Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 24 July 2026
Revised 20 Aug 2026
Accepted 07 Sep 2026

Natural Resources for Human Health 2026, Vol. 6 (22s): 1317–1323

KEYWORDS:
Hepatitis B, Medical Laboratory Technology, Needle recapping, Needle Stick Injuries, Vaccination.

Assessment of Knowledge, Attitude, and Practice of Needle Stick Injury Prevention Among Medical Laboratory Technology Students

Fathimath Farwah T P[1], Dr. Deeksha K[2], Pavithra D L[3]

[1]Assistant Professor, Unit of Medical Laboratory Technology, Yenepoya School of Allied Health Sciences, Yenepoya (Deemed to be University), Mangalore, Karnataka, India; ORCID id: 0009-0009-2175-0875
[2]Associate Professor, Stage-I, Department of Basic Sciences, Yenepoya School of Allied Health Sciences, Yenepoya (Deemed to be University), Mangalore, Karnataka, India; ORCID id: 0000-0003-4964-2373
[3]Assistant Professor, Unit of Medical Laboratory Technology, Yenepoya School of Allied Health Sciences, Yenepoya (Deemed to be University), Mangalore, Karnataka, India; ORCID id: 0009-0005-5768-8701
Corresponding author: Dr. Deeksha K
Associate Professor Stage-I, Department of Basic Sciences, Yenepoya School of Allied Health Sciences,
Yenepoya (Deemed to be University),Mangalore, Karnataka, India
Email: deekshak@yenepoya.edu.in

ABSTRACT: Background:

Needle stick injury (NSI) is a major occupational hazard among healthcare professionals, risking transmission of blood-borne pathogens such as HBV, HCV, and HIV. Despite HBV being vaccine-preventable, underreporting and inadequate training limit prevention efforts, compounded by unsafe needle handling, lack of safety-engineered devices, and improper sharps disposal. MLT students are particularly vulnerable due to limited practical experience, frequent laboratory exposure, and, at times, inadequate supervision

Objectives:

The study aimed to assess the knowledge, attitude, and practice (KAP) regarding needle-stick injuries among MLTs and to evaluate their associations.

Methods:

A cross-sectional study was conducted among 141 Medical Laboratory Technology students (undergraduates, interns, and postgraduates) to assess their knowledge, attitudes, and practices regarding NSIs. Data were collected using a pre-tested, self-administered questionnaire distributed electronically and analyzed using descriptive statistics and Spearman's rank correlation to assess inter-domain associations.

Results:

Most MLT students demonstrated good knowledge (98.6%) and positive attitudes (91.5%) toward NSI prevention, but practice remained inconsistent: only 44.7% were trained, and 68.1% still recap needles. Hepatitis B vaccination coverage was moderate (70.9%), while Hepatitis C awareness and preventive adherence lagged. Knowledge showed a significant

Natural Resources for Human Health
eISSN: 2583-1194

positive correlation with attitude (ϱ = 0.315, p < 0.001) and attitude with practice (ϱ = 0.224, p = 0.007), while knowledge showed no significant association with practice (ϱ = 0.116, p = 0.172).

Conclusion:

MLT student's demonstrated strong knowledge and attitudes but only moderate practices regarding needle-stick injuries, underscoring the need for continued institutional training and monitoring to strengthen clinical practice.

1. INTRODUCTION

Needle stick injuries (NSIs) are defined as accidental puncture wounds or cuts resulting from contact with needles or other sharp instruments. Despite their seemingly minor appearance, such injuries can lead to serious consequences through the transmission of blood-borne pathogens (Alsabaani A et al., 2022). Pathogens of greatest concern are Hepatitis B (HBV), Hepatitis C (HCV), and the Human Immunodeficiency Virus (HIV), all of which are capable of causing chronic and potentially fatal disease (Anandadurai D et al.,2024). Healthcare workers encounter these pathogens through accidental needle pricks, mucous membrane splashes, and contact through broken skin, with transmission risk estimated at 0.2% for HIV, 1.8% for HCV, and as high as 30% for HBV following a single percutaneous exposure (Makade KG et al.,2017; Mohamud R Y et al.,2023). While HBV can be prevented through vaccination, no prophylaxis exists for HCV or HIV, making prevention the only reliable means of protection (Alaridah N et al.,2023; Al-Khalidi GZ & Nasir NA, 2022).

