JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/3k4tkp96

Original Article

Knowledge, Attitude and Practices of Needle Stick Injury in Health Care Workers in Various Tertiary Care Hospitals, Lahore

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"Cite this Article" Received: 11 January 2026; **Accepted**: 16 April 2026; **Published**: 14 May 2026

Author Contributions: MY, AM, ME, SI, IA and FH contributed to concept, design, data collection, analysis, and drafting. **Ethical Approval**: Superior University, Lahore, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

ABSTRACT

Background: Needle stick injuries are common preventable occupational hazards among healthcare workers and may transmit serious blood-borne infections, including hepatitis B virus, hepatitis C virus, and human immunodeficiency virus. In tertiary-care hospitals, unsafe sharps handling, incomplete vaccination, underreporting, and inadequate post-exposure management can increase occupational risk. **Objective:** This study aimed to assess the knowledge, attitudes, and practices regarding needle stick injuries among healthcare workers in tertiary-care hospitals of Lahore and to identify gaps in prevention, reporting behavior, hepatitis B vaccination, and post-exposure management. **Methods:** A cross-sectional descriptive study was conducted among 250 healthcare workers, including doctors, nurses, laboratory technologists, and other allied healthcare personnel, working in selected tertiary-care hospitals of Lahore. Data were collected using a structured self-administered questionnaire covering demographic characteristics, training status, knowledge of needle stick injuries, attitudes toward reporting and prevention, and self-reported safety practices. Data were analyzed using IBM SPSS Statistics version 25 and summarized as frequencies and percentages. **Results:** Awareness of needle stick injuries was reported by 67% of participants, while 60% correctly identified hepatitis B, hepatitis C, and HIV as transmissible infections. Although 70% considered reporting important and 62% believed NSIs were preventable, unsafe practices remained common. Needle recapping was always practiced by 62%, only 41% had completed hepatitis B vaccination, 56% were aware of post-exposure prophylaxis, and 35% formally reported incidents. **Conclusion:** Healthcare workers demonstrated moderate awareness and generally positive attitudes toward needle stick injury prevention, but important gaps persisted in safe needle handling, vaccination completion, reporting behavior, and post-exposure response. Strengthening practical infection-control training, complete hepatitis B immunization, non-punitive reporting systems, and clear post-exposure protocols is essential to improve occupational safety. **Keywords:** Needle stick injuries, healthcare workers, occupational exposure, hepatitis B, hepatitis C, HIV, infection control.

INTRODUCTION

Needle stick injuries are a major occupational hazard among healthcare workers because they involve percutaneous exposure to potentially contaminated needles or sharp medical instruments during routine clinical care. Healthcare workers, including doctors, nurses, laboratory technologists, and allied health staff, are repeatedly exposed to blood and body fluids while performing procedures such as blood collection, intravenous cannulation, injections, surgical assistance, and laboratory sample handling. These injuries are clinically important because they can transmit serious blood-borne infections, particularly hepatitis B virus, hepatitis C virus, and human immunodeficiency virus, which remain major occupational safety concerns in healthcare systems worldwide (1).

Globally, needle stick injuries continue to occur despite the availability of standard precautions, infection-control protocols, hepatitis B vaccination, and post-exposure prophylaxis. International estimates suggest that hundreds of thousands of healthcare workers experience sharps-related injuries annually, with a substantial proportion exposed to blood-borne pathogens through preventable occupational incidents (2,3). The risk of infection after a needle stick injury depends on the pathogen involved, the depth of injury, the type of device, the amount of blood exposure, and the infection status of the source patient. Hepatitis B carries the highest risk among non-immunized healthcare workers, while hepatitis C and HIV also remain clinically significant because of their long-term consequences, psychological burden, and treatment implications (4,5).

The burden of needle stick injuries is particularly relevant in low- and middle-income countries, where overcrowded hospitals, high patient turnover, limited safety-engineered devices, inadequate staff training, inconsistent use of personal protective equipment, and weak reporting systems may increase occupational exposure. In Pakistan, the problem is further intensified by the continuing burden of hepatitis B and hepatitis C in the general population, which increases the potential consequences of unsafe sharps handling and delayed post-exposure management (6). Healthcare workers in tertiary-care hospitals are especially vulnerable because they manage high volumes of invasive procedures and emergency care, often under time pressure and resource constraints.

