



A STUDY ON THE INCIDENCE OF NEEDLE STICK INJURY (NSI), ASSOCIATED DEMOGRAPHIC FACTORS AND INJURY-RELATED CHARACTERISTICS AMONG NURSING STUDENTS OF SELECTED NURSING INSTITUTIONS OF AIZAWL, MIZORAM

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ABSTRACT

Needle Stick Injury (NSI) is a significant occupational hazard for healthcare workers, especially nursing students during clinical training. Inadequate awareness of standard precautions and post-exposure protocols, like Post-Exposure Prophylaxis (PEP), heightens the risk of serious infections such as Hepatitis B, C, and HIV. This study aimed to assess the incidence of NSI among nursing students in Aizawl, Mizoram, and explore its association with academic year. A total of 830 nursing students participated in a quantitative survey utilizing a self-administered questionnaire.

Results indicated that 29.6% of students reported experiencing at least one NSI, primarily caused by hollow-bore needles (61.4%), with recapping being the most common procedure leading to injuries (45.1%). Most incidents (71.1%) were single occurrences within the past year; however, neglect (47.0%) was the main reason for not reporting incidents, despite 74.8% of cases being reported to authorities. Common immediate measures taken post-exposure included washing the site with soap and water (66.2%). A statistically significant correlation was noted between academic year and NSI incidence ($\chi^2=71.1$, $df=3$, $p<.001$), indicating that injury rates escalated from 13.6% in the first year to 47.2% in the fourth year.

These findings highlight the need for enhanced integration of NSI prevention and PEP education earlier in nursing curricula, along with improved occupational safety training, strict anti-recapping policies, and encouragement of prompt incident reporting to safeguard nursing students during clinical training.

KEYWORDS: Needle Stick Injury; Nursing Students; Incidence; Post-Exposure Prophylaxis; Occupational Safety

INTRODUCTION

A needle stick injury (NSI) is an accidental wound caused by a hollow-bore needle or sharp instrument that penetrates the skin and can contact another person's blood or bodily fluids. These injuries significantly threaten healthcare workers' physical, psychological, and professional well-being due to their risk of transmitting serious blood-borne diseases like Hepatitis B, Hepatitis C, and HIV. Common scenarios leading to NSI include blood draws, intramuscular or intravenous medication administration, and unsafe practices like needle recapping. Systemic safety gaps, inadequately trained personnel, and non-compliance with safety protocols exacerbate these injuries.

The World Health Organization estimates that approximately 3 million healthcare workers experience percutaneous exposure to blood-borne pathogens annually, resulting in an estimated 16,000 cases of Hepatitis C, 66,000 cases of Hepatitis B, and 1,000 cases of HIV infection worldwide (WHO, 2016). Despite extensive research on NSI globally and in various parts of India, there exists a noticeable lack of research from Northeastern states, particularly Mizoram. This geographical gap in the literature represents a critical deficit in understanding the prevalence, risk factors,

awareness levels, and compliance with preventive measures among healthcare workers and nursing students in this region.

Multiple studies illustrate global NSI prevalence rates, revealing that nursing students and interns are particularly vulnerable, with their NSI rates ranging from 27% to 45% in various analyses. A systematic review identified that unsafe practices like improper needle disposal and inadequate training contribute to these injuries. Higher prevalence among nursing students in regions like Asia highlights the need for specific interventions and robust training programs to mitigate risks associated with clinical training.

Factors influencing NSI occur at individual, institutional, and systemic levels. Individual-level risk factors include inexperience, stress, and inadequate knowledge of safety protocols. Institutional factors encompass insufficient training, lack of safety devices, and high patient-to-staff ratios that prohibit effective management of safety practices. Systemic problems, particularly in developing nations, include resource limitations that lead to the improper reuse of medical instruments and insufficient occupational safety measures.

The Indian context

The Indian healthcare system faces significant challenges in addressing Needle-stick Injuries (NSI),



exacerbated by disparities in resource allocation and training. Nursing students often work in under-resourced environments with high patient loads, increasing their risk of NSI, predominantly from recapping needles during clinical rotations. Research by Priya and Krishnamurthy (2018) highlighted the burdens nursing students experience and stressed the importance of early intervention and education to mitigate NSI rates. Madhavan et al. (2019) focused on healthcare providers' knowledge and practices concerning NSI, revealing substantial gaps in understanding Post-Exposure Prophylaxis (PEP) protocols, which are crucial for proper post-exposure management. Further, Sain et al. (2025) identified significant knowledge shortcomings regarding NSI prevention and PEP among nurses in Nagpur, advocating for regular training and educational programs to improve awareness and practices in this critical area.

