International Journal of Community Medicine and Public Health
Vijay C et al. Int J Community Med Public Health. 2017 Jul;4(7):2443-2448
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20172838

Original Research Article

Knowledge of needle sticks injuries and its prevention among interns and post graduate students working at a tertiary health care centre, Bangalore

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Received: 02 May 2017
Accepted: 26 May 2017

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ABSTRACT

Background: Health care workers (HCW) especially doctors and nurses are at an increased risk of accidental needle stick injuries (NSI) due to the occupational environment in which they work. Hence the HCWs are at a higher risk of acquiring blood borne pathogens such as HIV, hepatitis B and C and other diseases. This study was done to assess knowledge regarding NSI and practice regarding disposal of needles and sharps among interns and postgraduate students.
Methods: This study was a cross-sectional study done among 110 interns and postgraduates medical students working in various departments of a tertiary health care centre in Bangalore. A self-administered questionnaire was used to collect the data regarding knowledge, practices and preventive measures among HCWs in their work place.
Results: Among the 110, 55 (50%) were from intern category and 55 (50%) were from the postgraduate category and 47 (42.7%) were male and 63 (57.3%) were female students. The prevalence of NSI was found to be 36.3%. Female participants and post graduates had better knowledge. Female participants and interns had better practice.
Conclusions: The Knowledge among the medical students (interns and postgraduates) was inadequate, indicating the need for awareness programs to reduce the burden of NSI among HCWs.

Keywords: Needle stick injuries, Interns, Postgraduates, Knowledge, Practice

INTRODUCTION

A needle stick injury is penetrating stab wound from a needle (or other sharp object) that may result in exposure to blood or other body fluids. The main concern is exposure to infectious disease agents present in the blood or other body fluids of another person.[1]

Health care workers (HCW) especially doctors and nurses are at an increased risk of occupational accidental needle stick injuries (NSI) due to their hazardous work environment. Hence the HCWs are at higher risk of acquiring blood borne pathogens such as HIV, hepatitis B and C, and other diseases.[2] Studies have also shown that HIV and Hepatitis B are among the important diseases transmitted by needle stick injuries.[3]

Needle stick injuries are unsafe event among HCWs in their working environment, while conducting procedures like with drawing blood, administering an intramuscular or intravenous injection or during needle recapping. The lack of knowledge, access or failure to use appropriate practice in the form of personal protective equipment contributes to increasing incidence of NSI among HCWs.[2] It has also been observed that the stress at work place can also put HCW at increased risk for NSIs.[2]

Generally, NSI cause only minor bleeding or visible trauma. However, even in the absence of bleeding, the risk of viral infection still remains. In turn, a NSI may also pose a risk for a patient if the injured HCW has a blood borne illness.[2]

Prospective studies have reported that the estimated risk for HIV infection after a percutaneous exposure to HIV infected blood is approximately 0.3%. There were more than three million HCWs who experience a percutaneous injury with a contaminated sharp object each year and these exposures result in about 1,000 HCWs ending with HIV. They also estimated that 4.4% (0.8%–18.5%) of HIV infections among HCW may be attributable to occupational sharps injuries worldwide.[3]

Similarly for Hepatitis B, HCWs who have received hepatitis B vaccine and have developed immunity to the virus are at virtually no risk for infection. But for an unvaccinated person, the risk from a single needle stick or a cut exposure to HBV infected blood ranges from 6%–30% and depends on the hepatitis B e antigen (HBeAg) status of the source individual.[4]

A study done by Leigh et al in 2004 in USA showed that among all those with NSI, the combined medical and work productivity costs summed up to $188.5 million.[5]

Injection safety should be assessed using standardized methods to allow for a reliable assessment. This will help determines whether a facility meets the necessary requirements for equipment, supplies and waste disposal. It also identifies unsafe practices that may lead to infections and helps estimates the proportion of health care facilities where injection practices are safe.[6] The incidence of NSI are under reported and the data collected through NSI register may have to be inflated ten times to get the true picture.[7]

Three major considerations are especially relevant in the assessment of potential unsafe injections practices: the safety of the injection recipient, the safety of the HCW and the safety of the community.[6]

The interns and postgraduates are young professional who probably for the first time in their professional life come in contact with patients and during their training period face stressful clinical situations which may lead to the increased incidence of NSIs. Hence, this study objective were to assess the level of knowledge regarding NSI and practice of giving injection and disposal of needles among interns and postgraduate students working at a tertiary health care centre in Bangalore.

METHODS

This was a cross-sectional study done among medical interns postgraduates. Ethical approval was obtained from the Institution Ethics Committee, St. John's Medical College, Bangalore. The study period was from July – December, 2016.