Although needle stick injuries are largely preventable, unsafe practices remain common in clinical environments. Recapping used needles, delayed disposal of sharps, overfilled sharps containers, lack of immediate wound care, poor compliance with personal protective equipment, and incomplete hepatitis B vaccination are repeatedly reported as modifiable contributors to occupational exposure (7-9). In addition, many healthcare workers do not report needle stick injuries because of fear of blame, lack of awareness about reporting procedures, perceived low risk from minor injuries, workload pressure, or uncertainty about post-exposure prophylaxis. These underreporting limits institutional surveillance, delays appropriate management, and weakens infection-control planning (10,11).

Knowledge, attitude, and practice assessment provides a practical framework for identifying gaps between awareness and actual workplace behavior. Knowledge reflects whether healthcare workers understand the causes, risks, transmission routes, prevention strategies, and post-exposure management of needle stick injuries. Attitude reflects their perception of reporting, professional responsibility, and institutional safety culture. Practice reflects real-world behaviors such as needle recapping, use of personal protective equipment, vaccination completion, immediate action after exposure, and formal reporting. Evaluating all three domains is necessary because awareness alone does not guarantee safe behavior, and positive attitudes may not translate into practice when institutional systems are weak.

Previous studies from Pakistan and other regional healthcare settings have reported variable levels of awareness, incomplete vaccination coverage, underreporting of needle stick injuries, and inconsistent compliance with standard precautions among healthcare workers (3–5). However, recent evidence from tertiary-care hospitals in Lahore remains limited, particularly regarding the combined assessment of knowledge, attitudes, and practices among multiple healthcare professional groups, including laboratory technologists, doctors, nurses, and other allied health personnel. Identifying these gaps is important for designing targeted infection-control training, strengthening reporting systems, improving vaccination coverage, and reducing preventable occupational exposure.

Therefore, this study aimed to assess the knowledge, attitudes, and practices regarding needle stick injuries among healthcare workers in various tertiary-care hospitals of Lahore and to identify gaps related to prevention, reporting behavior, hepatitis B vaccination, unsafe needle handling, and post-exposure management. The study was guided by the research question: what is the level of knowledge, attitude, and practice regarding needle stick injuries among healthcare workers in tertiary-care hospitals of Lahore, and which preventive and reporting gaps require institutional intervention?

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted to assess the knowledge, attitudes, and practices regarding needle stick injuries among healthcare workers employed in tertiary-care hospitals of Lahore, Pakistan. The study was carried out over a four-month period in both public and private tertiary-care settings, including Jinnah Hospital and Gulab Devi Hospital, where healthcare workers are routinely exposed to invasive procedures, blood samples, sharp instruments, and other occupational risks related to blood-borne infections. A cross-sectional design was selected because it allowed the assessment of awareness, perceptions, and self-reported preventive practices at a single point in time across different professional groups working in clinical and laboratory environments.

The study population included healthcare workers directly or indirectly involved in patient care, diagnostic procedures, specimen handling, or clinical support services. Eligible participants included doctors, nurses, laboratory technologists, and other allied healthcare personnel who had at least six months of professional experience in a healthcare setting. Healthcare workers with less than six months of experience, individuals not involved in clinical or laboratory work, and those who did not provide consent were not included (12). Participants were recruited through non-probability convenience sampling from the selected tertiary-care hospitals. A total of 250 healthcare workers participated in the study.

Data were collected using a structured self-administered questionnaire designed to assess demographic characteristics and key domains related to needle stick injuries. The questionnaire included items on age, sex, profession, duration of work experience, previous training regarding infection control or needle stick injury prevention, awareness of needle stick injuries, knowledge of infections transmitted through needle stick injuries, awareness of hepatitis B vaccination, knowledge of post-exposure prophylaxis, awareness of hospital reporting procedures, attitude toward reporting and prevention, availability and use of personal protective equipment, history of needle stick injury exposure, immediate action taken after injury, needle recapping behavior, hepatitis B vaccination completion, and participation in training sessions or workshops. The questionnaire was distributed through an online platform, and responses were screened before analysis to identify incomplete or non-response entries.

