

A Cross-Sectional Questionnaire-Based Study to Assess Knowledge, Attitude and Practice Regarding Needle Stick Injury and Post-Exposure Prophylaxis among Healthcare Workers in a Tertiary Care Teaching Hospital

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ABSTRACT

Background: Needle stick injuries (NSIs) are a common occupational hazard among healthcare workers, with potential exposure to blood-borne pathogens such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV). Despite the availability of standard precautions, hepatitis B vaccination, and post-exposure prophylaxis (PEP), NSIs continue to occur due to unsafe practices, inadequate reporting, and gaps in post-exposure management. Assessing healthcare workers' knowledge, attitudes, and practices is therefore essential for identifying preventable gaps and strengthening occupational safety measures.

Objective: To assess the knowledge, attitude and practices (KAP) regarding needle stick injuries and post-exposure prophylaxis (PEP) among healthcare workers in a tertiary-care teaching hospital.

Methods: A hospital-based cross-sectional questionnaire study was conducted among 166 healthcare workers. Data were collected using a structured questionnaire assessing demographic characteristics, knowledge regarding NSIs and PEP, attitudes towards occupational safety, and preventive and post-exposure practices. Knowledge was assessed using seven items, attitude using five Likert-scale statements, and practices using eight items. Data were analysed using descriptive statistics and appropriate tests of association.

Results: The study population had a mean age of **28.73 ± 6.88 years**, with females comprising 67.5%. Overall knowledge regarding NSIs and PEP was good. **94.6%** recognized transmission of HIV, HBV and HCV through NSIs, **97.6%** identified washing with soap and water as the appropriate immediate first-aid measure, and **97.0%** recognized needle recapping as unsafe. Attitudes were predominantly positive, with **93.4%** considering NSI a serious occupational hazard and **95.8%** supporting reporting of occupational exposures. However, **33.7%** reported having experienced an NSI. Among those exposed, only **60.7%** reported the injury and **57.1%** received PEP. Although **98.8%** reported appropriate sharps disposal, **46.4%** reported always or sometimes recapping needles. Hepatitis B vaccination coverage was **92.8%**.

Conclusion: Despite good knowledge and positive attitudes towards NSI prevention, important gaps persist in reporting, PEP uptake and safe needle-handling practices. Regular competency-based training, strengthening of

reporting mechanisms, and continuous monitoring of infection-prevention practices are warranted.

Keywords: Needle stick injury; healthcare workers; post-exposure prophylaxis; occupational exposure; knowledge; attitude; practice; hepatitis B.

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INTRODUCTION

Needle stick injuries (NSI) are a serious but preventable risk faced by healthcare workers in different clinical environments.¹ These injuries are quite common and often difficult to avoid during routine patient care. In the healthcare industry, NSI is one of the most preventable occupational risks.² Most needle stick injuries happen during tasks like administering injections, drawing blood, handling medical waste, reusing needles, and disposing of them, as well as transferring blood or bodily fluids from a collection syringe to a specimen container.³

Occupational exposure to NSI is significantly higher in developing countries, and many cases go unreported. It is estimated that about 75% of NSI cases in these regions are not documented.⁴ Globally, the reporting of NSI is very low, and the real number of such injuries is much higher than what is officially recorded.⁵ Healthcare institutions should not assume that a low reporting rate means a low occurrence of injuries. Research indicates that the number of NSI cases reported through standard hospital reporting systems is often ten times lower than the actual number.⁶

Non-safety incidents (NSIs) pose a significant risk of causing different kinds of infections, and healthcare professionals are constantly facing serious dangers. The primary issue caused by the underreporting of NSIs is that individuals who have been exposed might not receive post-exposure prophylaxis (PEP) in a timely manner, which is essential for preventing the infection from developing. For instance, PEP for HIV has been found to be effective in preventing infection in about 80% of cases.⁷ The risk of transmitting blood-borne infections such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV) is common in NSIs. Therefore, all healthcare workers should follow safety practices and guidelines to protect themselves from infection.² The risk of infection varies depending on the disease. Due to NSIs, the risk of infection for HIV ranges from 0.5% to 40% for HBV.⁸

There is evidence supporting best practices that can help prevent NSIs. However, the awareness and implementation of these practices among healthcare workers appear to be quite limited. Even though

published guidelines recommend that contaminated needles should not be recapped, studies from developed countries like the United States show that healthcare workers often recap needles.⁹ There are no national reporting systems for NSIs in India. However, a 2006 report indicated that about 63% of the 3 to 6 billion injections administered each year are unsafe.¹⁰ NSIs can impact the health system in both direct and indirect ways. In developing countries with limited healthcare workforce, there are fewer doctors and nurses available. NSIs and other occupational injuries affect healthcare services by increasing the number of workdays lost due to injuries and causing emotional distress to healthcare workers.¹¹

The Ministry of Health and Family Welfare, Government of India, suggests that healthcare providers should be informed about the necessary safety measures to prevent needle stick injuries (NSIs). It is also important to provide proper training to healthcare workers on how to handle sharp objects. Besides giving information and training, healthcare facilities should have effective reporting systems in place to ensure early detection of NSIs and prompt action, including providing post-exposure prophylaxis (PEP) and appropriate treatment. Early and accurate reporting is essential for timely initiation of PEP. In some Indian institutions, there are staff health services that keep records of NSI cases and have established safety procedures to manage such incidents and track if the number of cases is decreasing. Safety protocols should be consistently maintained in all hospitals and healthcare centers to prevent NSIs and ensure that safety measures are effectively followed, with immediate response plans in place for any exposure incidents. There is limited information available on the extent and characteristics of NSIs across different healthcare settings in India. This study was conducted to determine the prevalence of NSIs and to examine their occurrence among healthcare workers in a tertiary care hospital.