The global burden of NSIs is considerable. Approximately 3 million of the 39.5 million healthcare workers globally experience percutaneous exposure to infectious agents each year, which is responsible for about 2.5% of HIV cases among healthcare workers and roughly 40% of all occupational HBV and HCV infections (Karim F & Md R, 2022). The established contributors to these injuries include needle recapping, improper handling of sharps, absence of safety-engineered devices, inadequate personal protective equipment, and insufficient training (Alsabaani A et al.,2022).

Health science students represent a particularly vulnerable yet underrecognized population within this risk landscape. Students entering clinical environments, lacking the skills and experience of trained practitioners, are more likely to experience NSIs during early hands-on training (Datar UV et al., 2022). This risk is exacerbated by inadequate integration of infection control training into many health science curricula and by a widespread culture of underreporting among students (Anandadurai D et al.,2024). Medical Laboratory Technology (MLT) students face particularly high exposure, given their daily handling of infectious biological specimens and sharp instruments in fast-paced laboratory settings (Tawiah PA et al.,2020). Effective NSI prevention depends on three interrelated domains: knowledge, attitude, and practice, and any deficit in any of which can independently elevate risk. Despite this, there remains limited literature examining the KAP of MLT students regarding NSIs, particularly within the Indian context. This gap in understanding makes it challenging to design targeted and effective interventions. Therefore, this study aims to assess knowledge, attitudes, and practices regarding needle stick injuries among MLT students.

2. MATERIALS AND METHODS

2.1 Study Participants

A total of 141 MLT undergraduate, intern, and postgraduate students were enrolled through total enumeration sampling. Interns and postgraduate students who were already engaged in clinical practice were included by default, whereas undergraduates were eligible only if they had completed at least one clinical posting; first-year undergraduates were excluded due to their lack of clinical exposure.

2.2 Study tool description

A pretested, self-administered, semi-structured questionnaire by D. Anandadurai et al. (2024) was used to collect data. The questionnaire has 29 questions divided into four sections. The first section collects demographic data like age, gender, and academic year. The second section includes ten questions about needle stick injuries. These questions cover issues such as

blood-borne viruses, transmission risks, and vaccination details, including dosage and availability. It also discusses post-exposure prophylaxis, including its accessibility, timely actions, and initiation protocols.

The third section includes seven questions about reporting injuries, taking precautions when handling sharp items, and assessing attitudes. The last eight practice-related questions cover actions such as recapping needles, bending needles, disposing of needles in batches, using a needle cutter regularly, and disposing of waste in designated containers.

2.3 Study Procedure

This cross-sectional study was conducted at the School of Allied Health Sciences and the Central Laboratory of a tertiary care teaching hospital in Mangalore from April 2025 to April 2026. Ethical clearance was obtained from the Institutional Ethics Committee (YEC-4/2025/051) and the Scientific Review Board before data collection. The study was introduced to undergraduate and postgraduate students during classroom visits and to interns at the Central Laboratory of tertiary care teaching hospital. The study objectives and procedures were explained to all potential participants and contact details were obtained from those who expressed willingness to participate. The questionnaire was distributed through Google Forms, shared via email and WhatsApp, and informed consent was obtained from all participants using a mandatory checkbox before they could proceed.

2.4 Statistical analysis

Percentages and frequencies were used to summarize the Knowledge, Attitude, and Practice scores. Spearman's rank correlation was used to examine the relationship between Knowledge, Attitude, and Practice scores. Statistical significance was defined as a p-value < 0.05, and SPSS (version 27) was used to analyze the data.

RESULTS

A total of 141 Medical Laboratory Technology students participated in the current study. The participants comprised 117 (83.0%) undergraduate students, 16 (11.3%) interns, and 8 (5.7%) postgraduate students. The mean age of the participants was 21.05 ± 1.26 years, and the majority were female (73.8%).

Knowledge, attitudes, and practices regarding NSIs and their prevention were assessed among students. The students' knowledge regarding NSIs and their prevention is represented in Table 1. Nearly all participants identified proper disposal of sharps as a preventive measure (98.6%), while knowledge was also high regarding Hepatitis B vaccination requirements and workplace procedures following NSI exposure. However, only a small proportion (14.9%) recognized that routine needle recapping is not recommended, and gaps in knowledge were observed regarding post-exposure prophylaxis and the transmission risks of blood-borne pathogens.

