

Prevalence and Risk Factors of Needle Stick Injuries Among Student Nurses at Tertiary Care Hospital in Peshawar Khyber Pukhtankhwa

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Abstract

Background: Needle stick injuries pose a significant occupational risk for student nurses due to inexperience and frequent exposure to sharp instruments during clinical training, potentially leading to serious infections such as HIV and hepatitis. This study aims to determine the prevalence and identify risk factors associated with needle stick injuries among student nurses in tertiary care hospitals of Peshawar, KP.

Methodology: A cross-sectional descriptive study was conducted among 175 undergraduate nursing students in three major tertiary care hospitals of Peshawar. A convenience sampling technique was used, and data were collected through a structured questionnaire. Data analysis include descriptive statistics

Results: The study revealed that 68% of student nurses experienced needlestick injuries (NSIs) during clinical postings, predominantly among females aged 21 to 25. Most reported experiencing NSIs once, with the primary causes being

disposable needles (19.4%), IV cannula needles (17.1%), and blood collection needles (16.0%). There was significant under-reporting, as only 29.7% reported their injuries. Contributing risk factors included inadequate training, lack of supervision, and insufficient use of protective equipment, with many students also not-vaccinated against hepatitis B and tetanus.

Conclusions: NSI incidents are prevalent among student nurses due to factors like inadequate training, lack of experience, and insufficient PPE usage. The study calls for targeted interventions to prevent these injuries, recommending regular training programs, better supervision, and safe needle handling practices along with vaccination coverage for all students.

Introduction

Needle stick injuries continue to be a significant and pervasive hazard, posing a considerable occupational risk to healthcare workers worldwide [1]. These injuries occur when needles or other sharp objects accidentally puncture the skin, potentially exposing individuals to blood-borne pathogens such as HBV, HCV, and HIV [2,3]. The World Health Organization estimates that millions of these incidents occur annually, often resulting from unsafe working conditions, inadequate training, and non-compliance with safety protocols [4]. Nurses and nursing students are particularly vulnerable to needle stick injuries due to their clinical responsibilities, including administering injections, performing venipunctures, inserting IV lines, suturing, and disposing of medical waste [5,6]. Nursing students, who often work in supervised clinical settings, face unique challenges, including limited experience, learning new procedures under pressure, and variable supervision [7]. This dual role as learners and caregivers places them at a higher risk of making mistakes that can have serious consequences for their personal safety and future professional attitudes towards infection control and reporting behaviors [8].

In Pakistan, needle stick injuries among nursing professionals and students remain a critical yet neglected issue [9,10]. A recent meta-analysis of observational studies in Pakistan revealed a pooled prevalence of needle stick injuries of approximately 48% among nurses and 43% among nursing students, significantly higher than global averages [9]. This highlights an urgent need for preventive measures. A study focused on nursing students in Pakistan reported that approximately 61.9% of students had experienced needle or sharp injuries, with only 27.7% of incidents being reported [11]. Contributing factors included rushing, inattention, overcrowding, and insufficient protective measures [12]. Sharps handling practices were inconsistent, and many nursing students in other countries also reported low reporting rates and higher

incidence associated with procedural errors or unsafe disposal [13]. Empirical evidence from Pakistan highlights that younger age, fewer years of experience, employment in high-risk units, needle recapping, and lack of infection control training are significant risk factors for practicing nurses [14]. These findings help contextualize the risks that student nurses may face as they transition into clinical roles. Needle stick injuries cause not only immediate physical risk but also psychological stress, including fear, anxiety, and potential post-exposure worry [15].

Despite the accumulation of literature, gaps remain, particularly at the institutional and regional levels. In a study on student nurses at KTH, Peshawar, 37% participants reported experiencing NSIs within the past six months. The study also revealed that 70% of students had been vaccinated, and 75% had undergone screening for HBV, HCV, and HIV, yet gaps in safe practices and supervision were evident [16]. A recent meta-analysis in Pakistan estimated that 48% of nurses (95% CI: 35-61%) and 43% of nursing students (95% CI: 31-54%) reported experiencing at least one NSI during their practice period. Despite increased awareness, key risk factors such as inadequate knowledge, lack of protective measures, poor reporting systems, and insufficient training contribute to the high prevalence of NSIs [11].