Novelty of the Study

This study simultaneously assesses KAP regarding both needle stick injury and post-exposure prophylaxis, unlike previous studies focusing on a single aspect.

It identifies the gap between knowledge and actual

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practice, especially in PEP utilization.

It includes multiple healthcare worker groups (doctors, nurses, interns, technicians) for broader comparison.

It evaluates barriers to reporting NSI and PEP adherence, helping design targeted interventions.

Aim: To assess the knowledge, attitude, and practice regarding needle stick injury and post-exposure prophylaxis among healthcare workers.

Objectives:

Primary Objectives:

1. To assess knowledge regarding NSI and PEP among HCWs
2. To evaluate attitude toward NSI prevention and PEP
3. To assess practices followed after NSI

Secondary Objectives:

1. To determine the prevalence of NSI among HCWs
2. To identify factors associated with NSI occurrence
3. To evaluate PEP utilization and compliance

METHODOLOGY

Material and Methods:

Study Design: Cross sectional

Questionnaire based observational study.

Study setting: Tertiary care teaching hospital.

Study population: Healthcare workers including: Doctors, Nurses, Postgraduates, Interns, Laboratory technicians.

Study Period: 2 -3 months

Sample size:

$$n = \frac{(Z^2pq)/d^2}{(1.96^2 \times 0.5 \times 0.5) / (0.1^2)} = 96$$

Final sample size: 120–150 Healthcare Professionals

Study Tools: Data will be collected using a structured questionnaire consisting of the following sections: demographics, knowledge, attitude & practice.

Study Variables:

Inclusion Criteria: HCWs aged ≥ 18 years, working in clinical/laboratory settings, Willing to give informed consent

Exclusion Criteria: Non-clinical staff/ HCWs on long leave during study/ Those who not willing to consent.

Section A: Demographics

1. Age
2. Gender
3. Profession
4. Experience
5. Training on NSI/PEP

Section B: Knowledge

1. Definition of NSI
2. Diseases transmitted
3. PEP timing (72 hrs)
4. First aid after NSI
5. HBV vaccine protection
6. Recapping of needles

Section C: Attitude: Using Likert scale:

1. NSI is serious
2. Preventable
3. Reporting necessary
4. PEP effective
5. Training important

Section D: Practice

1. Ever had NSI
2. Reported or not
3. Took PEP
4. Completed PEP
5. Glove use
6. Needle disposal
7. Recapping

Scoring System Knowledge:

Correct = 1, Incorrect = 0

Good: $>75\%$

Average: $50-75\%$

Poor: $<50\%$

Attitude:

Likert scale (1–5)

Higher score = positive attitude

Practice: Categorize: Good practice $\geq 70\%$ correct responses & Poor practice $<70\%$

Content validation: The questionnaire was subjected to content validation by a panel of 04 subject experts, comprising faculty members from [Forensic Medicine/Community Medicine/Microbiology/Nursing]. Each item was independently assessed for its relevance, clarity and appropriateness using a 4-point relevance scale. The Content Validity Index (CVI) was calculated for individual items (I-CVI) and for the overall scale (S-CVI). Items meeting the predefined validity criterion of I-CVI ≥ 0.78 were retained, all items demonstrated an I-CVI ≥ 0.78 , and the overall S-CVI was >0.80 ; hence, the questionnaire was considered to have satisfactory content validity and the final questionnaire was used for data collection.

Data Collection: Participants completed the questionnaire either: In printed format, or electronically through a secure survey platform. No identifying personal information will be collected. All responses will remain confidential.

Data Analysis: All collected data has been entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) Version. Chi-square test, $p < 0.05$

Ethical Considerations: Ethical approval was obtained from the institutional Ethics committee.

Participation made Voluntary/Informed consent was obtained from all participants/Confidentiality and anonymity of participants was maintained throughout the study/ No personal identifiers will be collected.

RESULTS

4.1 Study Population

A total of 166 healthcare workers participated in this

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cross-sectional questionnaire-based study assessing the knowledge, attitude, and practice regarding needle stick injury (NSI) and post-exposure prophylaxis (PEP). All

4.2 Socio-demographic Characteristics of the Study Participants

Table 4.1. Socio-demographic characteristics of the study participants (n = 166)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	54	32.5
Female	112	67.5
Profession		
Doctor	92	55.4
Nurse	56	33.7
Intern	8	4.8

Age of Participants

- Sample size: 166
- Mean age: 28.73 years
- Standard deviation: 6.88 years
- Age range: 18–56 years

Results interpretation: The study included 166 healthcare workers with a mean age of **28.73 ± 6.88 years** (range: 18–56 years). Female participants constituted the majority of the study population

Fig 4.1. Distribution of study participants according to gender

Gender	No. of Participants
Male	54
Female	112

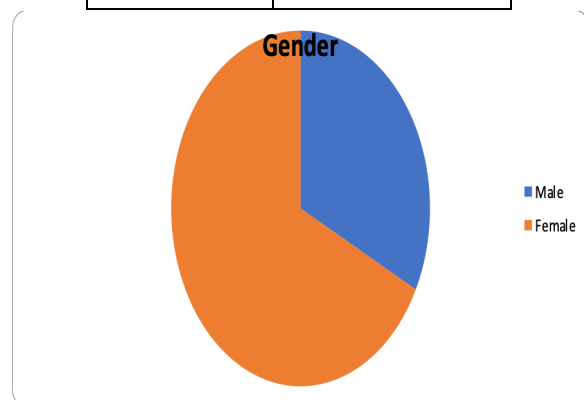


Fig 4.1: Pie chart showing the gender distribution of the study participants (n = 166).