Participants generally demonstrated positive attitudes toward NSI prevention and reporting. The majority expressed concern about sustaining an NSI (83.0%), believed that NSIs are preventable (91.5%), and indicated that they would report all sharps injuries immediately (96.5%). A high proportion also reported encouraging others to take precautions while handling sharps (93.6%) and disagreed with mixing low-risk sharps waste with domestic waste (73.8%). As shown in Table 2, however, 57.5% of participants agreed that patient care is more important than healthcare worker safety. Additionally, 56.7% expressed reluctance toward post-exposure prophylaxis due to concerns about medications, injections, or side effects.

The assessment of preventive practices revealed variable compliance with recommended safety measures. While 86.5% reported always disposing of sharps in designated containers and 80.1% reported not bending needles before disposal, only 31.9% reported avoiding needle recapping. More than half of the participants (55.3%) had not attended training programs on the safe handling of needles and sharps in the previous year. Hepatitis B vaccination within the preceding five years was reported by 70.9% of participants (Table 3).

Spearman's rank correlation analysis demonstrated a significant positive correlation between knowledge and attitude scores ($\varrho = 0.315$, $p < 0.001$). A significant positive correlation was also observed between attitude and practice scores ($\varrho = 0.224$, $p = 0.007$). However, the correlation between knowledge and practice scores was weak and not statistically significant ($\varrho = 0.116$, $p = 0.172$) (Table 4).

DISCUSSION

Promoting awareness and adherence to safe needle-handling practices is fundamental to reducing the risk of needle-stick injuries among healthcare personnel and trainees. As MLT students are routinely exposed to procedures involving needles and other sharps during their clinical training, understanding their level of preparedness to prevent such injuries is essential. Therefore, the present study evaluated the knowledge, attitudes, and practices related to needle-stick injury prevention among MLT students.

The students demonstrated satisfactory knowledge of NSI prevention, particularly regarding sharps disposal, Hepatitis B vaccination, and institutional NSI protocols. Similar findings have been reported among healthcare students, with awareness of standard precautions generally high (Al-Mugheed K et al., 2023). However, important knowledge gaps were identified regarding post-exposure management and needle recapping. Less than half of the participants correctly identified the recommended time frame for initiation of HIV post-exposure prophylaxis, indicating inadequate preparedness for post-exposure management. A substantial proportion of participants incorrectly considered needle recapping to be a recommended preventive measure. This finding is particularly concerning because needle recapping remains one of the leading causes of NSIs worldwide (Hosseinipalangi Z et al.,2022).

Participants generally exhibited favorable attitudes toward NSI prevention and reporting. Most respondents expressed concern about sustaining an NSI, believed that such injuries are preventable, and reported willingness to immediately report occupational exposures. Similar findings were reported by Al-Mugheed et al. among nursing students in Saudi Arabia, reflecting an increasing awareness of occupational safety during healthcare training (Al-Mugheed K et al., 2023). Nevertheless, more than half of the participants (57.5%) considered patient care to be more important than healthcare worker safety. They expressed reluctance toward post-exposure prophylaxis because of concerns regarding medications and adverse effects. Such perceptions may contribute to delayed reporting and inadequate post-exposure management. Similar concerns regarding the prioritization of clinical duties over personal safety have been reported among healthcare workers (Alfulayw KH et al.,2021).

Despite satisfactory knowledge and attitudes, inadequacies were observed in preventive practices. Although most participants reported disposing of sharps in designated containers, routine needle recapping remained common. Similar discrepancies between knowledge and practice have been reported among healthcare students, indicating that awareness alone may not ensure compliance with safe sharps-handling behaviors (Datar UV et al.,2022). Tawalbeh et al. demonstrated that infection-control training significantly improved compliance with universal precautions among nursing students, highlighting the importance of regular educational interventions in promoting safe clinical practices (Tawalbeh LI et al.,2019). Although most participants were aware of the importance of Hepatitis B vaccination, 70.9% reported having completed the full vaccination schedule. Verifying vaccination status before students begin clinical postings, with a booster or catch-up dose where needed, would help to ensure that all trainees are protected before exposure.