The main outcome variables were knowledge, attitude, and practice related to needle stick injuries. Knowledge was assessed through responses regarding awareness of needle stick injuries, recognition of hepatitis B, hepatitis C, and HIV as transmissible infections, understanding of preventive measures, awareness of hepatitis B vaccination, and knowledge of post-exposure prophylaxis and its timing. Attitude was assessed through participants' views regarding the importance of reporting needle stick injuries, professional responsibility for prevention, the role of safety precautions in reducing infection risk, availability of workplace protective equipment, and perceived fear of blame or job loss as a barrier to reporting. Practice was assessed through self-reported history of needle stick injury, formal reporting after exposure, immediate response after injury, needle recapping behavior, completion of hepatitis B vaccination, use of personal protective equipment during procedures, and attendance at relevant training sessions.

Needle stick injury was operationally defined as any percutaneous injury caused by a used or potentially contaminated needle or sharp medical instrument during clinical, laboratory, or healthcare-related work. Formal reporting was defined as informing the relevant supervisor, infection-control department, occupational health unit, or designated hospital authority after sustaining a needle stick injury. Safe practice was reflected by avoidance of needle recapping, consistent use of personal protective equipment, appropriate immediate wound care, formal reporting of exposure, completion of hepatitis B vaccination, and awareness or use of post-exposure management pathways.

To reduce information bias, data were collected using the same structured questionnaire for all participants, and participants were asked to respond independently according to their own knowledge

and routine practices. Anonymity was maintained to encourage honest reporting of sensitive practices such as needle recapping, non-reporting, incomplete vaccination, and previous exposure history. Selection bias was minimized by including healthcare workers from different professional categories and from both public and private tertiary-care hospital settings. Potential confounding by professional role, work experience, training status, and vaccination status was addressed at the analysis stage by organizing responses according to demographic and occupational characteristics where applicable.

The collected data were entered, cleaned, coded, and analyzed using IBM SPSS Statistics version 25. Categorical variables were summarized as frequencies and percentages. Demographic characteristics were presented using descriptive statistics, while knowledge, attitude, and practice responses were tabulated according to response categories. Missing or non-response entries were handled as variable-specific missing data and were not combined with affirmative or negative responses. For categorical comparisons, chi-square testing or Fisher's exact test was considered appropriate where expected cell counts were small. A p-value of less than 0.05 was considered statistically significant. Where applicable, associations between professional category, work experience, training status, knowledge of post-exposure prophylaxis, hepatitis B vaccination completion, reporting behavior, and needle recapping practice were assessed using appropriate categorical analysis.

Ethical principles for human-subject research were followed throughout the study. Participation was voluntary, and informed consent was obtained before questionnaire completion. Participants were informed about the purpose of the study, and confidentiality of responses was maintained. No personal identifiers were collected in the analytical dataset. Data were used only for research purposes, stored securely, and analyzed in aggregate form to protect participant privacy and maintain data integrity.

Quality control was maintained through structured data collection, response screening, consistent variable coding, and review of the dataset before analysis. Frequencies were checked against total responses for each variable, and non-response categories were retained where necessary to preserve transparency. The use of predefined questionnaire domains, standardized response categories, and reproducible statistical procedures ensured that the study methods could be repeated in similar tertiary-care settings for comparison of healthcare workers' knowledge, attitudes, and practices regarding needle stick injuries.

RESULTS

A total of 250 healthcare workers from tertiary-care hospitals in Lahore participated in the study. The respondents represented multiple healthcare cadres, with laboratory technologists forming the largest professional group, followed by allied healthcare workers, doctors, and nurses. Most participants were young healthcare workers, and the majority had less than one year of professional experience, indicating that the sample largely represented early-career personnel exposed to clinical and laboratory occupational risks. The quantitative results are presented in four numbered tables; no between-group comparative analysis is included in this descriptive results summary, so p-values are not applicable for the single-sample frequency distributions.

Table 1. Demographic and Professional Characteristics of Healthcare Workers

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	139	57
	Female	105	43
Age group	18–30 years	204	84
	31–45 years	21	8
	46–60 years	10	4
	>60 years	7	3
	No response	8	—
Profession	Laboratory technologist	139	57
	Doctor	31	12
	Nurse	10	4
	Other healthcare profession	64	26

Variable	Category	Frequency (n)	Percentage (%)
	No response	6	—
Work experience	<1 year	166	69
	1–5 years	43	17
	>5 years	32	13
	No response	9	—

Most respondents were male, accounting for 139 participants, while 105 participants were female. The age distribution showed that the majority of healthcare workers were in the 18–30-year age group, representing 204 participants, followed by 21 participants aged 31–45 years, 10 aged 46–60 years, and 7 above 60 years. Professionally, laboratory technologists were the dominant group, comprising 139 participants, while 31 were doctors, 10 were nurses, and 64 belonged to other healthcare professions. In terms of experience, 166 participants had less than one year of work experience, showing that a large proportion of the sample consisted of early-career healthcare workers.