Mizoram context: A critical gap

Despite significant global and national research on Needlestick Injuries (NSI), there is a notable lack of studies from Northeastern India, specifically Mizoram. This gap impacts the understanding of NSI prevalence, risk factors, awareness, and compliance among healthcare workers and nursing students in this region. Mizoram's distinct cultural and healthcare landscape presents unique challenges that existing studies from other regions cannot address. The state's geographical isolation, developing healthcare infrastructure, and a diverse educational landscape contribute to varying exposure levels to NSI among nursing students. Cultural nuances, including localized language and healthcare practices, further influence both the occurrence of NSI and the effectiveness of preventative measures. The limited research capacity in Mizoram underscores the necessity for localized studies to create relevant interventions and policies, as reliance on data from other areas may not accurately capture local needs and realities.

Need of the study

A systematic review and meta-analysis investigated the global prevalence and device-related causes of needle-stick injuries (NSIs) among healthcare workers (HCWs), encompassing 87 studies with 50,916 participants from 31 countries between 2000 and 2018. The one-year global pooled prevalence of NSIs was found to be 44.5% (95% CI: 35.7–53.2), with Southeast Asia reporting the highest regional prevalence at 58.2%. Notably, nursing students exhibited a NSI prevalence of 45.3%. The primary device-related cause of NSIs was hypodermic needles (55.1%), followed by IV cannulas (23.0%). Countries with lower socioeconomic development scores had significantly higher NSI rates, indicating a need for improved occupational health services and NSI education programs. This meta-analysis emphasizes the broader epidemiological context of NSIs. Additionally, a gap exists in research concerning North-Eastern states like Mizoram, limiting the understanding of NSI prevalence, risk factors, and preventive compliance among HCWs there. There is an urgent need for focused research in Mizoram to obtain empirical evidence about the frequency and determinants of NSIs. The study proposed aims to assess NSIs' incidence among nursing students in Aizawl, Mizoram, targeting the identification of educational needs and the promotion of safe clinical practices.

Review of Related Literature

Mbaisi et al. (2013) examined the prevalence of needle-stick injuries and splash exposures among 247 healthcare workers in a provincial hospital in Kenya, reporting that 37.2% of participants had experienced at least one percutaneous injury within the previous 12 months, with nurses constituting the highest proportion of those injured. Inadequate training, absence of safety-engineered devices, and improper disposal of sharps were identified as significant risk factors. The study found that junior and less experienced healthcare workers were disproportionately affected, reinforcing the importance of targeted training in the early stages of clinical exposure. These findings underscore the importance of institutional policies and ongoing education to reduce NSI incidence, particularly among nursing staff in resource-limited settings, and are directly relevant to the present study's focus on nursing students in Northeast India.

Ghasemzadeh et al. (2015) examined the frequency of needle-stick injuries and associated occupational factors among 254 nurses working in hospitals in Tehran, Iran. A high incidence of 78.3% was documented, with most injuries occurring during intravenous catheter insertion and blood sampling procedures. Night shifts, inadequate staffing ratios, and the absence of safety-engineered devices were identified as the leading contributing risk factors. Crucially, nurses with less clinical experience particularly those in training faced a disproportionately higher risk of sustaining an NSI. These findings corroborate the central premise of the present study, which investigates the vulnerability of nursing students during clinical postings, and support the need for structured protection and supervision frameworks in training environments.

Chen and Zhang (2021) conducted a systematic review and meta-analysis of eight published studies to determine the prevalence of needle-stick injuries among nursing interns, drawing data from PubMed, Embase, the Cochrane Library, and the China Academic Journals Full-text Database. The total combined prevalence of NSIs among nursing interns was 27% (95% CI: 18–37%), with the highest regional prevalence observed in Asia at 38% and the lowest in the United States at 9%. NSI rates were notably higher in developing countries (38%) compared to developed countries (21%). The study emphasized that due to unfamiliarity with clinical skills, limited occupational protection knowledge, and lack of experience, nursing interns represent a particularly high-risk subgroup for NSIs. These findings carry direct relevance to the present study conducted among nursing students in Northeast India, who face comparable clinical vulnerabilities during their training.

Xu et al. (2022) conducted a systematic review and meta-analysis published in *Frontiers in Public Health* specifically examining the prevalence of Needle-Stick Injuries among nursing students. The study found that nursing students reported a notable overall NSI prevalence of 35%, with significant regional variation. Asia exhibited the highest prevalence at 39.7%, reflecting the heightened risk associated with clinical training environments in developing nations characterized by high patient volumes and limited safety infrastructure. The study further identified recapping of needles, improper sharps disposal, and performance of procedures without adequate supervision as the primary injury mechanisms. The authors recommended mandatory pre-clinical



sharps safety education, regular simulation-based training, and institutional reporting systems specifically tailored for student nurses. This study is among the most directly applicable to the present research, as it focuses exclusively on the nursing student population across Asian healthcare settings.

