

Knowledge, Attitude and Practices of Medical Students regarding Needle stick injuries in Villupuram, India – A cross-sectional study

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Objective: To determine knowledge, attitude and practices of medical students regarding needle stick injuries. **Methods:** A cross sectional survey was conducted among the consenting medical students of 2nd, 3rd and 4th years at Government Villupuram Medical College and Hospital, Villupuram, India. Convenience sampling was used. Pre-tested questionnaires were administered to approximately 70% of each class. Data was analyzed using SPSS version 26.0. Associations were assessed using chi-square test and Fisher's exact test. A p-value of <0.05 was considered as significant. **Results:** The response rate of the survey was 85.7%. Sixty-one students (33.9%) were from 2nd and 3rd year each while 58 students (32.2%) were from 4th year. More than 85% students from each class were aware of the possibility of acquisition of Hepatitis B, Hepatitis C and HIV from needle stick injuries. Only 16.4% 2nd year students, 29.5% 3rd year students and 36.2% final year students knew the full details of needle stick injury prevention protocols. Curriculum was cited as an important source of information regarding needle stick injuries. Forty-seven (26.1%) students had received a needle stick injury in the past; however, only 14 students (29.7%) had reported the incident either to their consultant or the Infection Control Office. **Conclusion:** Overall knowledge of medical students regarding various aspects of needle stick injuries improved with seniority in medical college. However, the domains of attitude and practices need to be improved as the frequency of needle stick injuries was also observed to increase with the increasing year of medical education.

Keywords: Needle stick Injuries, Medical Students, Knowledge, Attitude, Practices

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Introduction

Health care workers (HCWs) can be exposed to blood and other body fluids through needle stick and other sharp injuries as well as through mucocutaneous exposures. [1] Needle stick injuries (NSIs) are, thus, among one of the implicit occupational hazards for HCWs. NSIs are associated with a number of different health hazards for HCWs; the most important of which is the threat of accession of potentially fatal conditions similar as Hepatitis B and C (HBV, HCV) and mortal Immunodeficiency Virus (HIV). Transmission of at least 20 different pathogens by injuries due to sharp instruments and needle sticks has been reported in literature. [2] The threat associated with transmission after percutaneous exposure to infected blood varies according to the specific blood borne pathogen. For HBV, this threat can be over to 30 depending on the presence of colourful serological labels in the blood of the case. For HCV, the transmission rate is around 3- 4. At 0.3, this threat of transmission is smallest for HIV. [3] HBV and HCV infections are among the biggest health challenges facing the developing world moment. An estimated one- third of the global population has been infected with HBV; roughly 350 million people are lifelong carriers. For HCV, the World Health Organization estimates that 170 million individualities worldwide are infected. [4] According to UNAIDS, around 39 million people worldwide are living with HIV as of December, 2006. [5] According to data from EPI Net system, sanitary workers dodge roughly 30 needle stick injuries per 100 beds per time on average- an intimidating figure by no magnification. [6] Estimated frequency of Hepatitis B in the Indian population is 4 and Hepatitis C is, [7,8] The general population frequency of HIV/AIDS in India was estimated as 0.1 while the high-threat population frequency as 1-2. [9] still, it's intimidating to note that according to the rearmost numbers, HIV/ AIDs frequency among Intravenous medicine druggies (IDUs) has been reported to be from 7.6-27. [10] According to the statistics from Centre for Injection Safety, the frequency of HBV infection in marketable blood benefactors in India is 10. For HCV infection, this frequency is 20 for marketable blood benefactors. [11] numerous of these cases come for admissions, consultations, procedures and biochemical examinations to hospitals daily where they're encountered by unknowing HCWs.