Table 2. Training and Knowledge Regarding Needle Stick Injuries

Variable	Response	Frequency (n)	Percentage (%)
Received formal training regarding NSIs	Yes	123	50
	No	121	49
Awareness regarding NSIs	Yes	164	67
	No	80	32
Knowledge of diseases transmitted through NSIs	Hepatitis B	47	20
	Hepatitis C	25	10
	HIV	22	9
	Hepatitis B, Hepatitis C, and HIV	146	60
Knowledge regarding prevention of NSIs	Yes	161	62
	No	30	12
	Don't know	61	25
Awareness regarding hepatitis B vaccination	Yes	148	60
	No	29	12
	Don't know	66	27
Awareness regarding post-exposure prophylaxis	Yes	138	56
	No	105	43
Knowledge regarding timing of PEP initiation	Immediately	110	45
	Within 24 hours	46	18
	Within 72 hours	23	10
	Don't know	63	26

Formal training related to needle stick injuries was reported by 123 healthcare workers, while 121 participants had not received such training. Basic awareness of needle stick injuries was present in 164 participants, whereas 80 participants reported no awareness. Knowledge of blood-borne infections transmitted through NSIs was moderate: 146 participants correctly identified hepatitis B, hepatitis C, and HIV collectively as transmissible infections, while smaller proportions identified only hepatitis B, hepatitis C, or HIV individually.

Preventive knowledge was reported by 161 participants, while 61 participants were uncertain and 30 believed NSIs were not preventable. Awareness of hepatitis B vaccination was present in 148 participants, but 66 were unsure about its role and 29 lacked awareness. Knowledge of post-exposure prophylaxis was also incomplete: 138 participants were aware of PEP, while 105 were not. Regarding timing of PEP initiation, 110 participants selected immediate initiation, 46 selected within 24 hours, 23 selected within 72 hours, and 63 did not know the appropriate timing.

Table 3. Attitudes Toward Reporting, Prevention, and Workplace Safety

Variable	Response	Frequency (n)	Percentage (%)
Awareness of hospital reporting procedures	Yes	161	66
	No	81	33
Importance of reporting NSIs	Yes	170	70
	No	26	10
	Not sure	47	19
Prevention of NSIs is a professional responsibility	Yes	200	82
	No	42	17
Safety precautions reduce infection risk	Yes	188	77
	No	54	22

Variable	Response	Frequency (n)	Percentage (%)
Availability of PPE in workplace	Yes	145	59
	No	39	16
	Sometimes	59	24
Fear of blame or job loss discourages reporting	Yes	100	41
	No	74	31
	Maybe	67	27

Attitudes toward prevention and reporting were generally positive. Awareness of hospital reporting procedures was reported by 161 participants, while 81 participants were unaware of such procedures. Reporting of NSIs was considered important by 170 participants, although 26 did not consider it important and 47 were unsure. A strong sense of professional responsibility was observed, as 200 participants agreed that prevention of NSIs is a professional responsibility. Similarly, 188 participants believed that safety precautions reduce the risk of infection.

Workplace support appeared variable. Adequate PPE availability was reported by 145 participants, while 59 stated that PPE was available only sometimes and 39 reported that PPE was not adequately available. Fear-related barriers to reporting were also evident: 100 participants believed that fear of blame or job loss discourages reporting, 67 considered it a possible barrier, and 74 did not view it as a reporting barrier.

