



Prevalence, student nurses' knowledge and practices of needle stick injuries during clinical training: A Problem-Solving Approach

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Abstract

Background: Needle stick injuries are common occupational hazards among healthcare workers, especially nurses, and pose a significant risk of transmission of blood-borne infections such as hepatitis B, hepatitis C, and HIV. Nursing students are particularly vulnerable due to limited clinical experience and inadequate knowledge regarding preventive measures and post-exposure management. The aim of this study was to determine the level of knowledge of the prevention guidelines and the prevalence of needle stick injury among nursing students of Holy Family College of Nursing, New Delhi.

Methods: A problem-solving approach with a pre-test and post-test design was used. The study was conducted among 102 GNM and B.Sc. Nursing students. Knowledge was assessed using a structured questionnaire. A planned teaching programme on needle stick injury and its prevention was implemented using a PowerPoint presentation. Pre-test and post-test were conducted on 29th December and 5th January, respectively. Mean scores and mean difference were calculated to evaluate the effectiveness of the intervention.

Results: The mean pre-test knowledge score was 8.52, which increased to 15.25 in the post-test. The mean difference of 6.73 indicated a significant improvement in knowledge following the planned teaching programme.

Conclusion: The planned teaching programme was effective in improving the knowledge of nursing students regarding needle stick injury and its prevention. Educational interventions should be regularly conducted to enhance awareness and promote safe practices among nursing students.

Keywords: Needles, Infection control, Nursing Students, Needle Stick Injury, Student Nurses

Introduction: Needle stick injuries are common occupational hazards among healthcare workers, especially nurses. These injuries can transmit serious infections such as hepatitis B, hepatitis C, and HIV. Every year, many healthcare workers are exposed to blood-borne infections due to unsafe handling of needles and sharps. Nursing students are at higher risk because they are still learning clinical skills.

Although standard safety precautions are followed in hospitals, needle stick injuries still occur due to lack of knowledge or improper practice. It is important for nursing students to have adequate knowledge about prevention and immediate management of needle stick injuries.

Needle stick injuries (NSIs) remain a significant occupational concern in healthcare settings due to their association with the transmission of serious blood-borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). A number of researchers have examined the prevalence, knowledge levels, and preventive practices related to NSIs among healthcare workers and students, particularly those in nursing programs.

Several studies have reported high incidence rates of needle stick injuries among nursing professionals. According to Smith et al. (2018), the annual incidence of NSIs among nursing staff ranged between 30% and 60%, indicating a persistent risk even in facilities with established infection control protocols. Similarly, studies conducted by Sharma and Gupta (2019) found that a majority of NSIs occurred during routine procedures such as injections, venipuncture, and disposal of used needles, primarily due to lapses in adherence to safety precautions.

Knowledge and awareness of NSI prevention have been identified as crucial factors influencing safe practice. A cross-sectional study by Khan and colleagues (2020) among nursing students revealed that only 45% demonstrated adequate knowledge regarding proper handling and disposal of needles. The study also highlighted significant gaps in understanding immediate post-exposure management protocols. In another investigation, Lee et al. (2021) noted that although most students recognized the importance of protective measures, less than half consistently applied standard safety precautions during clinical procedures.

This problem-solving study focuses on assessing the knowledge regarding needle stick injury and its prevention among 102 GNM 1st year and B.Sc. Nursing 2nd year students of Holy Family College of Nursing. The study aims to identify knowledge gaps and help in planning educational measures to prevent needle stick injuries and ensure student safety.

Material and methods:**Research Design**

A problem-solving approach with a **pre-test and post-test research design** was adopted to assess the knowledge regarding needle stick injury and its prevention among nursing students.

Study Setting

The study was conducted at **Holy Family College of Nursing**.

Study Population

The study population consisted of **GNM 1st-year** and **B.Sc. Nursing 2nd-year** students.

Sample Size and Sampling Technique

A total of **102 nursing students** were selected for the study using a **convenience sampling technique**.

