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Knowledge attitude and practice about occupation exposure to needle stick injuries and its prevalence among health care providers of tertiary hospital

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Abstract

Background: Needle-stick injuries (NSIs) pose occupational risks to healthcare providers through potential transmission of blood-borne infections. This study assessed the prevalence of NSIs and knowledge, attitudes, and practices regarding their prevention and management among healthcare providers working in a tertiary-care hospital.

Methods: A hospital-based cross-sectional study included 260 healthcare providers with at least six months of hospital employment. Data were collected using a pretested, semi-structured questionnaire covering sociodemographic characteristics, occupational exposures, and preventive behaviours. Knowledge, attitude, and practice were classified using predefined cut-offs. Data were analysed descriptively using jamovi version 2.6.44.

Results: Participants had a mean age of 31.8 ± 5.8 years; 70.8% were female, and 56.5% were staff nurses. Overall, 96 participants (36.9%) reported NSIs during current hospital employment. Adequate knowledge, favourable attitudes, and safe practices were observed in 73.8%, 63.1%, and 59.2%, respectively. Knowledge of blood-borne pathogens and institutional reporting procedures was demonstrated by 74.2%, whereas 64.2% knew immediate first-aid measures. Only 52.7% supported immediate injury reporting. Glove use and immediate sharps disposal were reported by 55.0% and 52.3%, respectively; 64.2% avoided recapping. Among injured participants, 79.2% reported their injury and 77.1% sought post-exposure evaluation.

Conclusion: NSIs affected over one-third of participants. Knowledge was more widespread than favourable attitudes and safe practices, with gaps in first aid, sharps disposal, and post-exposure responses. These

findings highlight the need for targeted practical training, accessible reporting mechanisms, and institutional safety measures to strengthen occupational protection and support consistent adherence to recommended preventive practices.

Key words: Needle-Stick Injuries, Healthcare Providers, Occupational Exposure; Knowledge, Attitudes, And Practices.

Introduction

Needle-stick injuries (NSIs) are percutaneous occupational exposures caused by needles or other sharp instruments contaminated with blood or body fluids. They represent one of the most important occupational hazards among healthcare providers because they may transmit blood-borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).[1,2] The World Health Organization estimates that unsafe injection practices and sharps-related exposures contribute substantially to the burden of occupational infection among health workers, particularly in resource-limited settings.[3]

Healthcare providers in tertiary-care hospitals are at particularly high risk because of high patient turnover, frequent invasive procedures, emergency care, heavy workload, inadequate staffing, and frequent handling of needles, sutures, scalpels, and other sharps. Nursing staff, resident doctors, interns, laboratory personnel, and cleaning staff are commonly exposed during injections, venepuncture, intravenous cannulation, wound care, surgery, specimen handling, and waste disposal.[4,5] The United States Center for Disease Control and Prevention estimates approximately 385,000 needlestick and other sharps-related injuries among hospital-based healthcare personnel annually, highlighting the continuing magnitude of the problem even in well-resourced systems.[6]

The consequences of NSIs extend beyond the immediate physical injury. They may cause anxiety, psychological distress, loss of working days, costs of post-exposure prophylaxis (PEP), serological follow-up, and, in some cases, chronic viral infection. Under-reporting is also common, often due to lack of awareness, time constraints, fear of blame, perceived low risk, or unfamiliarity with institutional reporting and PEP protocols. Prompt first aid, reporting, source-patient evaluation, hepatitis B vaccination status review, and appropriate PEP are therefore essential components of post-exposure management.[2,9]

Knowledge, attitude, and practice (KAP) are key determinants of NSI prevention. Adequate knowledge of universal precautions, safe injection practices, no-recapping policy, immediate disposal into puncture-resistant sharps containers, use of safety-engineered devices, and post-exposure protocols can reduce injuries.[9,10] However, studies among healthcare workers have shown that favourable knowledge and attitudes do not always translate into safe practices; recapping of needles, delayed reporting, improper sharps disposal, and incomplete PEP adherence remain frequent.[1,7,8]

A study among nurses in a tertiary hospital reported an NSI prevalence of 40.5%, with gaps in timely medical care and PEP despite high awareness of injury risks.

The prevalence of NSIs varies widely across settings and cadres. Reported lifetime or recent prevalence ranges from approximately 40% to more than 50% among healthcare workers in tertiary hospitals, with higher rates often observed among resident doctors, interns, and nurses.[8,11,12] These variations may reflect differences in

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workload, training, availability of safety devices, reporting culture, and study definitions of exposure.[1,11]

Although tertiary hospitals are expected to have infection-control committees, biomedical waste-management systems, and PEP protocols, the actual level of knowledge and compliance among frontline healthcare providers may be inconsistent. Assessing both the prevalence of NSIs and the KAP of healthcare providers is necessary to identify modifiable gaps and to design targeted training, supervision, and institutional safety interventions.[1,6,9] Therefore, the present study was undertaken to determine the prevalence of occupational exposure to needle-stick injuries and to assess the knowledge, attitude, and practices regarding NSIs among healthcare providers of a tertiary-care hospital.