Abdelmalik et al. (2023) published a comprehensive systematic review and meta-analysis in the *Journal of Clinical Nursing* examining the global prevalence of needle-stick injuries among nurses, revealing an overall pooled prevalence of 40.97%. The study delineated significant variations in NSI prevalence across WHO regions, socioeconomic development indices, and the developmental status of countries. South East Asia exhibited the highest prevalence at 49.9%, while the United States reported the lowest at 25.1%. The study also highlighted a clear distinction between developed countries (30.5%) and developing countries (46.6%), with low-to-middle socioeconomic development index countries experiencing the highest NSI prevalence at 48.9%. These findings provide a robust contemporary benchmark against which the NSI data collected in the present study among nursing students in Mizoram, India can be meaningfully compared.

Pandey et al. (2024) conducted a cross-sectional study among 213 healthcare workers in a tertiary care hospital in Lucknow, Uttar Pradesh, India, to determine the prevalence and associated factors of needle-stick injuries. The 12-month NSI prevalence was found to be 11.7%, with fingers being the most common site of injury (88%) and hospital wards the most frequent location of occurrence (40%). Needles were the most common sharp device implicated (72%), and the majority of injuries were superficial in nature (84%). A statistically significant association was found between NSI occurrence and gender, years of work experience, the practice of dismantling needles by hand, and working shift, with healthcare workers having fewer than three years of experience and those on evening or night shifts at significantly higher risk. The study recommended continuous education on safe injection techniques, the use of protective equipment, and prominent display of educational materials at all hospital workstations. These findings from a contemporary Indian tertiary care context are highly relevant to the present study examining NSI prevalence among nursing students in Northeast India.

Research Questions

1. What is the incidence of Needle Stick Injury (NSI) among nursing students of selected nursing institutions in Aizawl, Mizoram?
2. Is there a significant association between the incidence of Needle Stick Injury (NSI) and the academic year of nursing students in selected nursing institutions of Aizawl, Mizoram?

Objectives of the study

1. To assess the incidence of NSI among nursing students of selected nursing institutions in Aizawl.
2. To determine the association between the incidence of NSI and academic year.

METHODOLOGY OF THE STUDY

Research Approach

A quantitative research approach was used for this research. The quantitative approach was selected as it is

appropriate for measuring the incidence of NSI and determining associations between variables through statistical analysis. This approach allows for objective measurement, numerical data collection, and statistical testing of hypotheses, making it suitable for assessing the incidence and identifying associations with academic year (Creswell & Creswell, 2018). The quantitative approach enables the researchers to quantify the magnitude of the NSI problem among nursing students and to generalize findings to the broader population of nursing students in similar settings.

Research Design

A descriptive research design was employed to analyze the incidence of Needlestick Injuries (NSI) among nursing students. This design enables the characterization of the study population and the identification of associations between variables without manipulation. The study aimed to describe the incidence and demographic characteristics of participants, details of NSI incidents, and the link between NSI incidence and academic year. The cross-sectional nature of the design allowed for efficient assessment of prevalence and associations at a single point in time.

Variables Under Study

Dependent variable

Incidence of Needle Stick Injury

Independent variable

Academic year

Setting of the study

The study was conducted in selected nursing institutions of Aizawl, Mizoram namely, Regional Institute of Paramedical & Nursing Sciences, Zemabawk: Mizoram; College of Nursing Synod Hospital, Durtlang: Mizoram; BN College of Nursing, Hualngohmun: Mizoram; Aizawl College of Nursing, Ramrikawn: Mizoram; Health Worker Training Institute, Kulikawn: Aizawl; ANM School Aizawl, Zemabawk: Aizawl; Apollo School of Nursing, Luangmual: Aizawl; Blessino Nursing School, Maubawk: Aizawl; and MFM School of Nursing, Durtlang: Mizoram.

Population

The population of the study comprised of students of various nursing institutions within Aizawl district.

Sample and Sample Size

The samples were selected from nursing students from selected nursing institutions of Aizawl, Mizoram.

The sample comprised of 830 nursing students.

Sampling Technique

This study utilized a Non-Probability Purposive Sampling method, a technique where researchers intentionally select participants based on specific characteristics, expertise or criteria relevant to the objectives of the study.

Sampling Criteria

Inclusion criteria

- Students who are currently studying in selected nursing institutions in Aizawl.



- Students who can read and write English language.
- Students who are willing to participate.