Data Collection Tool

Data were collected using a **structured knowledge questionnaire** developed to assess knowledge regarding needle stick injury and its prevention. The questionnaire included items related to:

- Causes of needle stick injury
- Risk factors
- Preventive measures
- Immediate management and post-exposure steps

Procedure

The problem identified in the study was **deficit knowledge regarding needle stick injury and its prevention among nursing students**. To assess this, a **pre-test** was conducted among the selected GNM 1st-year and B.Sc. Nursing 2nd-year students using the structured questionnaire.

After identifying the knowledge gap, various strategies were considered to improve students' knowledge and safe practices, such as:

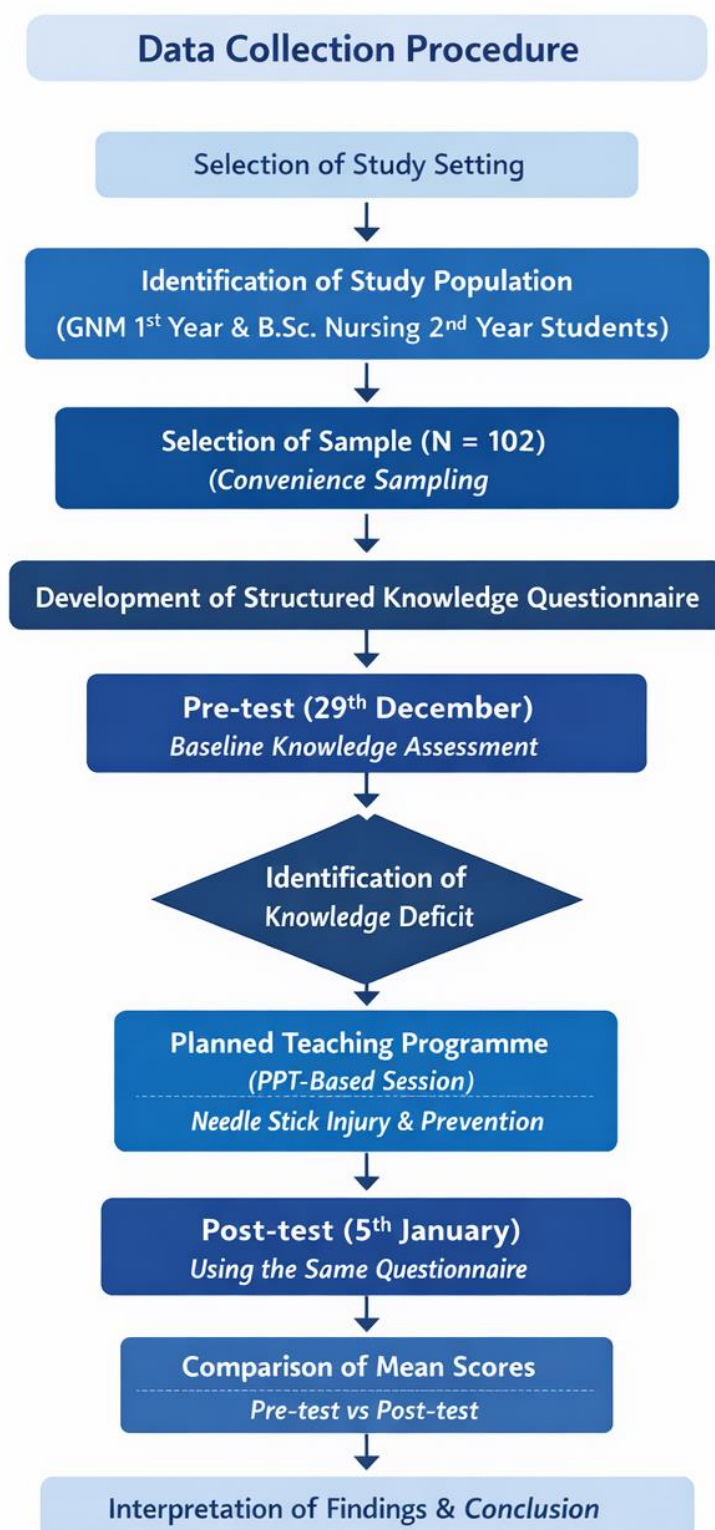
- Planned teaching programme
- Formulation of protocol
- Distribution of pamphlets
- Role play and awareness activities

Among these, a **planned teaching programme** was selected as the most appropriate intervention. Accordingly, a teaching session on needle stick injury and its prevention was conducted using a **PowerPoint presentation**.