Profession	
Doctor	92
Nurse	56

completed questionnaires were included in the final analysis.

Lab Technician	7	4.2
Others*	3	1.8
Years of Experience		
<1 year	51	30.7
1–5 years	55	33.1
>5 years	60	36.1
Received training on NSI/PEP		
Yes	104	62.7
No	62	37.3

*Others include dentist, postgraduate, and staff nurse. (67.5%), while males accounted for 32.5%. Doctors represented the largest professional group (55.4%), followed by nurses (33.7%), interns (4.8%), and laboratory technicians (4.2%). Based on years of professional experience, 36.1% of participants had more than five years of experience, 33.1% had 1–5 years of experience, and 30.7% had less than one year of experience. Furthermore, 62.7% of healthcare workers reported having received prior training on needle stick injury and post-exposure prophylaxis, whereas 37.3% had not.

Intern	8
Dentist	1
postgraduate	1
Lab Technician	7
Staff nurse	1

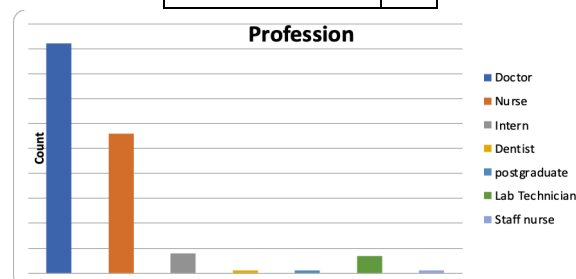


Fig 4.2: Bar graph showing the professional categories of the study participants (n = 166).

Experience	
> 5 Years	60
1-5 Years	55
< 1 Year	51

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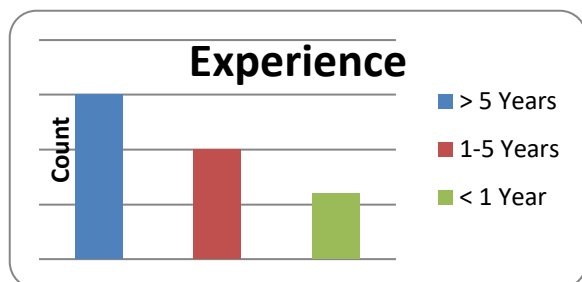


Fig 4.3: Bar graph showing the years of professional experience among the study participants (n = 166).

Training	
Yes	104
No	62



Fig 4.4: Pie chart showing the proportion of healthcare workers who had received previous training regarding needle stick injury and post-exposure prophylaxis.

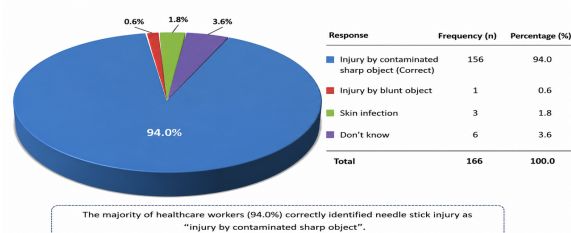
4.3 Knowledge Regarding Needle Stick Injury and Post-Exposure Prophylaxis

The knowledge of healthcare workers regarding needle stick injury and post-exposure prophylaxis was assessed using seven structured questions. The responses are presented as frequencies and percentages in the following tables in Tables 4.2–4.8.

Table 4.2. Knowledge regarding the definition of needle stick injury (n = 166)

Response	Frequency (n)	Percentage (%)
Injury by contaminated sharp object (<i>Correct</i>)	156	94.0
Injury by blunt object	1	0.6
Skin infection	3	1.8
Don't know	6	3.6
Total	166	100.0

Fig 4.5: Knowledge regarding the definition of needle stick injury (n=166)



The majority of healthcare workers (94.0%) correctly identified needle stick injury as "injury by contaminated sharp object".

Interpretation

The majority of healthcare workers (94.0%) correctly identified needle stick injury as an injury caused by a contaminated sharp object. Only 3.6% of participants were unaware of the correct definition, while very few respondents selected incorrect responses.

Table 4.3. Knowledge regarding infections transmitted by Needle Stick Injury (n = 166)

Response	Frequency (n)	Percentage (%)
All of the above (<i>Correct</i>)	157	94.6
HIV	5	3.0
Hepatitis B	4	2.4
Hepatitis C	0	0.0
Total	166	100.0

Interpretation

The majority of healthcare workers (157, 94.6%) correctly identified that HIV, Hepatitis B, and Hepatitis C can all be transmitted through needle stick injuries. Only 5 (3.0%) participants selected HIV alone and 4 (2.4%) selected Hepatitis B alone. None of the participants selected Hepatitis C alone. These findings indicate a high level of knowledge regarding blood-borne infections associated with needle stick injuries.