Methodology

Study design and setting

A hospital-based cross-sectional study will be conducted among healthcare providers working in a tertiary-care hospital. The study will include clinical and non-clinical healthcare personnel who are at risk of occupational exposure to needles and other sharps, such as doctors, interns, residents, nurses, laboratory technicians, and sanitation/waste-handling staff.

Study population

The study population will comprise healthcare providers who are directly or indirectly involved in patient care, specimen handling, injections, surgery, or biomedical waste management.

Inclusion criteria

- Healthcare providers working in the tertiary-care hospital during the study period.
- Personnel with at least six months of work experience in the hospital.
- Participants willing to provide written informed consent.

Exclusion criteria

- Administrative staff not involved in patient care or sharps handling.
- Healthcare providers on prolonged leave, maternity leave, or deputation during data collection.
- Participants unwilling to consent or unable to complete the questionnaire.

Study variables

The primary outcome variable will be the prevalence of needle-stick injury (NSI), defined as a percutaneous injury caused by a needle or sharp instrument contaminated with blood or body fluid during the participant's current hospital employment.

Independent variables will include:

- Sociodemographic characteristics: age, sex, marital status, education, and years of experience.
- Occupational characteristics: cadre/designation, department, working shift, duration of employment, and prior training in infection prevention or biomedical waste management.
- Knowledge variables: routes of transmission of blood-borne pathogens, universal precautions, safe sharps disposal, needle-recapping policy, immediate post-exposure steps, and availability of post-exposure prophylaxis (PEP).
- Attitude variables: perceived risk of NSI, perceived seriousness of blood-borne infection, willingness to report injuries, and attitude toward safety devices and training.
- Practice variables: use of personal protective equipment, safe injection and sharps-handling practices, sharps disposal practices, needle-

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recapping behaviour, incident reporting, and PEP-seeking behaviour.

Sample size

The sample size will be calculated using the formula for estimating a single proportion:

$n=z^2PQ/d^2$ where n is the required sample size, Z=1.96 for a 95% confidence level, P is the anticipated prevalence of NSI (21%) taken from reference study, and d is the absolute precision. Calculated sample size was 255 which was rounded off to 260.

Sampling technique

A consecutive sampling method will be used. All healthcare providers working in the hospital where study has been carried out were enrolled consecutively until the sample size was achieved.

Study tool

Data will be collected using a pre-tested, semi-structured, self-administered questionnaire developed after reviewing published literature and institutional infection-control guidelines.

Operational definitions

- **Needle-stick injury:** Any penetrating stab injury caused by a needle or other sharp instrument that may have been contaminated with blood or body fluids.
- **Knowledge:** Score obtained from responses to knowledge-related items; participants scoring above a pre-defined cut-off, such as 75% of the maximum score, will be classified as having adequate knowledge.
- **Favourable attitude:** Participants who agree with statements supporting safe practices, timely reporting, and prevention of NSIs.
- **Safe practice:** Self-reported adherence to recommended practices, including no recapping, use of puncture-resistant containers, appropriate PPE use, and reporting of exposures.

Data collection procedure

Permission was obtained from the hospital administration and the Institutional Ethics Committee. Written informed consent was obtained from each participant after explaining the objectives, voluntary nature, confidentiality, and right to withdraw. Data were collected through face-to-face administration of the questionnaire or through a secure electronic form, depending on feasibility. The investigator was available to clarify questions without influencing responses. Completed questionnaires were checked daily for completeness.

Data management and statistical analysis

Data were entered in Microsoft Excel and analysed using jamovi statistical software version 2.6.44. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarised as mean with standard deviation or median with interquartile range, depending on distribution.

Ethical considerations

Ethical approval was obtained from the Institutional Ethics Committee before initiation of the study. Participation was voluntary, and written informed consent was obtained. No, personally identifiable information was collected or reported. Data were kept confidential, stored securely, and used only for research purposes. Participants who reported a recent NSI were informed about the hospital's post-exposure management and reporting system, and referral for appropriate counselling or PEP were facilitated where required.

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Results

Total 96 participants reported NSIs out of 260. Prevalence of NSI was 36.9% in present study.