Evaluation

Evaluation of the intervention was done by administering a **post-test** using the same structured questionnaire. The pre-test and post-test were conducted on **29th December** and **5th January**, respectively, at **7:00 PM** in **Classroom No. 1**.

The **mean pre-test and post-test knowledge scores** were calculated, and the **mean difference** was used to determine the effectiveness of the planned teaching programme in improving knowledge.



Tool Description

The data collection tool consisted of two parts: **Part I** and **Part II**.

Part I included demographic variables and clinical profile of the participants. Demographic variables comprised age, gender, course enrolled, and year of study. The clinical profile section included information related to history of needle stick injury in the past 12 months, hepatitis B testing status, hepatitis B vaccination status and number of doses received, attendance in classes related to needle stick injury and post-exposure prophylaxis (PEP), and opinion regarding the need for more training on infection control practices.

Part II consisted of a structured knowledge questionnaire related to needle stick injury and its prevention. The questionnaire included multiple-choice questions covering the meaning of needle stick injury (NSI) and post-exposure prophylaxis (PEP), diseases transmitted through NSI, risk of HIV and hepatitis B transmission, common causes of needle stick injury, immediate management following NSI, reporting authority and reporting time, and proper disposal methods of used needles. Each question had four options, with one correct answer.

The tool was designed to assess baseline knowledge and to evaluate the effectiveness of the planned teaching programme by comparing pre-test and post-test scores.

Results: Data analysis was done using descriptive statistics. Mean and mean difference were calculated to assess improvement in knowledge levels between pre-test and post-test scores. The table 1 shows the details about Socio Demographic Profile of Participants enrolled in the study and were analysed and presented as Frequency. and Percentage.

Table 1

Frequency and Percentage Distribution of participants based on their Sociodemographic Characteristics

Variables	(n = 102)	
	Frequency (f)	Percentage (%)
Age in years		
15-20	99	97.05
20-25	3	2.95
25-above	0	0
Gender		
Female	102	100
Male	0	0
Course enrolled in		
GNM	46	45.09
B. Sc	56	54.9
Had needle stick injury in the past 12 months?		
Yes	6	5.88
No	96	94.11
Have you ever tested your hepatitis B virus?		
Yes	96	94.11
No	6	5.88
Vaccinated against hepatitis B virus?		
Yes	102	100
No	0	0
Attended any classes related to NSI and it's PEP		
Yes	102	100
No	0	0
More emphasis and training on NSI required		
Yes	102	100
No	0	0

All the subjects of the study were females and most of them 97.05% were in the age group of 18 to 20 years. The clinical profile section included questions related to hepatitis B testing and vaccination status of the participants. 5.88 percent subjects have experienced needle stick injury in the past 12 months. It assessed that all students had been tested for hepatitis B virus and but had received vaccination against hepatitis B. For those who were vaccinated, information regarding the number of doses received was also collected and all were fully vaccinated. In addition, participants also included the students' opinion on the need for increased emphasis and more frequent training on infection control practices. The details of Socio demographic profile are also represented in Figure 1.