Exclusion Criteria

- Students who are unwilling to participate.
- Students who are absent at the time of data collection.

Description of the tool

The tool used for this study was specifically developed by the researchers based on an extensive review of literature, existing validated questionnaires, and the study objectives. The tool consisted of two main parts designed to systematically collect data on demographic characteristics and the incidence of Needle Stick Injury (NSI) among nursing students. Both tools were structured as self-administered questionnaires to facilitate ease of completion and ensure confidentiality of responses.

Component of the research tool

The research tool consists of two primary components aimed at studying needle-stick injuries (NSI) among nursing students.

Tool 1: Demographic Proforma, collects essential demographic data through five items: age, sex, nursing program, academic year, and previous knowledge of NSI and post-exposure prophylaxis (PEP). This tool facilitates subgroup analysis, allowing the examination of factors influencing NSI incidence.

Tool 2: Incidence of Needle-Stick Injury, comprises eleven items that detail NSI occurrences, including the history of injectable medication administration, the experience of NSI, and specifics of the incidents. It assesses the type of device causing the injury, reporting status, immediate measures taken, and the infection status of the source patient. By gathering comprehensive data, it aims to identify risk factors and improve reporting systems, ultimately enhancing safety protocols for nursing students.

Validity of the tools

The validity of the tool was assessed through a systematic content validation process involving seven subject experts from various Nursing Institutions in Aizawl, Mizoram. The experts reviewed the tool for relevance, clarity, comprehensiveness, and appropriateness of response options, leading to a Content Validity Index of 88.60% for Tool 1: Demographic Proforma and 96.00% for Tool 2: Incidence of Needle Stick Injury, indicating high to excellent validity. Corrections based on expert feedback included merging redundant response options in Tool 1 and revising question structures for clarity. In Tool 2, inaccurate options were modified and a new sub-question was added to evaluate reporting behavior regarding needle stick injuries. These revisions enhanced the tools' clarity and relevance for research purposes.

Reliability of the tools

Reliability of the tool was confirmed through Kuder-Richardson Formula 20 (KR-20) testing, which assessed internal consistency for dichotomous items. A KR-20 coefficient of 0.72 indicates acceptable reliability, satisfying

the threshold of 0.70 for research instruments. This coefficient suggests that the tool consistently measures the same underlying construct of NSI incidence, ensuring reliable results across similar populations under similar conditions.

Pilot study

A pilot study is a preliminary trial of research methods to identify and address potential issues before a main study. Its purpose included testing the feasibility of the developed tool, exploring initial responses, evaluating data collection procedures, assessing questionnaire clarity for a larger nursing student study, estimating completion time, and detecting unforeseen challenges. Conducted with thirty participants from Mizoram College of Nursing, the study involved random selection, informed consent, and feedback on the questionnaire's clarity and relevance. Results indicated the data collection process was practical, with clear questionnaire items taking ten to fifteen minutes to complete, and no major issues arose. The pilot confirmed the methodology's applicability to a larger sample without the need for modifications.

Data Collection Process

The data collection process was conducted systematically to ensure data quality and completeness. Initially, administrative approvals were secured from the Principal of Mizoram College of Nursing and participating institutions. An official letter explaining the study was issued, and consent forms were prepared. Written informed consent was obtained from participants, ensuring confidentiality and the right to withdraw.

Data was collected over approximately four weeks using a self-administered questionnaire, following a clear explanation of the study's purpose. Completed questionnaires were personally collected by researchers. After collection, the data was verified for completeness, coded for analysis, and securely stored.

Ethical principles were strictly followed, including obtaining informed consent, maintaining participant confidentiality, and ensuring voluntary participation without penalty. Administrative permissions were also secured prior to the study's commencement.

Data Analysis

The study analyzed data using descriptive and inferential statistics. Descriptive statistics summarized characteristics of the study population and the incidence of needlestick injuries (NSI), calculating frequency and percentage distributions for demographic variables and NSI characteristics. Cumulative incidence was computed as the percentage of nursing students who experienced at least one NSI. Inferential statistics, particularly the chi-square test, assessed the relationship between NSI incidence and academic year, with hypotheses tested at a significance level of 0.05. Jamovi 2.7.28 software was utilized for data analysis, providing user-friendly functionality and quality outputs. Data presentation included tables, figures, and narrative descriptions for clear communication of findings.

Findings related to objective 1:

The analysis revealed that 246 nursing students (29.6%) of the total sample of 830 had experienced at least one



Needle Stick Injury since joining their respective nursing program. The remaining 584 students (70.4%) reported not having any previous experience of NSI. The incidence was calculated using the cumulative incidence formula:

Incidence of NSI (%) = (Number of nursing students experienced at least one NSI during their clinical training. This finding highlights the substantial burden of NSI among nursing students in Aizawl, Mizoram, and underscores the need for comprehensive prevention strategies.