Fig 4.6: Bar chart showing knowledge regarding infections transmitted by NSI (n=166)

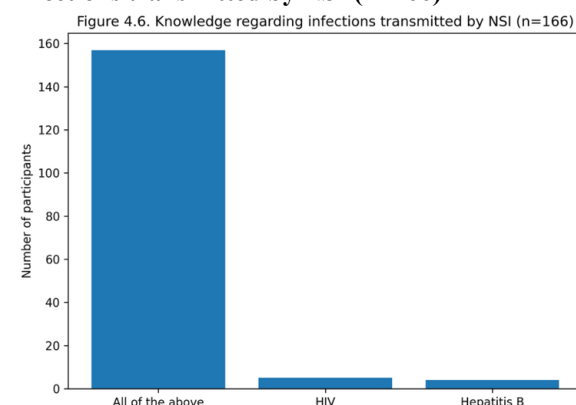
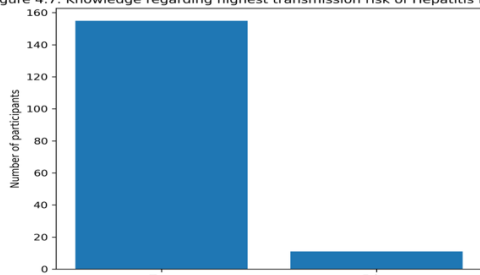


Table 4.4. Knowledge regarding the highest transmission risk of Hepatitis B following Needle Stick Injury (n = 166)

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Response	Frequency (n)	Percentage (%)
True (Correct)	155	93.4
False	11	6.6
Total	166	100.0

Figure 4.7. Knowledge regarding highest transmission risk of Hepatitis B (n=166)



Fig; 4.7: Knowledge regarding highest transmission risk of hepatitis B (n=166)

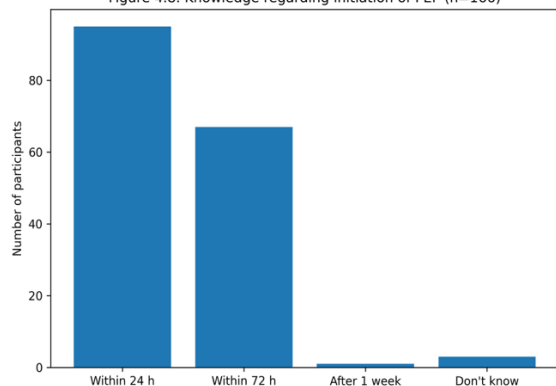
Interpretation

A majority of the healthcare workers (155; 93.4%) correctly recognized that **Hepatitis B** has the highest transmission risk following a needle stick injury. Only 11 (6.6%) participants answered incorrectly. These findings indicate an excellent level of awareness regarding the relative transmissibility of blood-borne pathogens after occupational exposure.

Table 4.5. Knowledge regarding the appropriate time to initiate Post-Exposure Prophylaxis (PEP) (n = 166)

Response	Frequency (n)	Percentage (%)
Within 24 hours	95	57.2
Within 72 hours (Correct)	67	40.4
After 1 week	1	0.6
Don't know	3	1.8
Total	166	100.0

Figure 4.8. Knowledge regarding initiation of PEP (n=166)



Fig; 4.8: Bar chart showing knowledge regarding initiation of PEP (n=166)

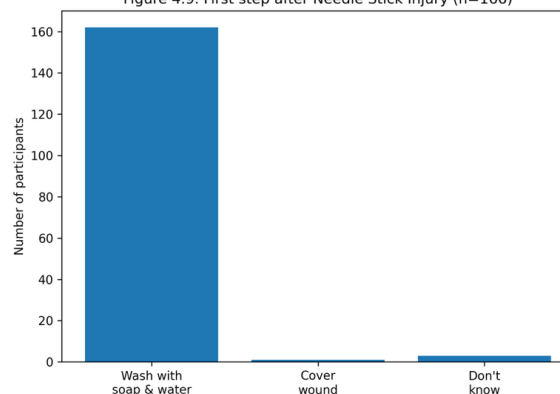
Interpretation

Regarding the appropriate time to initiate post-exposure prophylaxis (PEP), **67 (40.4%)** participants correctly identified that PEP should be started **within 72 hours** following needle stick injury. However, **95 (57.2%)** participants believed that PEP should be initiated within 24 hours. Although early initiation is clinically desirable, the accepted recommendation is that PEP should be started **as soon as possible and no later than 72 hours after exposure**. Only 1 (0.6%) participant selected "After 1 week," while 3 (1.8%) participants were unaware of the correct timing.

Table 4.6. Knowledge regarding the first step after Needle Stick Injury (NSI) (n = 166)

Response	Frequency (n)	Percentage (%)
Wash with soap and water (Correct)	162	97.6
Cover wound	1	0.6
Don't know	3	1.8
Ignore	0	0.0
Total	166	100.0

Figure 4.9. First step after Needle Stick Injury (n=166)



Fig; 4.9: Knowledge regarding the first step after Needle Stick Injury

Interpretation

Most healthcare workers (162; 97.6%) correctly identified that the first step following a needle stick injury is to wash the affected area immediately with soap and water. Only 1 (0.6%) participant believed that simply covering the wound was the appropriate first action, while 3 (1.8%) participants were unaware of the correct response. None of the participants selected "Ignore." These findings indicate an excellent level of knowledge regarding the immediate first-aid management of needle stick injuries.

