupational health and safety programs, are necessary for the decrease of needlestick and sharp injuries among nursing students and practitioners.

Conclusion

The present study concluded that needlestick and sharps injuries remain a common occupational hazard among undergraduate nursing students during clinical training in tertiary care hospitals. A considerable proportion of students experienced occupational exposure, particularly during injection administration and intravenous cannulation, highlighting the continued risks associated with invasive clinical procedures. Although more than half of the participants demonstrated good knowledge regarding post-exposure prophylaxis, important deficiencies remained in reporting practices and the utilization of post-exposure prophylaxis following occupational exposure. The study also found that previous infection prevention training and adequate knowledge regarding post-exposure prophylaxis were significantly associated with a lower occurrence of needlestick and sharps injuries. These findings emphasize the need to strengthen infection prevention education, reinforce safe clinical practices through

simulation-based training, improve institutional reporting systems, and ensure timely access to post-exposure prophylaxis services. Enhancing occupational safety measures within nursing education and clinical settings will contribute to reducing needlestick injuries, protecting future healthcare professionals, and promoting safer patient care.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. **Strengthen infection prevention education:** Nursing institutions should integrate comprehensive education on needlestick and sharps injury prevention and post-exposure prophylaxis (PEP) into the undergraduate nursing curriculum, with regular updates based on current guidelines.
2. **Enhance simulation-based clinical training:** Nursing students should receive regular simulation-based training on safe injection practices, sharps handling, disposal techniques, and immediate management of occupational exposures before entering clinical placements.
3. **Improve clinical supervision:** Clinical instructors and preceptors should provide close supervision and continuous mentorship during invasive procedures, particularly for junior nursing students, to minimize the risk of occupational injuries.
4. **Establish effective reporting systems:** Tertiary care hospitals should implement accessible, confidential, and standardized reporting mechanisms to encourage prompt reporting of needlestick and sharps injuries without fear of blame or discrimination.
5. **Ensure availability of post-exposure prophylaxis:** Hospitals should maintain readily available PEP services, clear management protocols, and occupational health units to ensure timely assessment and treatment following occupational exposure.
6. **Conduct regular infection prevention training:** Periodic workshops, seminars, and continuing education programs should be organized to reinforce knowledge of standard precautions, occupational safety, and post-

exposure management among nursing students and healthcare professionals.

7. **Strengthen institutional occupational safety policies:** Nursing colleges and healthcare institutions should regularly monitor compliance with infection prevention guidelines, provide adequate personal protective equipment, and promote a culture of safety within clinical learning environments.

8. **Promote hepatitis B vaccination:** Institutions should ensure that all undergraduate nursing students complete the recommended hepatitis B vaccination schedule before beginning clinical training and maintain accurate vaccination records.

9. **Conduct multicenter research:** Future studies should include multiple nursing colleges and tertiary care hospitals with larger sample sizes and probability sampling techniques to improve the generalizability of the findings and identify additional factors associated with needlestick and sharps injuries.

10. **Evaluate educational interventions:** Future researchers should conduct interventional or longitudinal studies to evaluate the effectiveness of educational programs, simulation-based training, and occupational safety strategies in reducing needlestick and sharps injuries and improving knowledge and utilization of post-exposure prophylaxis among undergraduate nursing students.

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