Table 1: Sociodemographic and occupational characteristics of study participants

Characteristics		Value
Mean age		31.8 ± 5.8
Gender	Male	76 (29.2%)
	Female	184 (70.8%)
Work experience	< 5 years	176 (67.7%)
	≥ 5 years	84 (32.3%)
Marital status	Married	142 (54.6%)
	Unmarried	118 (45.4%)
Cadre/designation	Doctor	72 (27.7%)
	Staff Nurse	147 (56.5%)
	Lab Tech	8 (3.1%)
	Ward Boy	22 (12.7%)

The mean age of participants was 31.8 ± 5.8 years. Most were female (70.8%), had less than five years of work experience (67.7%), and were married (54.6%). Staff nurses constituted the largest occupational group (56.5%), followed by doctors (27.7%)

Table 2: KAP of NSIs among health care providers

Domain	Item/summary classification	n (%)
Knowledge	Identifies HBV, HCV and HIV as blood-borne pathogens transmitted by NSI	193 (74.2%)
	Understands routes of occupational blood/body-fluid exposure	187 (71.9%)
	Knows universal/standard precautions	178 (68.5%)
	Knows the no-recapping policy	184 (70.8%)
	Knows immediate disposal into puncture-resistant sharps containers	176 (67.7%)
	Knows immediate first-aid steps following NSI	167 (64.2%)
	Knows institutional reporting and PEP procedures	193 (74.2%)
	Knows the role of hepatitis B vaccination	183 (70.4%)
	Overall adequate knowledge (predefined cut-off)	192 (73.8%)
Attitude	Perceives NSI as an important occupational hazard	163 (62.7%)
	Supports immediate reporting of every NSI	137 (52.7%)
	Supports use of safety-engineered devices	144 (55.4%)
	Supports regular NSI-prevention training	154 (59.2%)
	Encourages colleagues to follow safe sharps practices	132 (50.8%)
	Overall favourable attitude (predefined cut-off)	164 (63.1%)
Practice	Uses gloves for relevant blood/body-fluid exposure procedures	143 (55%)
	Disposes of sharps immediately into designated containers	136 (52.3%)
	Does not recap used needles	167 (64.2%)
	Avoids passing used sharps directly hand to hand	176 (67.7%)

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	Reports occupational NSIs (among injured respondents n=96)	76 (79.2%)
	Seeks post-exposure evaluation (among injured respondents n=96)	74 (77.1%)
	Overall safe practice (predefined cut-off)	154 (59.2%)

Knowledge regarding needle-stick injuries

Overall, 192 participants (73.8%) demonstrated adequate knowledge regarding needle-stick injuries (NSIs). Identification of HBV, HCV, and HIV as blood-borne pathogens transmitted through NSIs and awareness of institutional reporting and post-exposure prophylaxis (PEP) procedures were each reported by 193 participants (74.2%). Knowledge of occupational blood/body-fluid exposure routes was observed in 187 participants (71.9%), while 184 (70.8%) knew the no-recapping policy and 183 (70.4%) understood the role of hepatitis B vaccination. Awareness of universal/standard precautions and immediate disposal into puncture-resistant sharps containers was reported by 178 (68.5%) and 176 (67.7%) participants, respectively. Knowledge of immediate first-aid measures following NSI was the least frequently demonstrated knowledge item, reported by 167 participants (64.2%).

Attitudes toward NSI prevention

A favourable overall attitude was observed among 164 participants (63.1%). Recognition of NSI as an important occupational hazard was reported by 163 participants (62.7%), followed by support for regular NSI-prevention training among 154 (59.2%). Support for safety-engineered devices and immediate reporting of every NSI was expressed by 144 (55.4%) and 137 (52.7%) participants, respectively. Encouraging colleagues to follow safe sharps practices was the least frequently endorsed attitude item, reported by 132 participants (50.8%).

Practices related to NSI prevention and management

Overall, 154 participants (59.2%) were classified as having safe practices. Avoidance of direct hand-to-hand passing of used sharps was the most frequently reported preventive practice, observed among 176 participants (67.7%), followed by avoidance of needle recapping among 167 (64.2%). Glove use during procedures involving potential blood/body-fluid exposure was reported by 143 participants (55.0%), while immediate disposal of sharps into designated containers was reported by 136 (52.3%).

Among the 96 participants who had sustained an NSI, 76 (79.2%) reported the injury and 74 (77.1%) sought post-exposure evaluation. Thus, 20 injured participants (20.8%) did not report their injury, and 22 (22.9%) did not seek post-exposure evaluation.

Overall pattern

The proportion classified as having adequate knowledge (73.8%) exceeded the proportions with favourable attitudes (63.1%) and safe practices (59.2%).