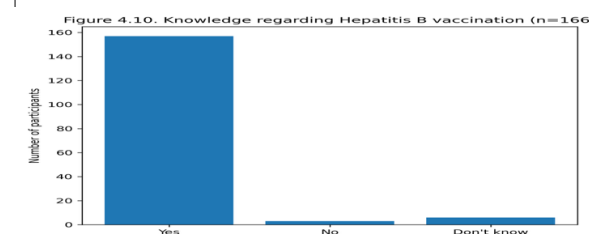
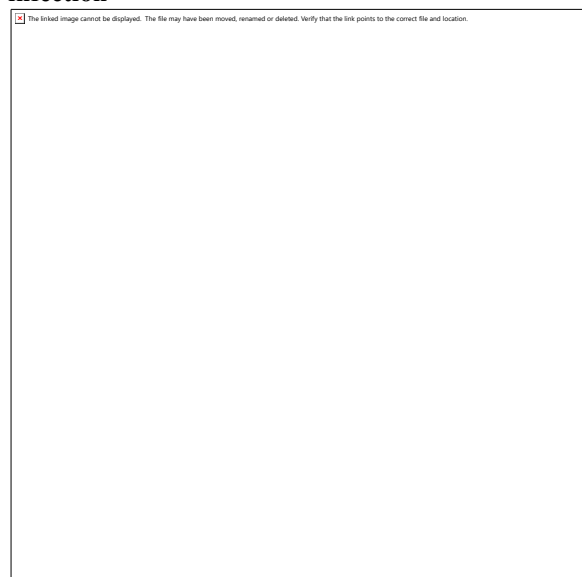
Table 4.7. Knowledge regarding the role of Hepatitis B vaccination in preventing Hepatitis B infection (n = 166)

Response	Frequency	Percentage (%)
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Yes (Correct)	157	94.6
No	3	1.8
Don't know	6	3.6
Total	166	100

Fig; 4.10: Knowledge regarding the role of Hepatitis B vaccination in preventing Hepatitis B infection



Interpretation

The majority of healthcare workers (161; 97.0%) correctly identified that **recapping of needles is unsafe** and should be avoided to reduce the risk of needle stick injuries. Only 2 (1.2%) participants considered recapping to be safe, while 3 (1.8%) participants were uncertain. These findings demonstrate an excellent level of knowledge regarding one of the most important preventive measures for occupational needle stick injuries.

4.3 Overall Summary of Knowledge

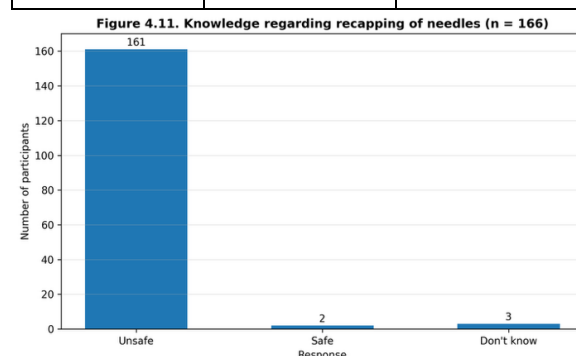
Overall, healthcare workers demonstrated **good knowledge regarding needle stick injuries and post-exposure prophylaxis**. More than 90% of participants correctly identified the definition of needle stick injury, the blood-borne infections transmitted through needle stick injuries, the higher **Table 4.9. Attitude of healthcare workers regarding needle stick injury and post-exposure prophylaxis (n = 166)**

Interpretation

The majority of healthcare workers (157; 94.6%) correctly recognized that **Hepatitis B vaccination prevents Hepatitis B infection**. Only 3 (1.8%) participants incorrectly answered "No," while 6 (3.6%) reported that they did not know. These findings indicate a high level of awareness regarding the protective role of Hepatitis B vaccination among healthcare workers.

Table 4.8. Knowledge regarding recapping of needles (n = 166)

Response	Frequency (n)	Percentage (%)
Unsafe (Correct)	161	97.0
Safe	2	1.2
Don't know	3	1.8
Total	166	100.0



Fig; 4.11: Knowledge regarding recapping of needles (n=166)

transmissibility of Hepatitis B, the immediate first-aid measures following exposure, the protective role of Hepatitis B vaccination, and the unsafe practice of recapping needles. However, a notable proportion of participants were unaware of the recommended time frame for initiation of post-exposure prophylaxis, indicating an area where additional educational interventions may be beneficial.

4.4 Attitude Regarding Needle Stick Injury and Post-Exposure Prophylaxis

The attitude of healthcare workers towards needle stick injury prevention and post-exposure prophylaxis was assessed using five statements on a five-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree). The responses are summarized in **Table 4.9**.