An important finding of the present study was the significant positive correlation between knowledge and attitude and between attitude and practice, whereas knowledge was not significantly associated with practice. These findings indicate that knowledge alone may be insufficient to influence behavior and that positive attitudes toward occupational safety are crucial to compliance with preventive measures. Similar observations have been reported among healthcare students, where attitudes were found to be more strongly associated with adherence to standard precautions than knowledge alone (Sharma M & Bachani R, 2023). These findings support implementing educational strategies that focus on behavioral change alongside knowledge enhancement. As the data were self-reported, some degree of response and recall bias is possible, although the questionnaire was pre-tested and anonymity was maintained to encourage honest responses. The study was conducted at a single center, and similar studies at other institutions would help confirm and extend these findings to a broader population of MLT students.

CONCLUSION

The Medical Laboratory Technology (MLT) students demonstrated a positive attitude and good basic knowledge of NSI prevention; however, safe practices remained only moderate, with notable discrepancies between knowledge and behavior, particularly regarding needle recapping, immunization follow-up, and sharps disposal techniques. These gaps highlight the need for continuous education and monitoring, with practical workshops and simulation-based sessions serving as effective strategies to bridge them.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

Nil

Author Contributions

All authors made substantial contributions to the conception and design of the study, data collection, analysis and interpretation of the findings, and preparation of the manuscript. All authors reviewed and approved the final manuscript.

Acknowledgement

We want to thank the Central Laboratory, Yenepoya Medical College Hospital, and Yenepoya (Deemed to be University for their constant support during the study.

AI Statement

The author used Grammarly to refine language and make grammatical corrections. The author reviewed and edited the output and takes full responsibility for the final content.

REFERENCES

[1] Alsabaani, A., Alqahtani, N.S., Alqahtani, S.S., Al-Lugbi, J.H., Asiri, M.A., Salem, S.E., et al., 2022. Incidence, knowledge, attitude, and practice toward needle stick injury among health care workers in Abha City, Saudi Arabia. Frontiers in Public Health 10, 771190. https://doi.org/10.3389/fpubh.2022.771190.

[2] Anandadurai, D., Praisie, R., Venkateshvaran, S., Nelson, S.B., Thulasiram, M., 2024. Awareness, perception, and practice regarding needle-stick injury and its prevention among healthcare workers in a tertiary care hospital in Southern India. Cureus 16(3), e55820. https://doi.org/10.7759/cureus.55820.

[3] Makade, K.G., Bhawnani, D., Verma, N., Dengani, M., 2017. Knowledge and response of health care workers after needle-stick injury in a tertiary care hospital setting in tribal Rajnandgaon, Chhattisgarh, India. International Journal of Research in Medical Sciences 5(3), 816–820. https://doi.org/10.18203/2320-6012.ijrms20170534.

[4] Mohamud, R.Y., Mohamed, N.A., Doğan, A., Hilowle, F.M., Isse, S.A., Hassan, M.Y., et al., 2023. Needlestick and sharps injuries among healthcare workers at a tertiary care hospital: a retrospective single-center study. Risk Management and Healthcare Policy 16, 2281–2289. https://doi.org/10.2147/RMHP.S434315.

[5] Alaridah, N., Joudeh, R.M., Al-Abdallat, H., Jarrar, R.F., Ismail, L., Jum'ah, M., et al., 2023. Knowledge, attitude, and practices toward hepatitis B infection among healthcare students—a nationwide cross-sectional study in Jordan. International Journal of Environmental Research and Public Health 20(5), 4348. https://doi.org/10.3390/ijerph20054348.

[6] Al-Khalidi, G.Z., Nasir, N.A., 2022. Knowledge, attitude, and practice regarding needle stick injuries among health care workers in Baghdad Teaching Hospital and Ghazy Al-Hariri Hospital for Surgical Specialties in 2020. Open Access Macedonian Journal of Medical Sciences 10(E), 1–7. https://doi.org/10.3889/oamjms.2022.9963.

[7] Karim, F., & Rahman, M. M., 2024. Prevalence of needle stick injury and associated determinants among healthcare employees of tertiary care hospital, Bangladesh. Journal of Science Technology Education Art and Medicine, 1(2), 10–15. https://doi.org/10.63137/jsteam.446585

[8] Datar, U.V., Kamat, M., Khairnar, M., Wadgave, U., Desai, K.M., 2022. Needlestick and sharps' injury in healthcare students: prevalence, knowledge, attitude and practice. Journal of Family Medicine and Primary Care 11(10), 6327–6333. https://doi.org/10.4103/jfmpc.jfmpc_155_22.