Table 1.1: Distribution according to type of device causing NSI

Sl. No	Device Causing NSI	Frequency	Percentage
1.	Hollow bore needle	151	61.4
2.	IV Cannula	74	30.1
3.	Suture needle	12	4.9
4.	Others	9	3.6
Total		246	100.0

Among the 246 students who experienced NSI. The analysis of device type revealed that hollow-bore needles were the primary device causing injuries, comprising 151 students (61.4% of the cases). This was followed by IV Cannula with 74 students (30.1%), Suture needle with 12 students (4.9%), and others with 9 students (3.6%). The predominant of hollow-bore

needles as the primary cause of NSI reflects their widespread use in clinical procedures including blood draws, intravenous medication administration, and injection therapy. This finding emphasizes the need for enhanced safety measures specifically targeting hollow-bore needle use.

Table 1.2: Frequency and percentage distribution of NSI:

Sl. No	Procedure causing NSI	Frequency	Percentage
1.	During recapping	111	45.1
2.	During disposal	98	39.8
3.	During cannulation	22	8.9
4.	Others	15	6.2
Total		246	100.0

The analysis of the procedure during which NSI occurred revealed that recapping was the most common procedure, with 111 students (45.1% of cases) occurring during this activity. This was followed by during disposal with 98 students (39.8%), during cannulation with 22 students (8.9%), and Others with 15 students (6.2%). The finding that recapping

is the most common procedure leading to NSI is consistent with global literature and emphasizes the critical importance of eliminating the hazardous practice of needle recapping. Many institutions have policies prohibiting recapping, yet its continued prevalence suggests inadequate enforcement and persistent unsafe habits.

Table 1.3: Distribution according to frequency of NSI in last twelve months:

Sl. No	Frequency of NSI in last 12 months	Frequency	Percentage
1.	1	175	71.1
2.	2	50	20.3
3.	3	11	4.5
4.	>4	10	4.1
Total		246	100.0

With regard to the frequency of injuries in the past year, a significant majority of students reported a single incident, comprising 175 students (71.1% of those who experienced NSI). This was followed by two incidents with 50 students (20.3%), three incidents with 11 students (4.5%),

and four or more incidents with 10 students (4.1%). While the majority experienced only one incident, the presence of students with multiple incidents (24.9%) indicates that some students are at higher risk of recurrent NSI and may require targeted interventions.

Table 1.4: Distribution according to immediate measure taken:

Sl. No	Immediate measure taken	Frequency	Percentage
1.	Washed with soap and water only	163	66.2
2.	Reported immediately to senior staff	58	23.6
3.	Prevented further bleeding from site	13	5.3
4.	Used antiseptic like Betadine	12	4.9
Total		246	100.0

In terms of immediate post-exposure response, the most frequently performed measure was washing the site with soap and water only, reported by 163 students (66.2% of those who experienced NSI). This was followed by reporting

immediately to senior staff with 58 students (23.6%), preventing further bleeding from the site with 13 students (5.3%), and using antiseptic like Betadine with 12 students (4.9%). The finding that washing with soap and water was the



most common immediate measure is encouraging, as this is recommended as a first-line measure. However, the relatively low proportion of students who reported immediately to senior staff (23.6%) indicates a gap in proper post-exposure

management protocols, as prompt reporting is essential for timely initiation of PEP when indicated.

Table 1.5: Reporting status of NSI incidents among Nursing students:

Sl. No	Reporting status	Frequency	Percentage
1.	Reported	180	74.8
2.	Not reported	66	25.2
Total		246	100.0

The analysis of reporting behavior revealed that out of the 246 recorded NSI incidents, the majority (180 incidents, 74.8%) were reported to some authority, while 66 incidents (25.2%) remained unreported. While the reporting rate is

relatively high compared to some studies, the fact that one in four incidents remained unreported indicates that barriers to reporting persist.

Table 1.6: Distribution according to designated personnel reported to:

Sl. No	Personnel reported to	Frequency	Percentage
1.	Nursing officer	106	58.9
2.	Senior nursing officer	60	33.4
3.	Others	11	6.1
4.	Infection control nurses	3	1.6
Total		180	100.0

Among the 180 reported incidents, the highest proportion of nursing students notified the Nursing Officer, comprising 106 students (58.9% of the reported cases). This was followed by Senior Nursing Officer with 60 students (33.4%). A smaller percentage of nursing students reported the injury to the Infection Control Nurse with only 3 students

(1.6%), while 11 students (6.1%) reported to other staff members. The low proportion of reports to the Infection Control Nurse suggests either a lack of awareness about the role of infection control departments in NSI management or the absence of clear reporting protocols directing students to infection control personnel.