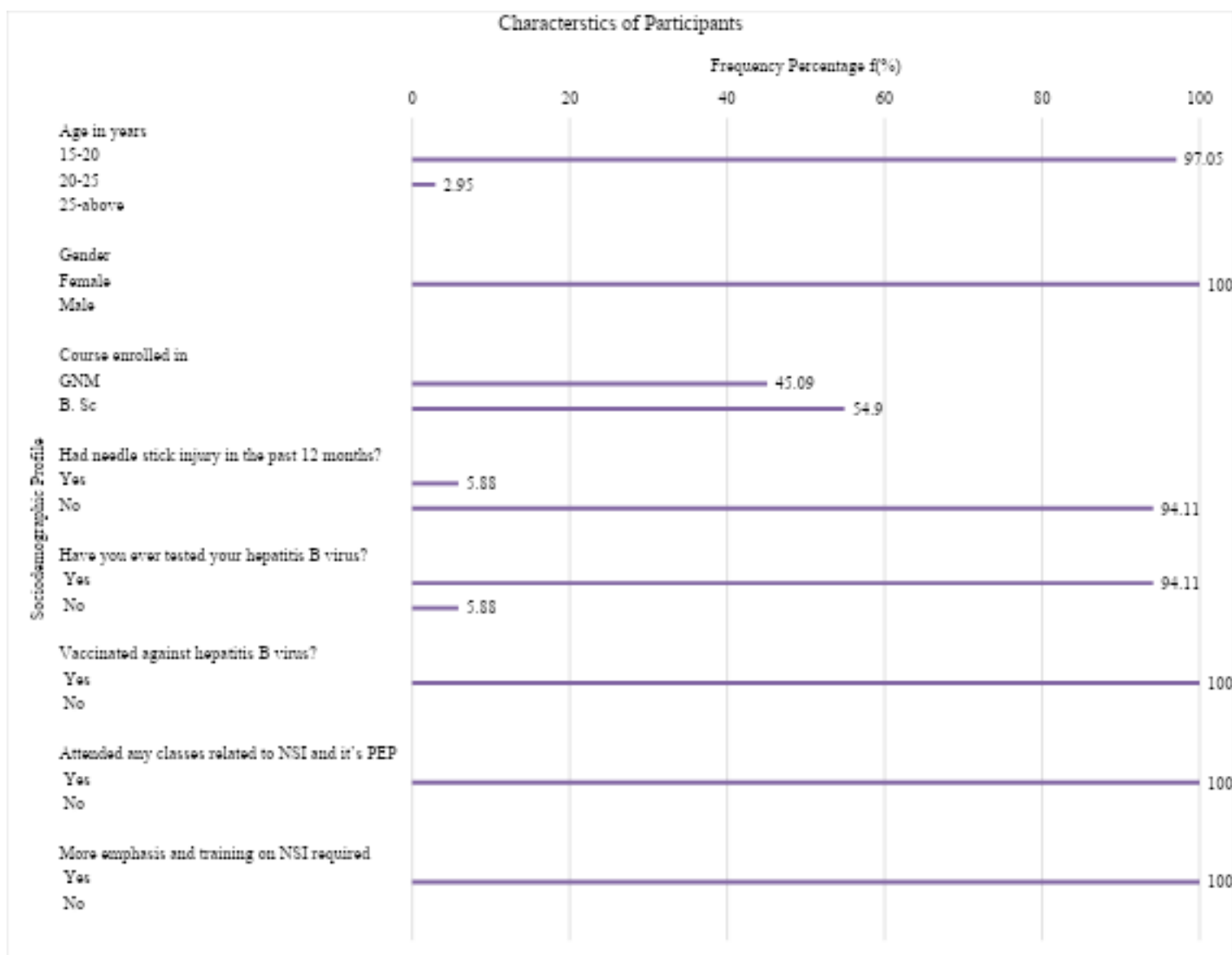


Figure 1 Bar Graph showing the Frequency Percentage Distribution of Participants by their Sociodemographic Characteristics

The part-2 deals with the knowledge level of participants in terms of NSI and its Post exposure Prophylaxis. The mean pre-test score was **8.52**, while the mean post-test score was **15.25**. The mean difference between the pre-test and post-test scores was **6.73**, indicating a significant improvement in knowledge regarding needle stick injury and its prevention after the planned teaching programme. Figure 2. shows item wise representation.