Medical scholars, being a part of the healthcare delivery system, are exposed to the same, if not lesser, magnitude of threat as other HCWs when they come into contact with cases and defiled instruments. In numerous tutoring centres, medical scholars are the first position of contact of cases with medical care. They're anticipated to take over conditioning related to patient care with the morning of their clinical times. As unborn croakers, they will have to face the pitfalls associated with NSIs. Being amateurs, they warrant experience and skill and are, thus, at a advanced threat of infection from unsafe practices related to needles and sharps. While studies assessing the KAP of NSIs have been conducted among nurses, croakers and operation room staff in India, there has been no study assessing KAP of NSIs among medical scholars in India. Only one study has been conducted to determine the knowledge regarding conditions like HIV, HBV and HCV among medical students in Villupuram, India. [12] Thus, this study was conducted to assess knowledge, stations and practices (KAP) of medical scholars regarding NSIs as threat is high for this group.

Methodology

The medical curriculum in universities across India spans across a period of five years. From 2nd year onwards, students begin their clinical rotations at the majority of institutions. Therefore, a cross sectional survey was conducted among the consenting medical students of 2nd, 3rd and 4th years at Government Villupuram Medical College and Hospital, Villupuram, India in the year 2019. Students of pre-clinical year (1st year) were excluded from the survey. Convenience sampling was used. Structured, pre-tested questionnaires were administered to approximately 70% of each class; the average strength of each class being 100. The total sample size, after adjustment for 10% non-response rate, was estimated to be 210. The questionnaire comprised both open and close ended questions. The data was entered and analysed using SPSS version 26. In descriptive analysis, the mean and standard deviation of continuous variables and percentages of categorical variables were computed. Associations were assessed using chi-square test and Fisher's exact test; the p-values for the different cross- tabulations have been mentioned in the tables alongside each variable.

Multiple logistic regression analysis was also done to ascertain the association between the year of study and receipt of NSI. A p-value of <0.05 has been considered as statistically significant, unless otherwise specified. The study was approved by the Institutional Ethics Committee at Government Villupuram Medical College. All ethical considerations including informed consent and confidentiality of respondents was ensured throughout the project.

Results

A total of 210 medical students belonging to 2nd, 3rd and 4th years were approached for the survey. One hundred and eighty students consented to participate in the survey; therefore, the response rate in our study was 85.7%. Sixty-one students (33.9%) were from 2nd and 3rd year each while 58 students (32.2%) were from 4th year. Ninety-three (51.7%) students were male. The mean age of respondents was 21.04 ± 1.59 years. Most of the respondents from each class were aware that NSIs and blood and body fluid exposure include injuries from used needles of syringes, sharps and exposure of fluids to mucous membranes (29.5% of 2nd years, 42.6% of 3rd years and 67.2% of final years). More than 85% students from each class were aware of the possibility of acquisition of Hepatitis B, Hepatitis C and HIV from these exposures. Eighteen percent of 2nd year students, 25% of 3rd year students and 45% of final year students also mentioned NSIs as a possible source of transmission for Viral Haemorrhagic Fevers. The percentage of final year students able to correctly identify the sero-conversion rates for each of Hepatitis B, Hepatitis C and HIV was higher than 2nd and 3rd year students. 16.4% 2nd year students, 29.5% 3rd year students and 36.2% final year students had not only heard about universal guidelines about prevention of needle stick and sharp injuries but they also knew the full details of these NSI prevention protocols. The association between the year of study and knowledge of the term NSI ($p=0.002$), knowledge about the sero-conversion rates of each of HBV, HCV and HIV ($p < 0.001$ for each association) was found to be significant. Table-1 provides details of answers to knowledge questions by participants. With regards to the source of information about NSIs, most of the students responded that it was taught as a part of the curriculum (22.8%).