Table 1.7: Distribution According to Reasons for Not Reporting NSI Incidents

Sl. No	Reasons for not reporting	Frequency	Percentage
1.	Neglected	31	47.0
2.	Others	15	22.7
3.	Worried and afraid	11	16.7
4.	Did not know the standard	9	13.6
Total		66	100.0

Among the 66 students who chose not to report their NSI, the most common reason was neglect, reported by 31 students (47.0% of the unreported cases). This was followed by other reasons with 15 students (22.7%), being worried and afraid with 11 students (16.7%), and lack of knowledge regarding the standard reporting protocol with 9 students

(13.6%). The predominance of neglect as the primary reason for non-reporting suggests that some students do not perceive NSI as a serious event requiring formal reporting, highlighting the need for awareness campaigns emphasizing the potential consequences of unreported NSI.

Table 1.8: Distribution According to Presence of Blood-Borne Infection in Source Patient

Sl. No	Presence of blood-borne infection	Frequency	Percentage
1.	No	216	87.8
2.	Yes	30	12.2
Total		246	100.0

The analysis of source patient infection status revealed that out of the 246 total incidents, only 30 incidents (12.2%) involved a source patient with a confirmed blood-borne infection. In contrast, the vast majority of cases (216 incidents, 87.8%) involved a source patient who did not have a known

blood-borne infection at the time of the NSI. While the majority of source patients were not known to have blood-borne infections, the 12.2% involving infected patients represent a significant risk of transmission, emphasizing the importance of PEP readiness.



Table 1.9: Distribution According to Specific Type of Blood-Borne Infection Among Source Patients

Sl. No	Type of blood-borne infection	Frequency	Percentage
1.	HIV	16	53.4
2.	Hepatitis C	5	16.6
3.	Hepatitis B	5	16.6
4.	Type of infection not known	4	13.3
Total		30	100.0

Among the 30 incidents involving source patients with blood-borne infections, the most prevalent infection was HIV, accounting for 16 cases (53.4% of the infected cases). This was followed by Hepatitis C and Hepatitis B, each accounting for 5 cases (16.6%). In 4 cases (13.3%), the type of blood-borne infection was not known. The high proportion of HIV infections among source patients is particularly concerning given the significant implications of HIV transmission and the importance of timely PEP initiation.

Conclusion

The incidence of needle-stick injuries (NSI) among nursing students in Aizawl, Mizoram, was reported at 29.6%. This figure aligns with findings from Chen and Zhang (2021) who indicated a 27% prevalence among nursing interns, while Xu et al. (2022) reported a 35% prevalence among nursing students. However, it is lower than Bouya et al. (2020) who found a 45.3% prevalence in nursing students and the global rate of 44.5% for healthcare workers (HCWs). Variability in these statistics may stem from differences in populations studied, geographical locations, and the implementation of NSI awareness and prevention measures.

Hollow-bore needles were identified as the leading cause of NSI at 61.4%, consistent with Bouya et al. (2020) which indicated hypodermic needles as the primary cause globally at 55.1%. Recapping emerged as the most frequently associated procedure with NSIs at 45.1%, reiterating findings by Xu et al. (2022). This prevalence suggests a deficiency in institutional policies against recapping, which may not be enforced adequately.

While 74.8% of NSI incidents were reported, a concerning 25.2% went unreported, primarily due to perceived neglect (47.0%). This indicates a possible underestimation of the severity of NSI events and highlights the necessity of

fostering a supportive culture conducive to immediate reporting without fear of repercussions, echoing the insights of Pandey et al. (2024).

The study also revealed that 12.2% of NSI incidents involved patients with blood-borne infections, with HIV being the most common (53.4%). This underscores the critical need for knowledge regarding post-exposure prophylaxis (PEP) and the establishment of robust protocols for timely post-exposure management.

Findings related to objective 2

The second objective of this study was to determine whether there exists a significant association between the incidence of Needle Stick Injury (NSI) and the academic year of nursing students. Academic year serves as a proxy for clinical experience and cumulative exposure to sharp instruments during clinical training. Previous studies have demonstrated that clinical experience is a significant determinant of NSI risk. Chen and Zhang (2021) reported that nursing interns, due to unfamiliarity with clinical skills and lack of experience, represent a particularly high-risk subgroup. Similarly, Xu et al. (2022) emphasized that nursing students in higher academic years face heightened risk associated with clinical training environments. This study, therefore, aimed to determine whether NSI incidence varies significantly across different academic years.