High prevalence of NSIs reported in Pakistan, particularly among healthcare workers. Common causes include needle recapping, lack of PPE, improper disposal, and insufficient training. Student nurses are underrepresented in existing research despite being at high risk. Educational interventions and infection control policies significantly reduce NSI rates. Need for more region-specific studies, especially in tertiary care hospitals in areas like Peshawar [12,14]. This study aims to contribute to a safer working environment and improved patient care. The purpose of the study is to determine the prevalence and explore the risk factors of needle stick injuries among student nurses. Assess the knowledge of student regarding needle stick injuries.

Methodology

The study followed a cross-sectional descriptive design meaning data was collected from participants at one point in time for comparison purposes. The study was conducted in three major tertiary care hospitals located in Peshawar, Khyber Pakhtunkhwa. These hospitals are: Lady Reading Hospital Peshawar, Khyber Teaching Hospital Peshawar and Hayatabad Medical Complex Peshawar from July, 2025 till December 202. The Population of this study was undergraduate nursing students from all tertiary care hospitals of Peshawar. The total population was 400 as an estimate. Sample size will be calculated through Rao soft. with the following parameters as :Margin of error: 5%,Confidence interval: 95%,Sample size: 173 and sampling technique used was convenience sampling. The inclusion criteria for the study was undergraduate nursing students currently enrolled in the 6th and 8th semesters, and students who were actively attending clinical rotations and are willing to participate in the study. Students who were on academic leave or semester break at the time of data collection were excluded from the study.

An adopted, validated questionnaire was used to assess the prevalence and risk factors of needle stick injuries among student nurses, comprising three sections on socio-demographic/work characteristics, associated factors, and behavioral practices. The tool demonstrated high validity and reliability (CVI = 0.96), followed a structured validation process, and included informed consent prior to participation. The first page of the questionnaire consisted of a consent form, if the participants agreed they could continue with the survey but if they did not give consent then they were excluded from the study. There were three sections in the questionnaire. Seven items made up section A: socio demographics and work characteristics. section two consist of 10 items that focus on factors associated with needle stick injuries while section 3 consist of 14 items that cover the behavioral characteristics regarding needle stick injuries [17].

The study targeted 6th- and 8th-semester undergraduate student nurses from tertiary care teaching institutes (GCON LRH, KTH, and HMC) after obtaining institutional permission and informed consent from participants. Data were collected through self-administered questionnaires and analyzed using SPSS version 27, with frequencies and percentages used to present demographic data, prevalence, and risk factors through tables, bar graphs, and pie charts.

Approval will be taken from relevant ethics committees. Informed consent will be taken from participants. Confidentiality and anonymity will be maintained

The Needle stick injuries were the dependent variable of our study. While independent variables contain: age, experience, year of education (semester), Gender, Working department, training and practice.

Results

The results are summarized using frequency and percentages for categorical variables. With accompanying pie chart and tables for the descriptive statistics of each categorical and nominal variables to facilitate understanding .

The total number of participants according to calculated sample size was 175 in which 156 (89.1%) were female and 19 (10.9%) were male. The 166 participants were of age between 21 to 25 (94.9%) ,5 (2.9%) were of age less than or equal to 20 and only 4 (2.3%) participant were of age more than 25. Majority participant were married (94.9%) and only few (5.1%) were married. The maximum number 94 (53.7%) participant were studying in semester 8 and 81 (46.3%) were in semester 6. The higher number of participants 97 (55.4%) reported that their clinical experiences were less than 6 months ,40 (22.9%) had 6 to 12 months while 38 (21.7%) had more than 12 months of clinical experience. Its means that majority of the participants were novice and have less clinical experience. Majority 52 (29.7%) of the students were working in medical ward, 42 (24.0%) were working in pediatric ward, 31 (17.7%) were in emergency unit, 25 (14.3%) were in ICU unit, 21 (12.0%) in surgical while only 2 (1.1%) and 1 (0.6%) were working in maternity and dialysis unit.