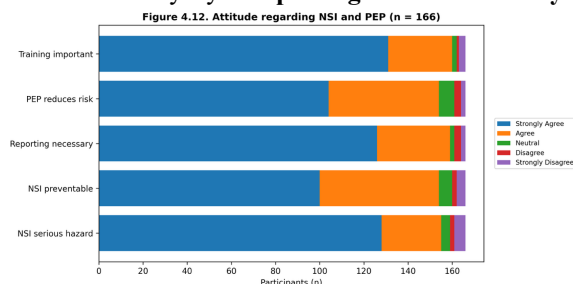
Statement	Strongly Agree	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree
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	e n (%)				ree n (%)
NSI is a serious occupational hazard	128 (77.1)	27 (16.3)	4 (2.4)	2 (1.2)	5 (3.0)
NSI can be prevented	100 (60.2)	54 (32.5)	6 (3.6)	2 (1.2)	4 (2.4)
Reporting NSI is necessary	126 (75.9)	33 (19.9)	2 (1.2)	3 (1.8)	2 (1.2)

Interpretation

Overall, healthcare workers demonstrated a **highly positive attitude** towards needle stick injury prevention and post-exposure prophylaxis. More than **90%** of participants either **agreed or strongly agreed** with each of the five statements. The highest positive response was observed for the statement "**Training programmes on NSI are important**" (96.4%), followed closely by "**Reporting NSI is necessary**"



The stacked bar chart demonstrates that the majority of healthcare workers exhibited a **positive attitude** towards needle stick injury prevention and post-exposure prophylaxis. For all five attitude statements, most participants selected "**Strongly Agree**" or "**Agree**", indicating favourable perceptions regarding the seriousness of NSI, the preventability of NSI, the importance of reporting occupational exposures, the effectiveness of PEP, and the need for regular training programmes. Responses indicating disagreement or

Variable	Yes n (%)	No n (%)
Experienced Needle Stick Injury	56 (33.7)	110 (66.3)
Reported NSI*	34 (60.7)	22 (39.3)
Took PEP after exposure*	32 (57.1)	24 (42.9)

*Percentages for reporting and PEP are calculated among the 56 participants who experienced an NSI.

necessar y					
PEP reduces infection risk	104 (62.7)	50 (30.1)	7 (4.2)	3 (1.8)	2 (1.2)
Training programmes on NSI are important	131 (78.9)	29 (17.5)	2 (1.2)	1 (0.6)	3 (1.8)

(95.8%) and "**NSI is a serious occupational hazard**" (93.4%). Similarly, **92.8%** of respondents believed that post-exposure prophylaxis reduces the risk of infection, while **92.7%** agreed that needle stick injuries can be prevented. Only a small proportion of participants expressed disagreement or uncertainty, indicating an overall favourable attitude regarding occupational safety and prevention of needle stick injuries.

Figure; 4.12: Interpretation

uncertainty were infrequent across all statements.

4.5 Practice Regarding Needle Stick Injury and Post-Exposure Prophylaxis

The practice of healthcare workers regarding needle stick injury prevention, reporting, and post-exposure prophylaxis was assessed using questions on occupational exposure, reporting behavior, use of personal protective measures, disposal practices, recapping of needles, Hepatitis B vaccination status, and causes of needle stick injury.

Interpretation

Among the 166 healthcare workers, **56 (33.7%)** had experienced at least one needle stick injury during their professional practice. Of these exposed individuals, **34 (60.7%)** reported the incident, whereas **22 (39.3%)** did not report the injury. Similarly, **32 (57.1%)** received post-exposure prophylaxis following exposure, while **24 (42.9%)** did not receive PEP. These findings indicate that although reporting and PEP uptake were observed in more than half of the exposed healthcare workers, a considerable proportion

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still failed to report occupational exposures or initiate post-exposure prophylaxis.

Table 4.11. Preventive practices related to needle stick injury among healthcare workers (n = 166)

Variable	Response	n (%)
Use of gloves while handling needles	Always	113 (68.1)
	Sometimes	49 (29.5)
	Never	4 (2.4)
Dispose needles in safety box	Yes	164 (98.8)
	No	2 (1.2)
Recap needles after use	Always	77 (46.4)
	Sometimes	31 (18.7)
	Never	58 (34.9)
Vaccinated against Hepatitis B	Yes	154 (92.8)
	No	12 (7.2)

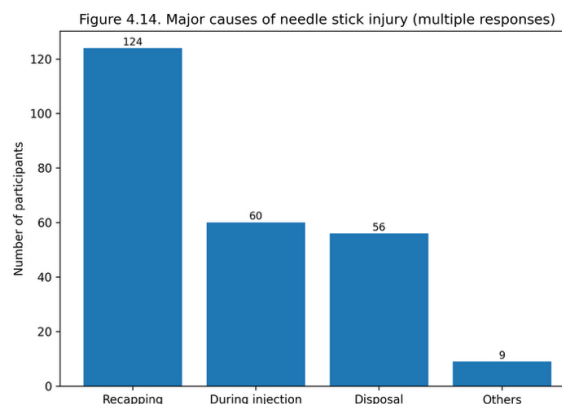
Interpretation

Most healthcare workers (**68.1%**) reported **always using gloves** while handling needles, and almost all (**98.8%**) disposed of used needles in designated safety boxes. Hepatitis B vaccination coverage was high, with **92.8%** of participants reporting vaccination. However, needle recapping remained a concern: **46.4%** reported **always recapping needles** and **18.7%** did so **sometimes**, whereas only **34.9%** reported **never recapping needles**. This suggests that despite good awareness, unsafe needle-handling practices continue among a substantial proportion of healthcare workers.