Association between incidence of NSI and academic year

To determine whether there is a significant relationship between the nursing students' academic year and the incidence of NSI, the chi-square test of independence was performed. The null hypothesis stated that there is no significant association between NSI incidence and academic year.

Table 2.1: Association Between Incidence of NSI and Academic Year (N=830)

Academic year	No NSI	Yes NSI	Total	X ²	df	p-value
	N (%)	N (%)				
1 st Year/I& II Semester	272 (86.3%)	43 (13.6%)	315	71.1	3	<.001
2nd Year/III & IV Semester	175 (66.3%)	89 (33.7%)	264			
3rd Year/V & VI Semester	89 (56.0%)	70 (44.0%)	159			
4th Year/VII & VIII Semester	48 (52.2%)	44 (47.2%)	92			

The chi-square test revealed a statistically significant association between academic year and the incidence of Needle

Stick Injuries (NSIs), with $\chi^2 = 71.1$ and a p-value < 0.001. NSI incidence rises progressively across academic years: 1st Year



(13.6%), 2nd Year (33.7%), 3rd Year (44.0%), and 4th Year (47.2%). Increased clinical exposure correlates with higher NSI risk, particularly a +20.1% increase from the first to the second year. Risk ratios further indicate fourth-year students are 3.5 times more likely to experience NSIs than first-year students. Important implications include the need for targeted

interventions, continuous safety training, adequate supervision for senior students, and curriculum modifications to enhance safety training. These findings align with previous studies highlighting that clinical experience significantly influences NSI risk.

Table 2.2: Progressive Increase in NSI Incidence:

Sl. No	Academic Year	NSI Incidence	Increase from previous year
1.	1 st Year	13.6%	-
2.	2 nd Year	33.7%	+20.1%
3.	3 rd Year	44.0%	+10.3%
4.	4 th Year	47.2%	+3.2%

The data demonstrated a progressive increase in NSI incidence as nursing students advance through their academic years. The incidence increased from 13.6% in the first

year to 33.7% in the second year, 44.0% in the third year, and 47.2% in the fourth year.

Table 2.3: Risk Ratio Across Academic Years:

Sl. No	Comparison	Risk ratio	Remark
1.	2 nd Year – 1 st Year	2.48	2.5 times higher risk
2.	3 rd Year – 1 st Year	3.24	3.2 times higher risk
3.	4 th Year – 1 st Year	3.47	3.5 times higher risk
4.	4 th Year – 2 nd Year	1.40	1.4 times higher risk

The risk ratio analysis reveals that fourth-year students are 3.5 times more likely to experience NSI compared to first-year students. This demonstrates that as students progress through their clinical training, their cumulative exposure significantly increases their vulnerability to NSI.

Interpretation of the Association

The chi-square analysis yielded a value of 71.1 with 3 degrees of freedom and a p-value of less than 0.001. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that there is a statistically significant association between academic year and NSI incidence.

Key Observations

- First Year:** Among the 315 first-year students, 272 students (86.3%) had not experienced NSI, while 43 students (13.6%) had experienced at least one NSI since joining their program. This is the lowest incidence among all academic years.
- Second Year:** Among the 264 second-year students, 175 students (66.3%) had not experienced NSI, while 89 students (33.7%) had experienced at least one NSI. This represents a significant increase from the first year incidence (13.6% to 33.7%).
- Third Year:** Among the 159 third-year students, 89 students (56.0%) had not experienced NSI, while 70 students (44.0%) had experienced at least one NSI. The incidence continued to rise from 33.7% to 44.0%.
- Fourth Year:** Among the 92 fourth-year students, 48 students (52.2%) had not experienced NSI, while 44 students (47.2%) had experienced at least one NSI. This represents the highest incidence among all academic years.

DISCUSSION

The study investigated the incidence of Needle Stick Injury (NSI) among nursing students in Aizawl, Mizoram,

revealing a prevalence of 29.6%. This statistic suggests that nearly one-third of nursing students encountered at least one NSI during clinical training, underscoring the urgent need for improved prevention and occupational safety measures in nursing education. This incidence aligns with recent literature, such as a systematic review by Chen and Zhang (2021), which reported a 27% pooled prevalence of NSI among nursing interns, while Xu et al. (2022) indicated a prevalence of 35% across Asia. Although consistent with regional trends, the reported incidence is lower than the 45.3% prevalence recorded by Bouya et al. (2020), suggesting potential differences in study populations and safety practices across institutions.