Domain	Category	Frequency 175 (%)
Gender	Male	156 (89.1%)
	Female	19 (10.9%)
Age	20 and below	5 (2.9%)
	21 to 25	166 (94.9%)
	More than 25 years	4 (2.3%)
Marital status	Single	166 (94.9%)
	Married	9 (5.1%)
Semester	1 st and 2 nd	0
	3 rd and 4 th	0
	5 th and 6 th	81 (46.3%)
	7 th and 8 th	94 (53.7%)
Working unit	Less than 6 months	97 (55.4%)
	6 to 12 months	40(22.9%)
	More than 1 year	38(21.7%)
Working department	Peadiatric unit	42 (24.0%)
	Maternity ward	2 (1.1%)
	Operation room	0
	Medical ward	52 (29.7%)
	Surgical ward	21 (12.0%)
	Emergency unit	31 (17.7%)
	ICU	25 (14.3%)
	Dialysis unit	1 (0.6%)

Prevalence and Behavioral Characteristics Regarding Needle Stick Injuries:

The study revealed a high prevalence of needle stick injuries, with n-119 (68%) of participants reporting prior exposure and regarding frequency, 30% experienced NSIs once, 17.1% twice, and 20.6% three times. Mostly superficial (30.3%) or moderate (29.7%), most commonly instrument for caused of NSI by disposable needles (19.4%) and IV cannula needles (17.1%), while NSIs most frequently occurred during procedure of waste disposal (27.4%) and cannulation procedures (25.1%). Despite high 93.7% awareness and belief in prevent-ability, 61.1% did not use personal protective equipment low PPE use, 38.3% did not reporting injuries while practices, inadequate vaccination among (61.1%), and notable knowledge was found among (91.4%) of participants suggesting that awareness alone may not translate into safe practices.

Table 2: Prevalence and Behavioral Characteristics Regarding NSI			
Parameter	Option	N	%
History of Needle Stick Injuries	• Yes	119	68.0%
	• No	56	32.0%
Frequency of NSIs Incidents	• One time	53	30.0%
	• Two time	30	17.1%
	• Three time or more	36	20.6%
	• None	56	32.0%
Severity of Injury	• Severe	14	8.0%
	• Moderate	52	29.7%
	• Superficial	53	30.3%
Instrument That Caused Injury	• Suture needle	9	5.1%
	• Blood sugar lancet	17	9.7%
	• Blood collection needle	28	16.0%
	• Iv cannula needle	30	17.1%
	• Disposable needle	34	19.4%
	• Other	3	1.7%
When Did Injury Occurred	• During changing bedsheet	3	1.7%
	• While cleaning room	1	6%
	• During waste disposal	48	27.4%
	• During suture	4	2.3%
	• During canalization	44	25.1%
	• During blood withdrawal	13	7.4%
	• Other	56	32.0%
Afraid About Injury	• Yes	151	86.3%
	• No	24	13.7%
Use PPE	• YES	68	38.9%
	• NO	107	61.1%
Needle Stick Injuries Preventable	• Yes	164	93.7%
	• No	11	6.3%
Received Tetanus Vaccine	• Yes	68	38.9%
	• No	107	61.1%
Risk of NSIs	• Risk	26	14.9%
	• Moderate risk	77	44.7%
	• High risk	72	41.1%

Disease Not Transmitted By NSI	• HIV	9	5.1%
	• HBV	8	4.6%
	• HCV	1	6%
	• Malaria	106	60.6%
	• NO idea	51	29.1%
Report Injury	• Yes	52	29.7%
	• No	67	38.3%
	• Injury did not occur	56	32.0%
If Not Reported, Reasons	• Consider it not important	41	23.4%
	• Due to fear of stigma	13	7.4%
	• Patient was a low risk	15	8.6%
	• Injury did not occur	56	32.0%
NSI Awareness	• Yes	160	91.4%
	• No	15	8.6%

Risk factors of Needle stick injury

Table 3 shows that heavy workload 40 clinical hours per week, high patient exposure (58.9%) handled more than 10 patients per day, 58.9% had not received training, and unsafe practices as 42.9% sometimes recapped needles and 38.3% always recapped needles, increasing the risk of accidental injuries. The absence of institutional support was notable, with 60.6% reporting no safety protocol in their workplace. Immunization coverage was poor, as only 32% had received the hepatitis B vaccine, leaving the majority vulnerable to blood-borne infections. Although most participants (74.3%) used safety boxes for sharp disposal, a significant proportion (25.7%) did not, posing additional risk. Concerning the placement of sharp containers, the majority (67.4%) were located within patient wards, while fewer were available in procedure rooms (16%), potentially limiting immediate access during high-risk procedures.