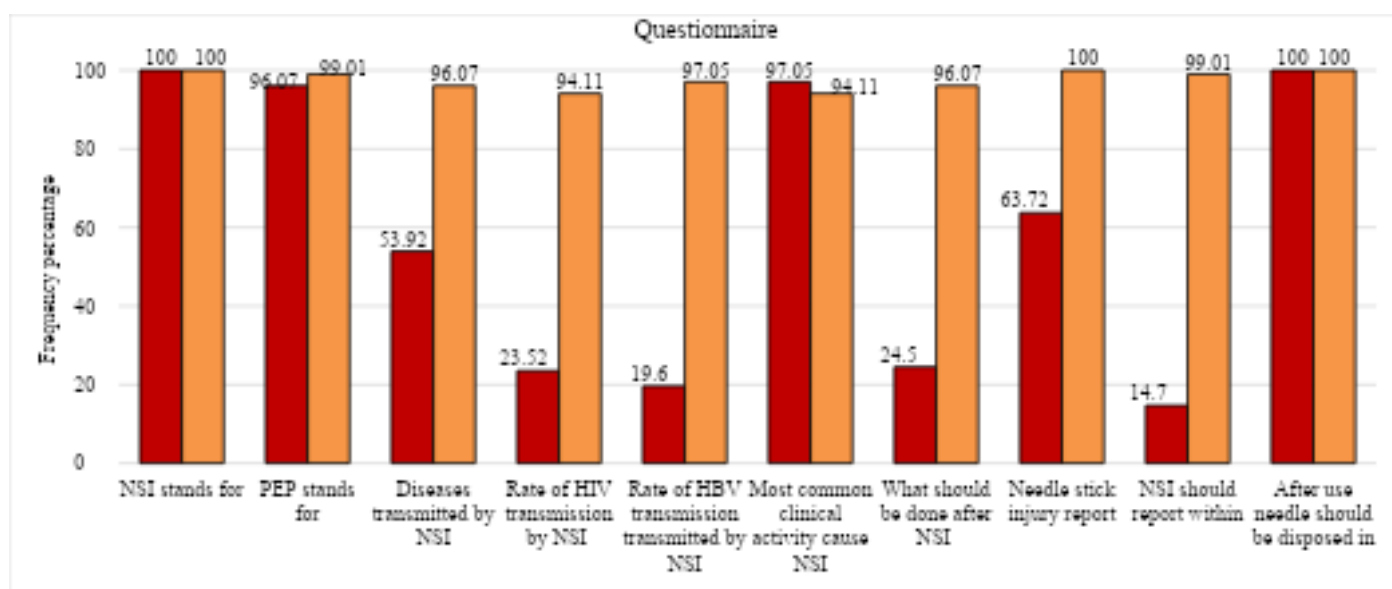


Figure 2 Bar Graph showing Item wise representation of Knowledge of NSI pre and post-test

Discussion:

The present study assessed the knowledge regarding needle stick injury and its prevention among GNM 1st year and B.Sc. Nursing 2nd year students and evaluated the effectiveness of a planned teaching programme. The findings revealed that nursing students had a moderate level of baseline knowledge, which significantly improved following the educational intervention.

In the present study, the mean pre-test score (8.52) indicated inadequate knowledge regarding needle stick injury and its prevention among nursing students. This finding is consistent with previous studies which reported insufficient awareness and unsafe practices related to needle stick injuries among nursing students and healthcare workers. Limited clinical exposure, lack of regular training, and insufficient emphasis on infection control practices during early clinical postings may contribute to this knowledge gap.

After the implementation of the planned teaching programme, the mean post-test score increased to 15.25, with a mean difference of 6.73. This significant improvement demonstrates the effectiveness of structured educational interventions in enhancing knowledge related to needle stick injury prevention. Similar findings have been reported in earlier studies, which showed that planned teaching programmes, workshops, and training sessions significantly improve knowledge and promote safe practices among nursing students.

The study also found that a small proportion of students had experienced needle stick injury in the past year, highlighting the occupational risk even during training. Although all participants were fully vaccinated against hepatitis B, the occurrence of needle stick injuries indicates the need for continuous education on safe handling of sharps, reporting procedures, and post-exposure management.

These findings emphasize the importance of integrating regular training sessions on needle stick injury prevention, post-exposure prophylaxis, and infection control measures into the nursing curriculum. Strengthening institutional policies, discouraging unsafe practices such as needle recapping, and simplifying reporting mechanisms may further reduce the incidence of needle stick injuries among nursing students.