[9] Tawiah, P.A., Oppong, K., Effah, E.S., Abaka-Yawson, A., Arhin-Wiredu, K., 2020. Occupational exposure to blood and body fluids among medical laboratory science students of the University of Health and Allied Sciences during vocational internship in the Volta Region of Ghana. The Scientific World Journal 2020, 4878315. https://doi.org/10.1155/2020/4878315.

[10] Al-Mugheed, K., Farghaly, S.M., Baghdadi, N.A., Oweidat, I., Alzoubi, M.M., 2023. Incidence, knowledge, attitude and practice toward needle stick injury among nursing students in Saudi Arabia. Frontiers in Public Health 11, 1160680. https://doi.org/10.3389/fpubh.2023.1160680.

[11] Hosseinipalangi, Z., Golmohammadi, Z., Ghashghaee, A., Ahmadi, N., Hosseinifard, H., Mejareh, Z.N., et al., 2022. Global, regional and national incidence and causes of needlestick injuries: a systematic review and meta-analysis. Eastern Mediterranean Health Journal 28(3), 233–241. https://doi.org/10.26719/emhj.22.031.

[12] Alfulayw, K.H., Al-Otaibi, S.T., Alqahtani, H.A., 2021. Factors associated with needlestick injuries among healthcare workers: implications for prevention. BMC Health Services Research 21, 1074. https://doi.org/10.1186/s12913-021-07110-y.

[13] Tawalbeh, L.I., Al-Rawajfah, O.M., Habiballah, L., 2019. The effect of infection control course on nursing students' knowledge of and compliance with universal precautions: a quasi-experimental study. Dimensions of Critical Care Nursing 38(3), 137–145. https://doi.org/10.1097/DCC.0000000000000352.

[14] Sharma, M., Bachani, R., 2023. Knowledge, attitude, practice, and perceived barriers for the compliance of standard precautions among medical and nursing students in Central India. International Journal of Environmental Research and Public Health 20(8), 5487. https://doi.org/10.3390/ijerph20085487.

Tables:

Table 1. Knowledge regarding needle-stick injuries and prevention

Knowledge parameters	**Correct response n (%)**
Identified disposal of sharps in designated containers as a preventive measure	139 (98.6)
Identified that needle recapping is not recommended	21 (14.9)
Knew that three doses of the Hepatitis B vaccine are required for full protection	119 (84.4)
Correctly identified that no vaccine is available for Hepatitis C	62 (44.0)
Correctly identified Hepatitis B as carrying the highest transmission risk following NSI	71 (50.4)
Aware of workplace NSI procedures and guidelines	132 (93.6)
Identified washing with soap and water as the immediate action following NSI	110 (78.0)
Correctly identified that no approved PEP exists for Hepatitis C	72 (51.1)
Correctly identified that HIV PEP should be initiated within 72 hours	62 (44.0)

Table 2. Attitude towards needle-stick injury prevention and reporting

Attitude Towards Needle Stick Injuries	**Correct response n (%)**
Concerned about sustaining a needle-stick injury	117 (83.0)
Agreed that patient care is more important than healthcare worker safety	81 (57.5)
Would report all sharps injuries immediately	136 (96.5)
Believed needle-stick injuries are preventable	129 (91.5)
Disagreed with mixing low-risk sharps waste with domestic waste	104 (73.8)
Expressed reluctance regarding post-exposure prophylaxis because of drugs/injections/side effects	80 (56.7)

Encouraged others to take precautions while handling sharps	132 (93.6)

Table 3. Practice regarding needle-stick injury prevention

Practice Behavior	**Correct response n (%)**
Did not recap needles before disposal	45 (31.9)
Did not use two-handed recapping	103 (73.1)
Did not bend needles before disposal	113 (80.1)
Always dispose of sharps in designated containers	122 (86.5)
Attended needle/sharps safety training during the previous year	63 (44.7)
Received Hepatitis B vaccination within the previous 5 years	100 (70.9)

Table 4. Correlation between knowledge, attitude, and practice scores

Variable	**Correlation coefficient**	**p-value**
Knowledge - Attitude	0.315	<0.001
Knowledge - Practice	0.116	0.172
Attitude - Practice	0.224	0.007