Table 3: Risk Factors of Needle Stick Injuries:			
Parameter		N	%
Do you work night shift during clinical duty	• Yes	175	100%
	• No		
Clinical hours per week	• <40	175	100%
	• >40		
Handling patient per day	• <10	71	40.6%
	• >10	104	58.9%
Have you received training on infection prevention or control	• Yes	72	41.1%
	• No	104	58.9%
Availability of sharp disposal container	• Not available	4	2.3%
	• Sometime available	87	49.7%
	• All time available	84	48.0%
Needle recapping practice	• Never recap	33	18.9%
	• Sometime recap	75	42.9%
	• Always recap	67	38.3%

Presence of safety protocol	• Yes	69	39.4%
	• No	106	60.6%
Received hepatitis B vaccine	• Yes	56	32.0%
	• No	119	68.0%
Method of sharp disposal	• Not using safety box	45	25.7%
	• Using safety box	130	74.3%
Location of sharp container	• On dressing trolley	13	7.4%
	• Within each patient ward	118	67.4%
	• Within each procedure room	28	16.0%
	• Other	16	9.1%

Discussion

Needle stick injuries pose a significant occupational hazard to health care worker, particularly student nurses, who are still in training and gaining clinical experience. These injuries can lead serious health consequences including the transmission of blood borne pathogen such as HIV, HBV, and HCV as well also lead to psychological distress among affected individual which can ultimately lead to fear, anxiety and job dissatisfaction. Despite risks, NSI remain a common occurrence in health care settings, with studies suggesting that a significant proportion of health care workers experience NSI during their careers. risk factors of NSI include, inadequate training, lack of standardized reporting system, insufficient use of protective equipment and lack pf experience and supervision.

The finding of the current study revealed a significant prevalence of NSIs among student nurses, with 68 % of the participants reporting experience of NSI during clinical posting this prevalence is higher than reported in some previous studies such as a study conducted in Palestine showed that 23.4% of student nurses experience NSI during clinical posting which is lower than the prevalence of our study [18]. This high prevalence in our study may be due to variation in supervision and safety protocol system across different countries. A review from research paper from 2013 to 2024 revealed that NSI prevalence among student nurses range from 6.2% to 67% which is consistent with our study [19] ,studies conducted in other parts of Pakistan have reported similar findings. Such as a study in conducted swat found that 62.1% of healthcare workers experienced NSI within the past year, with nursing staff being disproportionately affected (63.7%) [20]. Finding of this study is almost similar to our study ,as the prevalence of NSI in both studies is significantly high.

Similarly, another study conducted in Karachi reported that 60.6% of nurses experience NSI during the last year, results of this study is nearly similar to our study indicating high prevalence of NSI , these studies emphasize the need for targeted interventions to improve safety practices and reduce the risk of NSI among healthcare workers[21].

Additionally in our study majority of the incidents were classified as superficial (30.3%) ,with 29.7% being moderate this means that only few incident were severe ,however similar study conducted in Somalia also found that majority of the incident were moderate (59.5%) showing similarity with our study. Similarly most incident occur only one time (30.0%) followed by three or more time (20.6%) indicating the recurring nature of incident which is may be due to poor reporting system and non-compliance with safety protocols and inadequate supervision during procedure , highlighting the need for targeted safety intervention to prevent its recurring [1]. Results of our study also identified several key risk factors contributing to NSIs, including inadequate training on infection prevention or control, lack of proper supervision, and insufficient use of PPE , patient burden and high workload, and lack of experience, the majority of participants (61.1%) did not use PPE while performing duty, which increase their risk of exposure to blood borne pathogens. A study conducted in swat also report

that improper use of PPE (35.1%) and inadequate training (29%) were the contributing cause of NSIs among participants, which is consistent with our study highlighting a concerning issue in Pakistan related to inadequate safety protocol availability in hospitals [20].