Table 4. Practices Related to Needle Stick Injuries and Post-Exposure Response

Variable	Response	Frequency (n)	Percentage (%)
Experience of NSIs	Yes	87	35
	No	125	51
	Multiple times	31	13
Reporting of incidents	Yes	84	35
	No	82	33
	Not applicable	76	31
Immediate action after NSI	Washed with soap and water	111	46
	Used antiseptics	70	29
	Reported to supervisor	37	15
	Ignored injury	20	8
Needle recapping practice	Always	149	62
	Sometimes	36	15
	Never	55	22
Completion of hepatitis B vaccination	Yes	100	41
	No	88	36
	Not sure	53	22
Use of PPE during procedures	Always	143	59
	Sometimes	74	30
	Never	24	10
Attendance in NSI training/workshops	Yes	124	51
	No	118	48

A substantial proportion of healthcare workers had experienced needle stick injuries. Overall, 87 participants reported experiencing an NSI, while 31 participants reported experiencing NSIs multiple times. In contrast, 125 participants reported no previous NSI exposure. Formal reporting after exposure remained limited, with 84 participants reporting incidents and 82 participants not reporting them.

Immediate response practices varied considerably. Washing the affected area with soap and water was the most commonly reported action, performed by 111 participants, followed by antiseptic use in 70 participants. Only 37 participants reported informing a supervisor after injury, while 20 ignored the injury. Unsafe needle handling was common, as 149 participants reported always recapping needles and 36 reported recapping sometimes; only 55 participants reported never recapping needles.

Hepatitis B vaccination completion was reported by 100 participants, while 88 had not completed vaccination and 53 were unsure of their vaccination status. PPE use during procedures was reported as consistent by 143 participants, occasional by 74, and absent by 24. Attendance in NSI-related training or workshops was reported by 124 participants, while **118 had not attended such training.

Overall, the results show a clear gap between awareness and safe practice. Although 164 participants were aware of NSIs, 149 still reported always recapping needles, and although 170 considered reporting important, only 84 reported incidents formally. Similarly, despite 148 participants being aware of

hepatitis B vaccination, only 100 had completed the vaccination course. These findings indicate that knowledge and positive attitudes were not consistently reflected in preventive behavior, reporting practices, vaccination completion, or post-exposure response.

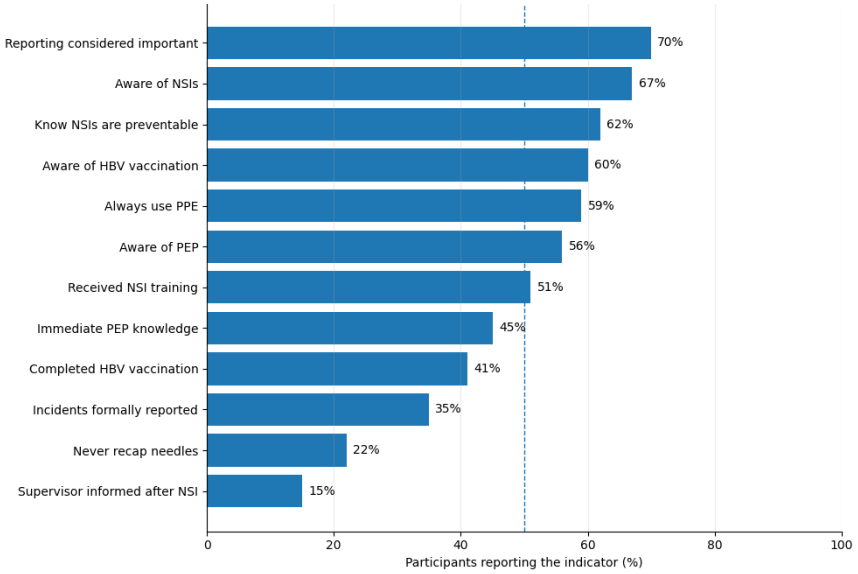

Figure 1. Knowledge–Practice Gap in Needle Stick Injury Prevention Among Healthcare Workers

The figure demonstrates a clear knowledge–practice gap in needle stick injury prevention. Although 70% of healthcare workers considered NSI reporting important, only 35% formally reported incidents, and only 15% informed a supervisor after injury. Similarly, while 67% were aware of NSIs and 62% believed they were preventable, only 22% reported never recapping needles. Awareness of hepatitis B vaccination was reported by 60% of participants, but vaccination completion was lower at 41%. PEP awareness was present in 56%, whereas correct immediate PEP timing was identified by 45%. These patterns indicate that awareness and positive attitudes were not consistently translated into safe occupational practices, particularly in reporting behavior, supervisor notification, vaccination completion, and avoidance of needle recapping. The figure uses aggregated study values only and does not introduce simulated or fabricated data.