Table 4.12. Reported causes of needle stick injury (Multiple-response analysis, n = 166)

Cause of Needle Stick Injury	Frequency (n)	Percentage (%) *
Recapping	124	74.7
During injection	60	36.1
Disposal of needles	56	33.7
Other causes	9	5.4

*Multiple responses were permitted; therefore, percentages do not total 100%.



Fig; 4.14: Bar chart showing Major causes of needle stick injury (Multiple responses)

Interpretation

Among the reported causes of needle stick injury, **recapping of needles** was the most frequently identified cause, reported by **124 (74.7%)** participants. This was followed by injuries occurring **during injection (60; 36.1%)** and **during disposal of needles (56; 33.7%)**. A small number of participants (**9; 5.4%**) reported other causes, including surgical procedures, uncapped needles, lack of attention, and other miscellaneous circumstances. These findings suggest that unsafe needle handling practices, particularly recapping, remain the leading contributor to occupational needle stick injuries.

DISCUSSION

5.1 Overview

Needle stick injuries (NSIs) remain an important occupational hazard among healthcare workers (HCWs), with potential exposure to blood-borne infections including HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV). Despite the availability of standard precautions, hepatitis B vaccination, and post-exposure prophylaxis (PEP), NSIs continue to occur because of unsafe practices, inadequate training, under-reporting, and delays in post-exposure management.

The present cross-sectional study assessed knowledge, attitude, and practices regarding NSI and PEP among **166 healthcare workers** in a tertiary care teaching hospital. The participants demonstrated **good knowledge and a positive attitude** towards NSI prevention and management. However, important gaps were observed in actual practice. Approximately one-third (**33.7%**) had experienced an NSI, while under-reporting, incomplete PEP uptake, and continued needle recapping were identified. These findings highlight a persistent **knowledge–practice gap** despite favourable attitudes towards occupational safety.

5.2 Socio-demographic Characteristics

The mean age of participants was **28.73 ± 6.88 years**, indicating a predominantly young healthcare workforce. Females constituted **67.5%** of the study population. Doctors accounted for **55.4%**, followed by nurses (**33.7%**), interns (**4.8%**), laboratory technicians (**4.2%**), and other healthcare workers (**1.8%**).

Participants were relatively evenly distributed according to professional experience: **30.7%** had less than one year of experience, **33.1%** had 1–5 years, and **36.1%** had more than five years of experience. Previous training on NSI and PEP had been received by **62.7%**, whereas **37.3%** had not received formal training, indicating a need for regular and periodic refresher training.

5.3 Knowledge Regarding NSI and PEP

Overall knowledge regarding NSI and PEP was satisfactory. Most participants correctly identified the definition of NSI, routes of transmission, immediate first-aid measures, hepatitis B

vaccination, and the importance of PEP.

A total of **94.0%** correctly identified NSI as an injury caused by a contaminated sharp object. Similarly, **94.6%** recognized that HIV, HBV, and HCV can be transmitted through NSI, while **93.4%** correctly identified HBV as having the highest transmission risk among these three infections.

Knowledge regarding the timing of PEP showed some uncertainty. While **57.2%** selected initiation within 24 hours, **40.4%** selected within 72 hours. Although both responses indicate awareness of the urgency of PEP, this finding emphasizes the need to reinforce the principle that PEP should be initiated **as soon as possible and within the recommended 72-hour window**.

Knowledge of immediate first aid was excellent, with **97.6%** correctly identifying washing the exposed area with soap and water as the first step following NSI. Similarly, **94.6%** recognized the protective role of hepatitis B vaccination.

Although **97.0%** correctly identified needle recapping as unsafe, a substantial proportion reported continuing this practice. This discrepancy between knowledge and behaviour represents an important finding of the study and suggests that educational interventions alone may not be sufficient to achieve sustained behavioural change.

5.4 Attitude Regarding NSI and PEP

Participants demonstrated an overall favourable attitude towards NSI prevention and post-exposure management. **93.4%** agreed that NSI represents a serious occupational hazard, while **92.7%** believed that NSIs are preventable.

The importance of reporting was recognized by **95.8%** of participants, and **92.8%** agreed that PEP reduces the risk of infection following occupational exposure. Furthermore, **96.4%** considered regular training programmes on NSI prevention important. Despite this favourable attitude, actual reporting and PEP uptake were lower than expected. This difference suggests that positive perceptions do not necessarily translate into appropriate behaviour. Practical barriers such as workload, perceived low risk, fear of blame, lack of time, or uncertainty regarding reporting procedures may contribute to this gap.

5.5 Practice Regarding Needle Stick Injury and Post-Exposure Prophylaxis

The practice findings demonstrated a gap between knowledge and actual compliance with recommended preventive measures. **33.7%** of healthcare workers reported having experienced a needle stick injury (NSI). Among those injured, **60.7%** reported the incident, while **39.3%** did not, indicating substantial under-reporting of occupational exposures.

Among those who experienced NSI, **57.1%** received post-exposure prophylaxis (PEP), whereas **42.9%** did not, highlighting the need for prompt reporting and easy access to post-exposure services.

Compliance with standard precautions was variable, with 68.1% always using gloves during procedures involving blood or body-fluid exposure. However, 98.8% reported immediate disposal of used needles in puncture-proof containers, indicating excellent adherence to sharps-disposal practices.