Other important sources of information mentioned by the students included consultants (20.6%), colleagues (17.8%) and nurses (14.4%). Attendance at an organized training programme as a source of information for NSI was mentioned by 13.3% of the students. The majority of respondents (80%) were aware that effective vaccination is available for Hepatitis B as a post-exposure prophylactic measure. Thirteen percent students, the majority of these (75%) belonging to 3rd year, also mentioned that effective vaccination was available for Hepatitis C as a post-exposure prophylactic measure while 7% held this opinion for HIV. In response to a hypothetical scenario where students were given the choice to not report any of the three infections (Hepatitis B, Hepatitis C and HIV) after getting an NSI, most of the students (55%) chose not to report NSI associated with HIV. The reason commonly cited by medical students for their choice of not reporting the HIV associated NSI was ostracization by peers (60%) as well as the possibility of significantly harsh rebuke from consultants (28%). Out of 180 respondents, 47 (26.1%) had received an NSI in the past. Out of these 47 students, 8 (17%) were from 2nd year, 15 (32%) from 3rd year and 24 (51%) belonged to final year. The association between receipt of NSI and year of study was found to be significant ($p=0.002$). Thirty-three (70.2%) had received a single NSI. Fourteen students (29.8%) had reported the NSI either to their consultant or Infection Control Office. The most common reasons cited by medical students for not reporting the NSI to appropriate authority were the fear of getting into trouble (62%), taking some prophylactic measures on their own (24%), and waiting to feel unwell or symptomatic (11%) before approaching appropriate authorities.

Medical students attributed the event of NSI to personal inexperience (28%), lack of awareness about NSIs (22%), carelessness (18%), stress due to academics and other reasons (13%) and lack of supervision (9%). The majority of injuries had occurred while recapping syringes (32%), injecting or drawing blood samples (27%) and from glass equipment like broken vials (21%). NSIs during suturing and surgery were an infrequent occurrence overall (8%). The hand and the forearm were the most common sites for receipt of NSI (62% and 36% of instances respectively). Regarding the post NSI emotional repercussions,

Students reported feeling anxious (40%), fearful of contracting infections (33%) and anger directed at oneself for not being careful enough (21%). The association between the year of study and the enquiry about the patient and his disease history was significant ($p < 0.001$). Table-2 provides details of the practice variables of the respondents. The majority of the students in our study (96%) had received 3 doses of hepatitis B vaccination. However, only 34 (19%) students had got their antibody titres checked after the vaccination. There was a significant association between the year of study and the receipt of sharps related training ($p=0.036$), avoidance of needle recapping ($p < 0.001$) and avoidance of breaking needles by hand ($p=0.015$). Table-3 details other preventive practices undertaken by medical students with regards to NSIs. Using multiple logistic regression analysis, the year of study emerged as an independent predictor for receiving an NSI [Adjusted Odd's Ratio=6.5, 95% Confidence Interval=1.5 - 8.6] as compared to students studying in 2nd and 3rd years. Students in 4th year were also more likely to receive a NSI as compared to 3rd year students [Adjusted Odd's Ratio=3, 95% Confidence Interval=0.9 - 5.4]

Table 1: Descriptive characteristics and knowledge variables of NSIs

Variables	2nd year % (n=61)	3rd year % (n=61)	4th year % (n=58)
NSI/Blood and Body Fluid Exposure includes ($p=0.002$)			
Injuries from needles of syringes	19.7	11.5	0
Injuries from sharps	21.3	16.4	10.3
Exposure of fluids to mucous membranes	13.1	18	10.3
All of the above	29.5	42.6	67.2
Splash on intact skin	16.4	11.5	12.1
Disease that NSI can transmit (**)			
Hepatitis B	85	89	94
Hepatitis C	92	93	95
HIV	88	94	97
Hepatitis A and E	22	13	5
Malaria	38	21	27
Viral Haemorrhagic Fevers	18	25	45
Sero-conversion Rates for Hepatitis B ($p<0.001$)			
<5%	31.1	14.8	6.9
5- 25%	49.2	47.5	37.9
>25%	19.6	37.7	55.2
Sero-conversion Rates for Hepatitis C ($p<0.001$)			