DISCUSSION

The present study demonstrates that needle stick injuries remain an important occupational safety concern among healthcare workers in tertiary-care hospitals of Lahore. Although most participants had basic awareness of needle stick injuries and recognized their preventable nature, important gaps were observed between knowledge, attitudes, and actual preventive practices. Awareness regarding NSIs was reported by 67% of participants, and 62% believed that these injuries were preventable; however, unsafe practices remained common, particularly needle recapping, which was reported as a routine practice by 62% of respondents. This discrepancy suggests that general awareness alone is insufficient to ensure safe clinical behavior, especially when workplace habits, workload pressure, training gaps, and institutional safety culture influence day-to-day practice.

Knowledge regarding blood-borne infections transmitted through needle stick injuries was moderate. Approximately 60% of participants correctly identified hepatitis B, hepatitis C, and HIV as major infections associated with NSIs, indicating that a considerable proportion of healthcare workers understood the core infectious risks of occupational sharps exposure. However, fragmented knowledge was still evident, as some participants identified only one infection rather than recognizing the broader range of major blood-borne pathogens. This finding is important because incomplete understanding of transmission risk may reduce perceived urgency after exposure and may contribute to delayed reporting or inappropriate post-exposure action. Previous studies from Pakistan have similarly emphasized that

healthcare workers' knowledge of NSI-related infections is variable and that gaps in awareness can weaken adherence to standard precautions (13–15).

The findings also revealed deficiencies in post-exposure knowledge and response. Awareness of post-exposure prophylaxis was reported by 56% of participants, while 45% correctly identified immediate initiation as the appropriate response after exposure. Although washing the affected area with soap and water was the most common immediate action, reported by 46% of participants, only 15% informed a supervisor after injury, and 8% ignored the injury completely. These results indicate that many healthcare workers may perform basic first aid but do not consistently follow institutional reporting and post-exposure management pathways. Since timely reporting is essential for risk assessment, baseline testing, prophylaxis, counseling, and follow-up, weak post-exposure response systems may increase both clinical and psychological consequences after NSIs.

Attitudes toward reporting were generally positive, but this did not translate into consistent reporting behavior. Although 70% of participants considered reporting of NSIs important and 66% were aware of hospital reporting procedures, only 35% reported incidents formally. Fear of blame or job loss was identified as a reporting barrier by 41% of participants, while a further 27% considered it a possible barrier. This pattern suggests that underreporting is not simply a knowledge problem; it may also reflect fear, stigma, lack of supportive institutional response, uncertainty about reporting mechanisms, or the perception that minor injuries do not require formal documentation. Similar barriers to NSI reporting have been described in occupational health literature, where underreporting is frequently associated with fear, workload, lack of awareness, and low perceived risk (16,17).

The high frequency of unsafe recapping is one of the most clinically significant findings of this study. Only 22% of participants reported never recapping needles, whereas 62% reported always recapping and 15% reported recapping sometimes. Needle recapping is a well-recognized preventable risk factor for sharps injuries and directly reflects a gap between infection-control knowledge and procedural safety behavior. This finding highlights the need for practical, behavior-focused training rather than awareness sessions alone. Training programs should include demonstration-based instruction on safe sharps disposal, immediate disposal at point of care, avoidance of two-handed recapping, correct use of sharps containers, and repeated reinforcement through supervision and audit. Safety-engineered devices and accessible puncture-resistant sharps containers may further reduce recapping-related injury risk (18–20).

Hepatitis B vaccination coverage was also suboptimal. Although 60% of participants were aware of hepatitis B vaccination, only 41% had completed the vaccination course, while 36% had not completed it and 22% were unsure about their vaccination status. This finding is concerning because hepatitis B is vaccine-preventable and carries a higher occupational transmission risk than several other blood-borne infections among non-immunized healthcare workers. In a healthcare environment where NSIs occur and reporting is inconsistent, incomplete vaccination coverage represents a preventable institutional safety failure (21). Hospitals should maintain vaccination records, ensure pre-placement vaccination, provide catch-up vaccination for unvaccinated staff, and confirm completion of the full hepatitis B vaccination schedule where required.

