

Original Research Article

Knowledge, attitude, and practices regarding needle stick injuries among medical students in a Government Medical College, Bengaluru

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ABSTRACT

Background: A needle stick injury (NSI) is the penetration of skin resulting from a needle or other sharp object that, before the exposure, was in contact with blood, tissue, or other body fluid. Needle-stick injuries are most prevalent within the healthcare sector. Although the immediate physical effects of a needlestick injury are usually minimal, these injuries significantly increase the risk of transmitting blood-borne diseases to those exposed in occupational settings. This study is done to assess the knowledge, attitude and practices regarding needlestick injuries among medical students in a government medical college, Bengaluru.

Methods: A cross-sectional study was conducted among medical students of a government medical college in Bengaluru. 350 Students were participated in the study (70 students from each year). Students were selected by using stratified random sampling method, participants were given a semi-structured and pre-tested questionnaire to fill.

Results: Among 350 medical students (mean age 21.09 ± 1.92 years, 240 males and 110 females), 81.4% were vaccinated against Hepatitis B, and 52% received training on safe device use in the past year. While 78.9% believed NSI are preventable, 72.9% were aware of the infections transmitted through NSI. A total of 231 students (66%) demonstrated good knowledge, 262 (74.85%) had a positive attitude, and 186 (53.14%) exhibited good practices regarding NSI.

Conclusions: Overall, the knowledge about the needle stick injuries regarding various aspects like disposal of the sharp objects and infection caused by NSI is good.

Keywords: Hep B vaccination, Hypodermic needles, Medical students, Needlestick injury

INTRODUCTION

A needle stick injury (NSI) is the penetration of skin resulting from a needle or other sharp object that, before the exposure, was in contact with blood, tissue, or other body fluid. Occupational needle-stick injuries are most prevalent within the healthcare sector.¹ Other occupations at increased risk of NSI include law enforcement, laborers, tattoo artists, food preparers, and agricultural workers. Though the acute physiological effects of a needle-stick injury are generally negligible, the efficiency with which these devices transmit blood-borne diseases places those exposed to occupational NSI at increased

risk of contracting infectious diseases, such as Hepatitis B (HBV), Hepatitis C (HCV), and the Human Immunodeficiency Virus (HIV).²⁻⁴ Globally, the incidence of needle stick injuries is around 43%, and it is high in developing and underdeveloped countries. Africa has the highest rate of these injuries, accounting for 51%.⁵ Among healthcare workers (HCWs) and laboratory personnel worldwide, more than 25 blood-borne viruses have been reported to be associated with NSI.¹ The Hepatitis C virus infection is the most transmitted disease via NSI (39%). It also contributes to Hepatitis B (37%) and HIV (4.4%) infections, respectively.^{6,7} Women are affected more frequently than men.⁵ The incidence of injuries is found to be higher in health care workers

compared to other professionals. If necessary, action is not taken soon after the injury, it may lead to diseases like HCV, HBV, or HIV infection. Medical students during their clinical postings and compulsory rotating internship are more prone to such injuries. As such, this study was conducted to assess the knowledge, attitude and practice among medical students towards needle stick injuries.

METHODS

A cross-sectional study was conducted among medical students at a government medical college in Bengaluru from January to February 2025 (2 months).

The sample size was calculated based on the knowledge of infections caused by needlestick injuries (NSI), which was reported to be 64.88% in a study by Patel et al.⁸ An absolute precision (d) of 5% with a 95% confidence interval was considered. The sample size (n) was calculated using the formula:

$$N = \frac{(Z\alpha)^2 pq}{d^2}$$

Where $Z\alpha$ =Standard table value for 95% confidence interval= 1.96, p =knowledge on infections caused by NSI is 64.88%, q =100- p =75.5 %, d =absolute precision=5.

$$N = \frac{(1.96)^2 64.88 \times 35.12}{5^2} = \frac{8753.41}{25} = 350$$

The total sample size is 350. (70 from each batch-1st, 2nd, 3rd, 4th year MBBS and Interns). The total sample size was 350 students, with 70 students selected from each batch (1st, 2nd, 3rd, 4th year MBBS, and interns) using a stratified random sampling method.

Medical students and interns above 18 years of age who provided informed consent were included in the study. After obtaining ethical clearance, participants were given

a semi-structured and pre-tested questionnaire to complete.