<3%	68.9	21.3	22.4
3-4%	14.8	34.4	63.8
>4 %	16.3	44.3	13.8
Sero-conversion Rates for HIV ($p<0.001$)			
< 1%	16.4	39.3	53.4
1.03%	27.9	27.9	27.6
>3%	55.7	32.8	19
Awareness of Any Preventive Guidelines ($p=0.059$)			
Only heard about them but don't know details	26.2	18	15.5
Know some details about them	13.1	21.3	24.1
Know full details about them	16.4	29.5	36.2
Have not heard about them at all	44.3	31.1	24.1

* Some percentages do not add up to 100 because of multiple responses

** P-value wasn't computed because of a multiple response question format of this variable.

Table 2: Descriptive Characteristics and practice variables of NSI

Variables	2nd year % (n=8)	3rd year % (n=15)	4th year % (n=24)
Time NSI ($p=0.12$)			
Once	75	73.3	66.6
Twice	12.5	20	25
More than twice	0	0	4.2
Can't recall the exact number of NSIs	12.5	6.7	4.2
Post-exposure Measures Taken ($p=0.135$)			
Immediately washed the wound	50	26.7	62.5
Allowed it to bleed	0	26.7	0
Notified the infection control office	12.5	13.3	12.5
Reported the incident to your consultant	25	13.3	16.7
Applied an adhesive medicated plaster	12.5	19.9	8.3
Enquired about Patient and his/her disease history ($p<0.001$)			
Yes	25	60	87.5
No	75	40	12.5

Table 3: Preventive practices of medical students

Preventive Practices	2nd year % (n=61)	3rd year % (n=61)	4th year % (n=58)
Hepatitis B Vaccination*			
Received at least 1 dose of Hepatitis B vaccination	95	97	97
Received All 3 doses of Hepatitis B vaccination	95	90	93

Got antibody titres checked after vaccination	1.6	4.8	51.7
Regular use of gloves (p=0.247)	65	72	80
Regular use of tray to keep syringes (p=0.596)	40	45	46
Regular use of sharp disposal containers (p=0.676)	55	62	72
Received sharps related training (p=0.036)	19.7	32.8	41.4
Avoidance of needle recapping (p<0.001)	44	64	81
Avoid breaking needles by hand (p=0.015)	61	81	92

* P- Value was not computed for this variable because of multiple response format

Discussion

This study demonstrates that medical students generally have strong knowledge of the transmission of serious diseases through NSIs; nevertheless, future research should focus on enhancing students' understanding of preventive measures. Almost 90% of the medical students were generally aware that NSIs can spread HBV, HCV, and HIV. This study is analogous to the ones that have been published in the past. [13]

The risk of transmission following percutaneous contact with infected blood varies depending on the particular bloodborne disease. HBV, HCV, and HIV all have transmission rates of 30%, 3%, and 0.3%, respectively. [14] Most of the second- and third-year students in this study underestimated the sero-conversion rates for hepatitis B, while the fourth-year students accurately identified them as being above 25–30%.

In this study, responses to questions about sero-conversion rates for Hepatitis C and HIV varied, although final-year medical students demonstrated superior knowledge of the right numbers. Unfortunately, the lifetime prevalence of needle stick and sharp injury is also known to grow, as was demonstrated in this study, despite the fact that it has generally been seen that awareness of NSIs improves with increasing years of medical education. As medical students go to more senior years, variables including increasing amount of clinical exposure and responsibility in patient care, greater level of stress, and longer working hours may be responsible for this.