Similarly, high patient burden (58.9%) were also recorded to be the risk of NSI which is consistent to several other studies as swat study also report high workload⁽³⁰⁾ (40%) and Mogadishu study also showed that high patient burden (43.2%) is the risk of getting NSI [1, 20]. Swat study further showed that recapping needle was a major risk factor (88.3%) which is in contrast to our study as current study found that recapping practice were 42.9% among students nurses which means that nearly half of the student recap needle, but a study conducted in Ethiopia found that recapping needle is the major risk contributing factor of NSI that are inconsistent with the current study as in our study recapping needle is not the risk of NSI [22].

The current study found that 55.4% of the participant had less than six months of clinical posting experience which means that majority of the students were novice having less experience which may contribute to high prevalence of NSI among them as studies from several other countries found that one of the major risks of NSI is lack of experience [30, 32]. Furthermore underreporting of injuries was common among several studies, current studies found that only 29.7% cases of NSI were reported to department or supervisor by affected participants and the main reason for not reporting incidents was not considered it important (23.4%) and fear of stigma (7.4%), and study conducted in swat also revealed that only 26.2% cases of NSIs were reported which is nearly similar to our study [30], however they did not highlight the reason for not reporting the incidents. Similarly, a systematic review and meta-analysis of 32 studies found that 35% of student nurses experience NSI with a significant proportion (63%) not reporting these incidents. Which is consistent with the results of our study [23].

Likewise, the study found that NSI were most commonly caused by disposable needle (19.4%), IV cannula (17.1%) and blood collection needle (16.0%). However, studies from various countries found other instruments to be the leading cause of injuries such as study in south Gondar Ethiopia found that suture needles were cause of 41.1% of the injuries [22], and a systematic review and meta-analysis of 87 studies found that hypodermic needles were the most common cause of injuries (55.1%) results of both studies is in contrast with our study as in current study most common instrument was disposable needle [24]. Similarly, in our study majority of the injuries occur during waste disposal (27.4%), during cannulation (25.1%) and during blood withdrawal (7.4%), the Palestine study also found that majority of the incident occur during blood withdrawal (41.9%) which is in contrast to the current where most injuries occur during waste disposal (27.4%) [18]. With respect to vaccination 38.9% student nurses received tetanus vaccine and 32.0% received hepatitis B vaccine in our study, however a similar study conducted in swat found that 62.7% nursing student received hepatitis B vaccination these variation in results may be due to variation in institutions facilities and access to vaccinations [30], despite high awareness (91.4%) of NSI and importance of these vaccination, access remain barrier in many settings [25]. In current study vaccinations coverage was not universal, underscoring the need for stronger vaccination policies. Results of our study found that majority of the participant (44.7%) perceived NSI as moderate risk injuries, with 41.1% perceived as high while 86.3% were afraid of getting NSI but despite this high-risk awareness and fear of getting NSI high proportion of participant believe that that malaria is not transmit by NSI (60.6%) which means that student nurses were not fully recognize with the potential transmission risk indicating the need for awareness campaign.

There were several limitation of the study the sampling technique was Convenience sampling, due to time and budget constraints, limiting the generalizability of results to all healthcare settings in Pakistan. The cross-sectional, descriptive design involved data collection at a single time point, restricting the ability to establish associations between

risk factors and needle-stick injuries (NSIs). The reliance on self-reported data raises concerns about recall bias and underreporting, potentially compromising response accuracy. Furthermore, the study's focus on three tertiary hospitals in Peshawar limits its representation of the entire student nurse population in Pakistan.

Conclusion

The results of this study provide a valuable insight into the prevalence and risk factors of needle stick injuries among student nurses at tertiary care hospitals in Peshawar. The findings revealed a concerning high prevalence of needle stick injuries. The study also found various factors that contribute to needle stick injuries such as inadequate training on infection prevention or control, high patient burden, lack of proper supervision, and insufficient use of personal protective equipment being major contributing risk factors causing anxiety and fear among students. The study's results emphasize the necessity for targeted interventions to reduce the risk of needle stick injuries and foster a safer working environment for student nurses, addressing specific gaps in training, supervision, and safety protocols to protect this vulnerable group.

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