Limitations of the study

The findings of this study are valuable as they contribute to the existing body of knowledge on needle stick injuries. However, the results should be interpreted with caution due to certain limitations. The study was conducted in a single institution, which limits the generalizability of the findings. In addition, Future research should involve multiple nursing institutions with a larger sample size to obtain more comprehensive and generalizable results. Furthermore, the use of self-reported data may have introduced response bias, which could not be entirely eliminated.

Recommendations

1. **Regular teaching programmes** on needle stick injury prevention should be conducted for all nursing students before and during clinical postings.
2. **Skill-based training sessions** (return demonstrations, simulation, and role play) should be organized to improve safe handling of needles and sharps.
3. The college should ensure **orientation on standard precautions and post-exposure prophylaxis (PEP)** for every new batch of students.
4. **Protocols and posters** on needle stick injury prevention and immediate management should be displayed in clinical areas, procedure rooms, and nursing stations.
5. Nursing students should be encouraged to follow **safe injection practices**, including avoiding needle recapping and using proper sharp disposal methods.
6. **Availability of safety devices** such as puncture-proof sharps containers and safety-engineered syringes should be ensured in all clinical areas.
7. **Reporting systems** for needle stick injuries should be strengthened, and students should be motivated to report NSIs immediately without fear or hesitation.
8. Periodic **evaluation and monitoring** of students' knowledge and practices should be carried out through audits, checklists, and OSCE assessments.
9. Similar studies can be conducted on a **larger sample size** and in different nursing colleges to improve generalizability.
10. Future research may include assessing **practice and incidence rate** of needle stick injuries along with knowledge, to obtain more comprehensive findings

Implications of the Study

1. Implications for Nursing Practice

- Nursing students should consistently follow **standard precautions** while performing clinical procedures involving needles and sharps.
- Safe practices such as **avoiding recapping**, using correct disposal methods, and maintaining **sharp safety awareness** must be emphasized during clinical postings.
- Nursing personnel should act as **role models** for students by demonstrating correct needle handling techniques.
- Immediate management of NSI, including **first aid measures and prompt reporting**, should be practiced to reduce risk of infection.

2. Implications for Nursing Education

- The nursing curriculum should include structured teaching on **needle stick injury prevention, standard precautions, and post-exposure prophylaxis (PEP)**.
- Regular **planned teaching programmes, workshops, and simulation-based training** should be conducted for students before clinical exposure.

- OSCE-based evaluation and return demonstrations should be incorporated to assess students' competency in safe needle handling.
- Educational materials such as **protocols, posters, and pamphlets** should be provided to reinforce learning.

3. Implications for Nursing Administration

- Nursing administrators should ensure the availability of essential resources such as **puncture-proof sharps containers, gloves, and safety-engineered devices** in all clinical areas.
- Policies and protocols related to NSI prevention and management should be implemented and strictly monitored.
- A supportive system should be developed to encourage **immediate reporting and documentation** of NSIs without fear among students.
- Regular **clinical audits and supervision** should be conducted to monitor adherence to safe practices.

4. Implications for Nursing Research

- Further studies can be conducted with **larger sample sizes** and in different nursing institutions to improve generalizability.
- Future research can assess not only knowledge but also **actual practices and incidence of NSIs** among nursing students.
- Comparative studies can be conducted between different groups such as **GNM vs B.Sc. Nursing students** or students of different academic years.
- Interventional studies can evaluate the effectiveness of different strategies such as **protocol-based training, simulation, role play, and skill labs** in reducing NSIs

Conclusion

This study demonstrated that nursing students had a moderate level of knowledge regarding needle stick injury prevention measures and lacked safe infection control practices in several aspects. These findings have important implications for current clinical practices and highlight the need for a collaborative effort between nursing administrators in academic and clinical settings to develop effective strategies aimed not only at reducing but also eliminating the occurrence of needle stick injuries. To improve the knowledge levels of nursing students, it is recommended that the nursing curriculum be reviewed, long-term educational and training programs be developed, strict implementation of infection control and needle stick injury prevention policies be ensured, unsafe practices such as needle recapping be discouraged, reporting protocols be simplified, and regular educational programs be made available to promote safer clinical practices.

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