According to a cross-sectional study conducted at two Munich medical schools, there were 23% more NSIs among medical students overall, ranging from 12% in first-year students to 41% in fourth-year students. According to reports, mishaps most frequently happened during

Blood collection procedures. [15] It is comparable to this study, where most injuries happened when injecting or collecting blood samples or recapping syringes. 33% of fourth-year students in US research reported having one or more injuries, according to the study. In 34% of cases, the injury was brought on by someone else using a needle or other object. [16]

According to the findings of a study done on medical interns in Iran, hospital procedures including phlebotomy and suturing accounted for the highest percentage of exposure episodes, while needles were the most frequent object of exposure (41% of exposure episodes). However, it revealed that a small percentage of students followed basic safety precautions including donning gloves, not reusing used needles, and disposing of sharp things properly. In the current study carried out at Government Villupuram Medical College and Hospital, [17] students were asked about their preventative strategies and the steps they had taken for post-exposure prophylaxis. The majority of students said that they used gloves and sharps disposal containers to lower the incidence of NSI. It was also noted that needle breaking by hand and needle recapping were avoided. Of 180 responders, 26.1% had previously gotten an NSI, with the majority being medical students in their last year. Nonetheless, the exposure rate is low when compared to other studies on medical students; Wicker et al. and Okeke et al. report NSI incidence rates of 58.8% [18] and 48% [13], respectively. This can be attributed to the fact that the current study, which was conducted at the Government Villupuram Medical College and Hospital, involved medical students from all three clinical years, whereas the majority of other studies only included students from senior clinical years, contributing to a comparatively higher NSI incidence rate. The incidence rate of 67% of NSIs among final-year medical students in this study provides additional evidence for this conclusion. The financial expense of handling NSIs is high. The resulting emotional effects must also be taken into account.

According to cost calculations, using needle stick prevention technology will ultimately be more affordable. It is first necessary to improve the recording of needle stick injuries in order to offer more scientific data on the effectiveness of needle stick prevention devices. [19] Reporting is connected to personal anxieties,

Unit quality management, and administrative responses to reports. As shown in our study, patient and worker safety incidents, including NSIs, are typically underreported. Good quality management procedures and effective handling of incident reports may encourage more reporting and improve safety. [20]

The reporting rate of NSIs to the infection control office was reported to be 53% in a recent Pakistani study. This figure outperforms earlier reports by Alam (7%), McGeer (5%), Gurubachaya (21%), and Patterson (30%). [21] Only 13 students (27.7%) in our sample had reported the incident to either their consultant or the Infection Control Office. The medical students gave a multitude of excuses for not reporting an NSI, and these need to be addressed for better reporting data. The effectiveness of strategies to prevent NSIs in the healthcare industry has not been thoroughly tested by randomised controlled studies.

The majority of these research focused on surgical interventions as opposed to patient care in nursing units, likely because the latter is more challenging to observe. [22] The use of safer needle devices, sharps collecting boxes, gloves, and other personal protective equipment can help prevent NSIs by eliminating needle recapping. The "Universal Precaution Guidelines" were introduced in 1985 by the US Centres for Disease Control (CDC) and Occupational Safety and Health Administration (OSHA). These guidelines are meant to prevent sharp injuries among healthcare workers (HCWs) and reduce their occupational hazards to a minimum level. [23] The number of NSIs in the US reduced from an estimated one million exposures per year in 1996 to 385,000 in 2000 as a result of the adoption of these procedures. [24] In this poll, more than 90% of the medical students who took part had gotten all three doses of the Hepatitis B vaccine. Comparatively, in other published research, medical students' immunisation level was subpar. [13] This is explained by the fact that medical students are routinely immunised upon enrolment into the medical college due to an elevated Hepatitis B prevalence in the area. It is advised that a similar regulation be introduced in all medical colleges in our region because medical students have a higher chance of developing NSI. However, antibody titres should also be routinely checked among all vaccinated because of the possibility of non-response to the first series of vaccination.

Conclusion

In conclusion, this KAP study revealed that medical students now have a better understanding of associated hazards and safeguards against needle stick injuries.

With medical school seniority. Yet, with each additional year of medical school, a higher prevalence of needle stick injuries was seen among medical students, strongly indicating the need for reform in the areas of attitudes and behaviours. To reduce these occurrences in the future, more instruction and training sessions on infection management and sharps injuries need to be added to the medical curriculum.

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