A notable knowledge–practice gap was observed with needle recapping, with 46.4% reporting that they always or sometimes recapped used needles, despite high awareness that recapping is unsafe.

Overall, these findings emphasize the need for regular training, reinforcement of standard precautions, improved reporting mechanisms, and prompt access to PEP to translate existing knowledge and positive attitudes into safer clinical practices.

Strengths of the Study

The present study has several strengths that enhance the validity and relevance of its findings.

Firstly, the study included **166 healthcare workers** from different professional categories, including doctors, nurses, interns, laboratory technicians, and other healthcare personnel. This provided a comprehensive assessment of knowledge, attitudes, and practices across a multidisciplinary healthcare workforce.

Secondly, a **structured and validated questionnaire** was used to collect data, ensuring uniformity in data collection and improving the reliability of participants' responses.

Thirdly, the study simultaneously evaluated the **knowledge, attitude, and practice (KAP)** domains regarding needle stick injuries and post-exposure prophylaxis. This comprehensive approach enabled identification of gaps between theoretical knowledge and actual clinical practice, thereby providing valuable insights into occupational safety among healthcare workers.

Another important strength is that the study was conducted in a **tertiary care teaching hospital**, where healthcare workers are routinely exposed to invasive procedures and are therefore at a higher risk of occupational exposure. Consequently, the findings have direct implications for improving infection prevention strategies within similar healthcare institutions.

Finally, the study identified specific unsafe practices, such as **continued needle recapping and under-reporting of needle stick injuries**, despite good overall knowledge and positive attitudes. These findings provide evidence-based information that can guide future educational programmes, institutional policies, and occupational health interventions.

Limitations of the Study

Despite its strengths, the present study has certain limitations that should be considered while interpreting the findings.

The study was conducted in a **single tertiary care teaching hospital**, which may limit the

generalizability of the results to other healthcare settings with different patient populations, institutional policies, and workplace practices.

The study employed a **cross-sectional design**, which assesses knowledge, attitudes, and practices at a single point in time. Therefore, causal relationships between knowledge, attitudes, and practices cannot be established.

Information was collected using a **self-administered questionnaire**, making the study susceptible to **recall bias** and **social desirability bias**, where participants may over-report desirable practices or under-report unsafe behaviours.

The study relied on participants' self-reported history of needle stick injuries and post-exposure practices, which may not accurately reflect actual occupational exposure or reporting records.

In addition, the study did not evaluate factors such as workload, working hours, availability of safety-engineered devices, institutional reporting systems, or psychological barriers influencing reporting behaviour and post-exposure prophylaxis uptake. Assessment of these factors may provide additional insights into occupational safety practices and should be explored in future research.

Recommendations

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

1. **Regular training programmes** on needle stick injury prevention, standard precautions, and post-exposure prophylaxis should be conducted for all healthcare workers, including newly recruited staff.
2. **Periodic refresher training** should be organized to reinforce safe injection practices, discourage needle recapping, and improve adherence to universal precautions.
3. Healthcare institutions should establish a **simple, confidential, and easily accessible reporting system** for needle stick injuries to encourage prompt reporting and timely management.
4. **Post-exposure prophylaxis services should be available round the clock**, with clearly displayed institutional protocols for immediate management following occupational exposure.
5. Continuous monitoring and regular audits should be undertaken to ensure compliance with infection prevention practices, biomedical waste management guidelines, and standard precautions.
6. **Hepatitis B vaccination** should be ensured for all healthcare workers before clinical postings, and periodic monitoring of protective antibody titres should be considered for high-risk personnel.

7. Hospitals should promote the use of **safety-engineered devices**, needle destroyers, and puncture-proof sharps disposal containers to minimize occupational exposure.
8. Future multicentric studies involving larger populations and diverse healthcare settings are recommended to improve the generalizability of findings and evaluate interventions aimed at reducing needle stick injuries.

Conclusion

Needle stick injuries remain an important occupational hazard among healthcare workers because of the risk of transmission of blood-borne infections such as HIV, Hepatitis B virus, and Hepatitis C virus. The present study demonstrated that healthcare workers in the study institution possessed **good knowledge** regarding needle stick injuries, routes of transmission, first-aid measures, Hepatitis B vaccination, and post-exposure prophylaxis. Participants also exhibited a **positive attitude** towards occupational safety, reporting of needle stick injuries, and the importance of regular infection control training.

Despite these encouraging findings, the study identified several gaps in practice. Approximately one-third of healthcare workers had experienced a needle stick injury, while a considerable proportion failed to report the incident or receive post-exposure prophylaxis. Furthermore, unsafe practices such as **needle recapping** continued despite adequate knowledge regarding its associated risks, highlighting a significant gap between knowledge and actual clinical practice.

The study emphasizes that improving occupational safety requires more than knowledge alone. Regular competency-based training, strict implementation of standard precautions, prompt reporting mechanisms, easy access to post-exposure prophylaxis, and continuous institutional monitoring are essential for reducing needle stick injuries and protecting healthcare workers from occupational exposure.

Overall, the findings of the present study underscore the need for sustained educational initiatives and strengthened institutional infection control policies to promote safer workplace practices and enhance the effective management of needle stick injuries among healthcare workers.

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