Training exposure appeared limited despite the occupational relevance of NSIs. Approximately half of the participants had received formal training regarding NSIs, and 51% had attended related training sessions or workshops. This limited training coverage may partly explain the observed gaps in PEP awareness, reporting behavior, vaccination completion, and recapping practices. Training should not be limited to theoretical lectures; it should include practical simulation, role-specific risk scenarios, clear reporting algorithms, post-exposure response drills, and periodic refresher sessions. Newly recruited staff and early-career healthcare workers require particular attention because most participants in this study were aged 18–30 years and had less than one year of work experience. Early professional habits are likely to influence long-term safety behavior, making structured orientation essential.

The professional distribution of participants is also relevant to interpretation. Laboratory technologists formed the largest group, followed by other healthcare workers, doctors, and nurses. Laboratory personnel frequently handle blood samples and sharp devices, and their inclusion strengthens the occupational relevance of the study. However, the smaller number of nurses and doctors limits detailed comparison across professional categories in the descriptive analysis. Future analyses using the available dataset could provide additional insight by comparing NSI history, recapping practices, vaccination status, reporting behavior, and PEP awareness across professional groups, years of experience, and training status. Such subgroup analysis would help identify high-risk cadres requiring targeted intervention.

The overall pattern of findings supports the presence of a knowledge–practice gap. Participants showed moderate awareness of NSIs, infection risk, prevention, and reporting importance, yet several safety practices remained weak. For example, reporting was considered important by 70% of participants, but formal reporting was reported by only 35%; awareness of hepatitis B vaccination was 60%, but vaccination completion was 41%; and 62% believed NSIs were preventable, yet only 22% avoided needle recapping. These differences indicate that occupational safety interventions must move beyond information delivery and address behavioral, institutional, and system-level barriers.

The findings have practical implications for hospital infection-control programs. Tertiary-care hospitals should implement mandatory NSI prevention training at induction and at regular intervals, ensure continuous availability of PPE, promote complete hepatitis B vaccination, maintain accessible sharps containers, discourage recapping through policy and supervision, and establish a confidential, non-punitive reporting system. A clear post-exposure pathway should be displayed in clinical and laboratory areas so that healthcare workers know whom to inform, where to report, when to initiate PEP evaluation, and how follow-up testing will be conducted. Strengthening institutional safety culture is essential because fear of blame and uncertainty about reporting can undermine even well-designed protocols.

This study has several limitations. Its cross-sectional design allows assessment of knowledge, attitudes, and practices at a single point in time but does not establish causal relationships between training, awareness, and safe practice. The use of self-reported responses may introduce recall bias and social desirability bias, particularly for sensitive practices such as needle recapping, non-reporting, and incomplete vaccination. The study was conducted in selected tertiary-care hospitals in Lahore, which may limit generalizability to other healthcare settings, rural hospitals, primary-care facilities, and institutions with different infection-control resources. In addition, the descriptive nature of the current analysis limits interpretation of associations between professional category, training status, work experience, and NSI-related practices.

Despite these limitations, the study provides useful evidence on occupational safety gaps among healthcare workers in Lahore. The results show that NSIs are not only a matter of individual awareness but also reflect broader institutional issues involving training, reporting systems, vaccination coverage, PPE availability, and safety culture. Addressing these gaps through structured infection-control education, practical skills training, complete hepatitis B immunization, non-punitive reporting, and continuous monitoring may reduce preventable sharps injuries and improve protection of healthcare workers from blood-borne occupational infections.

CONCLUSION

Needle stick injuries remain a significant occupational health concern among healthcare workers in tertiary-care hospitals of Lahore, with the findings showing a clear gap between awareness and safe clinical practice. Although most participants demonstrated basic knowledge of NSIs, recognized major blood-borne infections such as hepatitis B, hepatitis C, and HIV, and expressed positive attitudes toward prevention and reporting, important deficiencies were observed in post-exposure knowledge, formal reporting, hepatitis B vaccination completion, and safe needle handling. The frequent practice of needle

recapping, incomplete vaccination coverage, limited supervisor notification after injury, and inconsistent reporting behavior indicate that knowledge alone is insufficient to ensure occupational safety. Strengthening institutional infection-control systems through regular practical training, complete hepatitis B immunization, accessible personal protective equipment, non-punitive reporting mechanisms, clear post-exposure management pathways, and continuous monitoring of sharps safety practices is essential to reduce preventable needle stick injuries and protect healthcare workers from blood-borne infections.

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