Discussion

The present study assessed knowledge, attitudes, and practices regarding needle-stick injuries (NSIs) among 260 healthcare providers at a tertiary-care hospital. Adequate knowledge was observed in 73.8%, whereas favourable attitudes and safe practices were reported in 63.1% and 59.2%, respectively. These findings indicate that knowledge was more widespread than favourable attitudes and preventive practices. However, aggregate percentages cannot establish whether knowledgeable individuals consistently practised safely. Similar discrepancies were reported by Sain et al. among nurses in Nagpur and Alsabaani et al. among healthcare

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workers in Saudi Arabia, where awareness coexisted with unsafe sharps-handling practices.[1,2]

Among the participants, 96 reported an NSI, corresponding to a prevalence of 36.9% during current hospital employment. This was numerically lower than the 40.5% reported by Sain et al., but higher than the 11.57% reported by Alsabaani et al.[1,2] These comparisons require caution because exposure periods and participant composition differed. The Saudi Arabian study assessed injuries during the preceding 12 months, whereas the present study considered current hospital employment. Furthermore, Sain et al. included nurses exclusively, while the present study included multiple occupational cadres. Consequently, these differences cannot establish better or poorer institutional safety.[2]

Knowledge of pathogens transmitted through NSIs and institutional reporting and PEP procedures was demonstrated by 74.2% of participants. Nevertheless, knowledge of immediate first aid was lower, at 64.2%, identifying an educational priority. Overall adequate knowledge was less frequent than the 89.4% classified as having good NSI knowledge in the Nagpur study, although differences in questionnaires and scoring thresholds limit direct comparison.[1] Awareness of post-exposure procedures was also lower than the 81.0% reported by Alsabaani et al. Conversely, knowledge of the no-recapping policy was higher in the present study, at 70.8%, compared with 61.2% in their study.[2]

Attitudinal findings revealed further opportunities for improvement. Although 62.7% recognised NSI as an important occupational hazard, only 52.7% supported immediate reporting, and 50.8% encouraged colleagues to follow safe sharps practices. These findings contrasted with the Nagpur study, where 96.8% supported immediate reporting and 97.7% considered NSIs preventable.[1] Similarly, 90.3% of respondents in the Saudi Arabian study agreed or strongly agreed that workplace sharps injuries should be reported immediately.[2] Differences may reflect professional composition, institutional expectations, or measurement approaches; however, these explanations were not examined in the present study.

Preventive practices were inconsistent. Only 55.0% reported glove use during relevant exposure-prone procedures, and 52.3% reported immediate sharps disposal. Avoidance of recapping was reported by 64.2%. In comparison, approximately 24% of respondents in the Nagpur study reported recapping, which was significantly associated with NSI occurrence.[1] Alsabaani et al. reported two-handed recapping among 27.5%, also with a significant association with injury history.[2] Madhavan et al., studying interns and nurses in Kerala, identified recapping as the activity associated with 29% of injuries among interns.[13] These findings reinforce the importance of examining specific procedural behaviours alongside overall practice scores.

Post-exposure responses were comparatively encouraging: 79.2% of injured participants reported their injury, and 77.1% sought evaluation. Reporting exceeded the 65.2% observed in Nagpur and 47.3% in Saudi Arabia.[1,2] Nevertheless, approximately one-fifth did not report their injury, and nearly one-quarter did not seek evaluation. The higher reporting proportion among injured participants than the proportion endorsing immediate reporting overall is not necessarily contradictory because the denominators and questions differ. Moreover, post-exposure evaluation should not be equated with PEP initiation or completion, which were not reported in the present results.

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These findings favour combining practical training with institutional support rather than relying exclusively on knowledge-based education. Training could prioritise first aid, sharps disposal, reporting pathways, and exposure assessment, while workplace audits could assess implementation. The CDC sharps-injury prevention workbook similarly emphasises a safety culture, injury reporting, data analysis, and evaluation of safety devices.[6] Cadre-specific interventions may also be useful, given the better preventive practices among nurses than interns reported by Madhavan et al.; however, stratified analyses are required before identifying priority groups in the present study.[13]

Several limitations warrant consideration. The cross-sectional design precludes causal interpretation, while self-reported practices and injury histories may be affected by recall and social-desirability biases. The single-centre sample limits generalisability, and differing employment durations create unequal opportunities for injury. Comparisons are further constrained by heterogeneous exposure definitions and KAP instruments. Overall, the study identifies reasonably widespread knowledge alongside less consistent preventive attitudes and practices, supporting further assessment of both individual behaviour and institutional safety arrangements.

Conclusion

Healthcare providers demonstrated adequate knowledge regarding needle-stick injuries; however, favourable attitudes and safe practices were less consistent. Gaps persisted in sharps disposal, glove use, injury reporting, and post-exposure evaluation. These findings highlight the need for targeted training, accessible reporting systems, and institutional safety measures to strengthen occupational protection among healthcare-workers.

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