The predominant cause of NSI was attributed to hollow-bore needles (61.4%), reflecting Bouya et al.'s finding of similar trends globally. Recapping was identified as the leading procedure causing NSI (45.1%), indicating a need for stricter enforcement of no-recapping policies, as this practice is preventable and highlights inadequate safety education among students. Immediate post-exposure measures showed that while 66.2% of students washed the injury site, only 23.6% reported the incident to senior staff, indicating a significant gap in understanding proper management protocols and potentially instilling a culture of fear regarding repercussions.

In terms of reporting behavior, 74.8% of NSI incidents were reported, yet 25.2% went unreported primarily due to neglect (47.0%). Other barriers included fear (16.7%) and lack of knowledge regarding reporting protocols (13.6%). This indicates a critical need for an encouraging environment to facilitate reporting without negative consequences, along with clear communication of protocols. The relevance of blood-borne infection risk was highlighted by 12.2% of incidents involving infected source patients, predominantly HIV (53.4%).

The analysis indicated a significant association between NSI incidence and academic year ($\chi^2 = 71.1$, $df = 3$, $p < .001$), with the incidence increasing progressively from the



first year (13.6%) to the fourth year (47.2%). This suggests that cumulative clinical exposure, as students gain experience and participate more actively in procedures, raises their vulnerability to NSIs. The risk ratio analysis determined that fourth-year students are 3.5 times more likely to experience NSI compared to first-year students, highlighting the necessity for ongoing safety training throughout the nursing curriculum, particularly for students with increased clinical responsibilities.

Conclusion

The incidence of Needle Stick Injury among nursing students in Aizawl, Mizoram, was found to be 29.6%, with hollow-bore needles (61.4%) and recapping (45.1%) being the most common device and procedure, respectively. While 74.8% of NSI incidents were reported, 25.2% remained unreported, primarily due to neglect (47.0%). A highly significant association was found between academic year and NSI incidence ($\chi^2 = 71.1$, $df = 3$, $p < .001$), with injury rates escalating from 13.6% in the first year to 47.2% in the fourth year. Additionally, 12.2% of NSI incidents involved source patients with blood-borne infections, with HIV being the most prevalent (53.4%).

These findings highlight the urgent need for enhanced integration of NSI prevention and PEP education earlier in nursing curricula, along with improved occupational safety training, strict anti-recapping policies, and encouragement of prompt incident reporting. The progressive increase in NSI incidence across academic years underscores the importance of continuous safety training throughout the nursing curriculum, with targeted interventions for senior students who face greater clinical exposure and complexity of procedures. By implementing these recommendations, nursing institutions can significantly reduce the burden of NSI and safeguard the health and well-being of nursing students during their clinical training.

Recommendations

This study presents a series of recommendations aimed at reducing needlestick injuries (NSI) among nursing students, categorized into five primary areas: Nursing Practice, Nursing Education, Nursing Administration, Supportive Reporting Culture, and Nursing Research.

1. Nursing Practice

The study highlights the importance of strict adherence to infection prevention protocols. It emphasizes eliminating the manual recapping of needles, which was identified as the leading cause of NSI (45.1%). Additionally, nursing students should be trained in the rigorous handling and disposal of sharps, ensuring immediate disposal in puncture-resistant containers. Education on immediate post-exposure responses is crucial, as only 23.6% of students reported their injuries promptly.

2. Nursing Education

Integrating NSI prevention and post-exposure prophylaxis (PEP) education early in nursing programs is essential, especially given the increase in NSI incidences from 13.6% in the first year to 33.7% in the second year. Strengthening pre-clinical training, which includes simulation-based education on safe handling, disposal, and response protocols, is also recommended. Continuous safety training throughout the curriculum is necessary due to the progressive rise in NSI (up to 47.2% by the fourth year).

3. Nursing Administration

The implementation and enforcement of strict policies regarding sharps safety are critical. Healthcare institutions should prohibit recapping, mandate safety-engineered devices, and have defined reporting procedures. Regular mandatory in-service training on NSI prevention and PEP protocols is recommended. The study points to a need for enhanced supervision for senior students, given their higher NSI incidence, and stresses the importance of making safety-engineered devices readily available.

4. Supportive Reporting Culture

Fostering a culture that encourages prompt reporting of NSI incidents without fear of repercussions is vital. The primary reason for non-reporting was neglect (47%), which suggests a need for awareness campaigns about the consequences of unreported NSI. Institutions are encouraged to implement non-punitive reporting systems to alleviate fears of academic repercussions.

5. Nursing Research

Finally, the study calls for further research encompassing larger samples and diverse settings to enhance generalizability. Comparative and longitudinal studies will help track how knowledge, attitudes, and practices change over time, while also identifying barriers to reporting. Evaluating the long-term effectiveness of training programs and conducting multicentre studies can help tailor interventions to the specific needs of regional nursing populations, especially in under-researched areas of India.

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