Statistical analysis

The data collected was entered in Microsoft Excel and analyzed using SPSS version 20.0. Socio-demographic data was presented using descriptive statistics: mean, median, standard deviation, and percentage wherever applicable.

Chi square test was used to find the association. Data was presented in the form of tables wherever necessary.

RESULTS

A total of 350 students participated in the study from the 1st, 2nd, 3rd, and 4th year MBBS courses and the intern group. The mean age of the participants was 21.09±1.92 years. Among them, 240 (68.6%) were male and 110 (31.4%) were female (Table 1).

Around 80.3% of the students knew about NSIs and their causes, and 74.9% knew the precautions to avoid NSIs and the blood-borne infections they can cause.

59.4% knew that the injury site should be washed with soap and water immediately after an injury, and about 66% of the students knew about post-exposure prophylaxis and the three doses of the Hepatitis B vaccine.

However, 47.7% of students believed that needles should be recapped before disposal after a procedure, and only 74.9% thought that safer devices, techniques, and gloves should be used to avoid NSIs.

Table 1: Gender wise distribution of students (n=350).

Gender	Academic year				
	1st	2nd	3rd	4th	Intern
Male	50	40	46	45	59
Female	20	30	24	25	11

Table 2: Knowledge on NSI (n=350).

Academic year	Level of knowledge			P value
	Good (%)	Average (%)	Poor (%)	
1 st	30 (42.8)	38 (54.3)	2 (2.9)	0.0007*
2 nd	51 (72.8)	18 (25.8)	1 (1.4)	
3 rd	45 (64.3)	24 (34.3)	1 (1.4)	
4 th	48 (68.6)	21 (30)	1 (1.4)	
Intern	57 (81.4)	13 (18.6)	0	

*Indicates a statistically significant association (p value < 0.05)

Table 3: Attitude towards NSI (n=350).

Academic year	Level of attitude			P value
	Good (%)	Average (%)	Poor (%)	
1 st	47 (67.1)	23 (32.9)	0	0.2264
2 nd	52 (74.3)	16 (22.8)	2 (2.9)	
3 rd	52 (74.3)	18 (25.7)	0	
4 th	53 (75.7)	15 (21.4)	2 (2.9)	
Intern	58 (82.9)	12 (17.1)	0	

Table 4: Practice on NSI (n=350).

Academic year	Level of attitude			P value
	Good (%)	Average (%)	Poor (%)	
1 st	32 (45.7)	27 (38.6)	11 (15.7)	0.1704
2 nd	34 (48.6)	29 (41.4)	7 (10)	
3 rd	37 (52.9)	30 (42.8)	3 (4.3)	
4 th	38 (54.3)	23 (32.9)	9 (12.8)	
Intern	45 (64.3)	19 (27.1)	6 (8.6)	

Furthermore, 59.4% of the students were worried about NSIs, while 16.9% believed that patient care was more important than the safety of healthcare workers. A majority (83.7%) wanted to report all sharp injuries immediately 78.9% thought NSIs were preventable and 72.9% believed that sharp object waste should be disposed of by a professional company rather than in domestic waste. 67.7% of students did not recap needles, 24% did not bend needles after procedures, and 86.6% always placed sharp items in assigned disposal containers.

Finally, only half of the students had received training on the use of safe devices in the past year, even though 81.4% of them had received a Hepatitis B vaccination.

Among 350 students, 231 (66%) had good knowledge (Table 2), 262 (74.85%) had a good attitude (Table 3), and 186 (53.14%) had good practice on NSI (Table 4).

DISCUSSION

The findings from this study highlight the varying levels of knowledge, attitude, and practice regarding needlestick injuries (NSI) among medical students across different academic years. While a majority of students correctly identified NSI as a wound caused by needles that accidentally puncture the skin, a small proportion remained unaware or misinformed.

This aligns with the study conducted by Megnath et al and Sharma et al which indicated gaps in awareness, particularly among early-year students.^{9,10} Moreover, misconceptions regarding syringe recapping persist among students across different years, with some believing it to be a recommended practice, despite the study done by Spruce and Bindra, which provided well-documented evidence that it increases NSI risk.^{11,12}

Knowledge regarding disease transmission through NSIs was found to be relatively high, with most students correctly identifying HBV, HCV, and HIV as the primary bloodborne pathogens. However, a portion of students remained unsure about these risks, reflecting the need for reinforced education on infection control, as suggested by the study conducted by Singru et al and Askarian et al.^{13,14}

Additionally, only 66% of students correctly reported the required three-dose schedule for full hepatitis B protection, underscoring the need for stronger vaccination awareness programs. The study also found that knowledge about safe disposal practices was inconsistent, with only some students aware of the correct capacity for sharps containers and a significant proportion admitting to not knowing the correct disposal limits.

The persistent practice of needle recapping and bending before disposal, despite awareness of the associated risks, aligns with findings from the study done by Juni et al and Sriram et al, emphasizing the need for more rigorous training and reinforcement of infection control guidelines.^{15,16} Furthermore, although most students acknowledge the importance of reporting NSI, hesitancy in following proper post-exposure protocols remains a concern, as highlighted in the study conducted by Shen and Sangwan on NSI management among healthcare professionals.¹⁵⁻¹⁸

Infection prevention practices, including proper disposal of sharps and adherence to vaccination schedules, are critical in mitigating NSI risks. Literature suggests that targeted educational interventions, combined with access to safe disposal containers and safety-engineered devices, can significantly improve compliance, as demonstrated in the study conducted by Kulkarni et al and Radha et al on infection control measures.^{19,20} However, this study, like

others, highlights that a substantial number of students have not received formal training in the use of safe devices, which may contribute to unsafe handling practices, as observed in the study done by Lee et al and Gita et al analyzing medical students' training exposure.^{21,22}

The integration of structured NSI prevention programs into medical education, as recommended by the study conducted by Goel et al could help bridge these gaps and ensure that future healthcare professionals develop safe work habits early in their careers. Strengthening institutional policies and fostering a safety-first culture will be essential in reducing the incidence of NSI and ensuring better occupational health outcomes.²³

This study also found a significant increase in knowledge with academic progression, with interns (81.4%) showing the highest good knowledge and first-year students the lowest (42.8%) ($p=0.0007$), similar to findings by Gurubacharya et al and Patel et al.^{4,8} However, attitude improvements across years were not statistically significant ($p=0.2264$), aligning with Sharma et al, who reported that awareness does not always translate into compliance.¹⁰

Despite increased knowledge, NSI practice levels did not consistently improve ($p=0.1704$). The proportion of good practice was lowest in first-year students (45.7%) and highest among interns (64.3%), with intermediate years showing varying levels of adherence. This trend is consistent with findings by Datar et al and Goel et al, who reported that while awareness of NSI prevention was high, actual adherence to safe practices remained inconsistent.^{7,23}

CONCLUSION

The study highlights significant knowledge, attitude, and practice gaps regarding needle stick injuries (NSI) among medical students across different academic years. While most students correctly identified NSI risks and blood borne pathogen transmission, misconceptions regarding syringe recapping, vaccine schedules, and proper sharps disposal persist. Additionally, some students were unsure about preventive measures, indicating the need for reinforced infection control education. Although most recognized NSI as preventable and understood the importance of reporting sharps injuries, unsafe practices like needle recapping and bending were still observed, emphasizing the need for stronger compliance with safety guidelines.

To address these gaps, comprehensive training programs on NSI prevention should be integrated into the medical curriculum, ensuring that students receive hands-on exposure to safe needle-handling practices. Regular workshops, stricter monitoring of sharps disposal compliance, and improved access to safety devices can further reduce NSI risks. Additionally, reinforcing the

importance of post-exposure protocols and ensuring that all students are fully vaccinated against Hepatitis B will strengthen overall occupational safety. By implementing these strategies, medical institutions can create a safer working environment for future healthcare professionals while minimizing the risks associated with needle stick injuries.

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REFERENCES

1. ICD Codes. Fact sheet: ICD-10-CM Code W46.1XXA. Available at: <https://icd.codes>. Accessed on 21 January 2025.
2. Cooke CE, Stephens JM. Clinical, economic, and humanistic burden of needlestick injuries in healthcare workers. *Medical Devices: Evid and Res*. 2017;3:225-35.
3. Siddique K, Mirza S, Tauqir SF, Anwar I, Malik AZ. Knowledge attitude and practices regarding needle stick injuries amongst healthcare providers. *Pak J Surg*. 2008;24(4):243-8.
4. Gurubacharya DL, Mathura KC, Karki DB. Knowledge, attitude and practices among health care workers on needle-stick injuries. *Kathmandu Univ Med J (KUMJ)*. 2003;1(2):91-4.
5. Hosseinipalangi Z, Golmohammadi Z, Ghashghaee A, Ahmadi N, Hosseinifard H, Mejareh ZN, et al. Global, regional and national incidence and causes of needlestick injuries: a systematic review and meta-analysis. *Eastern Mediterranean Health J*. 2022;28(3):233-41.
6. World Health Organization. Fact sheet: Occupational infections. Available at: <https://www.who.int/tools>. Accessed on 21 January 2025.
7. Datar UV, Kamat M, Khairnar M, Wadgave U, Desai KM. Needlestick and sharps' injury in healthcare students: Prevalence, knowledge, attitude and practice. *J of Fam Med and Prim Care*. 2022;11(10):6327-33.
8. Patel TC, Bagle TR, Maurya M, Sharma V. Knowledge, attitude and practice of needle stick injury and post exposure prophylaxis in undergraduate medical students. *Int J Bas & Clin Pharmacol*. 2018;7(7):1297.
9. Megnath A, Nusrath A, Rani NA. Prevalence of Needle Stick Injury among Interns of Rural Medical Teaching Hospital. *J Med Sci Hea*. 2017;3:14-9
10. Sharma R, Rasania SK, Verma A, Singh S. Study of prevalence and response to needle stick injuries among health care workers in a tertiary care hospital in Delhi, India. *Indian J Comm Med*. 2010;35(1):74-7.
11. Spruce L. Back to basics: sharps safety. *AORN*. 2016;104(1):30-6.

12. Bindra S, Ramana Reddy KV, Chakrabarty A, Chaudhary K. Awareness about needle stick injuries and sharps disposal: a study conducted at Army College of Dental Sciences. *J maxillofac Oral Surg*. 2014;13:419-24.
13. Singru SA, Banerjee A. Occupational exposure to blood and body fluids among health care workers in a teaching hospital in Mumbai, India. *Indian J Comm Med*. 2008;33(1):26-30.
14. Askarian M, Malekmakan L. The prevalence of needle stick injuries in medical, dental, nursing and midwifery students at the university teaching hospitals of Shiraz, Iran. *Indian J Med Sci*. 2006;60(6):227-32.
15. Juni MH, Amir Aiman M, Asma Nabilah A, Ng JH, Wong SJ, Ibrahim F. Perception regarding needle stick and sharp injuries among clinical year medical students. *Perception*. 2015;3:56-9.
16. Sriram S. Study of needle stick injuries among healthcare providers: Evidence from a teaching hospital in India. *J of Fam Med and Prim Care*. 2019;8(2):599-603.
17. Shen C, Jagger J, Pearson RD. Risk of needle stick and sharp object injuries among medical students. *Am J Inf Cont*. 1999;27(5):435-7.
18. Sangwan BR, Kotwal A, Verma AK. Occupational exposure to blood and body fluids amongst health care workers in a teaching hospital of the armed forces. *Med J Armed Forces India*. 2011;67(1):21-4.
19. Kulkarni V, Papanna MK, Mohanty U, Ranjan R, Neelima V, Kumar N, et al. Awareness of medical students in a medical college in Mangalore, Karnataka, India concerning infection prevention practices. *J Infect Pub Heal*. 2013;6(4):261-8.
20. Radha R, Khan A. Epidemiology of needle sticks injuries among the health care workers of a rural tertiary care hospital-a cross-sectional study. *National J Comm Med*. 2012;3(04):589-94.
21. Lee JM, Botteman MF, Xanthakos N, Nicklasson L. Needlestick injuries in the United States: epidemiologic, economic, and quality of life issues. *Aaohn J*. 2005;53(3):117-33.
22. Gita N, Rao NP. Needle stick injuries in a tertiary care hospital in India: observations from a clinical audit. *Int J Res Med Sci*. 2017;5(7):2938-42.
23. Goel V, Kumar D, Lingaiah R, Singh S. Occurrence of needlestick and injuries among health-care workers of a tertiary care teaching hospital in North India. *J labor Phys*. 2017;9(01):20-5.

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