The calculated sample size was 100, based on a study done by Sharma et al, the knowledge of disease transmission through needle stick and sharp injury was 50.2%, with 10% absolute precision and 95% confidence interval.[7] A total of 110 subjects were contacted considering 10% non-responsive rate. The study group included interns and post graduates above the age of 18 years, both male and females. The participants included 55 medical interns and 55 medical postgraduates who were randomly selected from the list of interns and postgraduates. The subjects were explained about the study objectives and written informed consenting was obtained from all the study participants. The tool used in this study was a standardized tool developed by Rampal et al and it was a self-administered questionnaire.[8] The tool consisted of questions which assessed knowledge, practices and preventive measures adopted by HCWs at the work place. Along with these demographic details, past history NSI and current designation and work place were also documented. The questionnaire consisted of 18 questions. There were 8 questions that assessed knowledge, 8 questions that pertained to practice/prevention and remaining 2 questions looked into prevalence of a NSI. The questions in each of the categories were coded and a cumulative score was given to each of the candidates. When a candidate secured a score of equal to or greater than 7, the candidate had good knowledge/practice that is expected of an intern or postgraduate.

Data collected was entered and analyzed for descriptive statistics such as frequency, mean and standard deviation. Pearson's Chi Square test and Fishers Exact were used to assess associations and 'p' value less than 0.05 was considered significant. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0.

RESULTS

This study included 110 participants, 55 (50%) medical interns and 55 (50%) medical postgraduate from a tertiary health care centre in Bangalore. There were 47 (42.7%) male and 63 (57.3%) female. The responses to the self-administered tool were as follows, Table 1.

The overall response was found to be good, (scores were more than 75% for most of the questions except for knowledge regarding needleless devices). At the same time, for very few questions the interns and postgraduates (PG) were able to score more than 95%.

In this study, 101 (91.8%) of the participants knew about the World Health Organization (WHO) Universal Precautions to prevent NSI, but none were able to enumerate more than three personal protective equipment's (gloves, goggles, gowns, caps, mask).[9,10]

When asked about recent advances and other safer devices such as needless safety devices, it was found that only 34 (30.9%) of the participants had some knowledge.[11]

Table 1: Responses to self-administered questionnaire.

Question	Right Answer	Percentage
1. Do you know about Universal precaution guidelines?	Yes	101 (91.8%)
2. Do you know about needleless safety device?	Yes	34 (30.9%)
3. Can Hepatitis B be transmitted by Needle stick and sharp injuries?	Yes	109 (99.1%)
4. Can Hepatitis C be transmitted by Needle stick and sharp injuries?	Yes	97 (88.2%)
5. Can HIV/AIDS be transmitted by Needle stick and sharp injuries?	Yes	110 (100%)
6. Do you need to wear gloves during Phlebotomy?	Yes	110 (100%)
7. Do you wear gloves during Phlebotomy?	Yes	96 (87.3%)
8. Do you wear gloves when withdrawing a needle from a patient?	Yes	97 (88.2%)
9. Should needles be recapped/Bent after use?	No	93 (84.5%)
10. Do you recap needles after use?	No	84 (76.4%)
11. Do you disassemble used needles or sharps with your hand?	No	82 (74.5%)
12. Do you wear gloves when disposing of contaminated needles or sharps?	Yes	100 (90.9%)
13. Do you separate the needle from syringe prior to disposal?	Yes	95 (86.4%)
14. Do you throw used needles or sharps into the sharps bin immediately?	Yes	102 (90.7%)
15. Do you wear gloves when manipulating the sharp bin?	Yes	85 (77.3%)
16. Do needle stick and sharp injuries need to be reported?	Yes	109 (99.1%)
17. Have you ever had a needle stick Injury?	Yes	40 (36.4%)
18. Was the incident of the needle stick/sharp injury reported?	Yes	13 of the 40 (36.6%) who had NSI reported the incident.

Table 2: Association between Knowledge of NSI with gender and designation.

Knowledge of NSI	Variable	Total (n = 110)	Good knowledge 87 (100)
Gender	Male	47 (100%)	37 (78.7%)
	Female	63 (100%)	50 (79.3%)
Designation	Intern	55 (100%)	42 (76.3%)
	PG	55 (100%)	45 (81.8%)

Table 3: Association between Practice of NSI with gender and designation.

Practices in NSI	Variable	Total (n = 110)	Good practices (n=33)
Gender	Male	47 (100%)	13 (27.6%)
	Female	63 (100%)	20 (31.7%)
Designation	Intern	55 (100%)	18 (32.7%)
	PG	55 (100%)	15 (27.2%)

Table 4: Prevalence of NSI and reporting of the NSI.

NSI	Prevalence 40 (100)	P value
Reported	13 (32.5%)	<0.05
Not Reported	27 (67.5%)	

In relation to the questions that involved the various infections that could be transmitted via NSI 109 (99.1%), 97 (88.2%) and 110 (100%) of the individuals responded rightly that Hepatitis B, Hepatitis C and HIV/AIDS can spread by NSI.[12-14]

It was seen that the knowledge of NSI is almost equal among males and females. It is also seen that post graduates have a better knowledge compared to interns.

It was seen that females have better practices with respect to handling needles and sharps in comparison to males.

Interns have better practices when compared to the postgraduates.

The practice of wearing gloves during procedure involving needle, 110 (100%) of the participants said that it was necessary to wear gloves during phlebotomy but only 96 (87.3%) of them practiced the same. When the knowledge of recapping a needle was analyzed it was noticed that 93 (84.5%) of the individuals knew that a needle should not be recapped but only 84 (76.4%) of them did not recap the needle. In this study, 82 (74.5%) of the participants did not disassembling used sharps and needles with the hands. It was noted that 95 (86.4%) of the individuals separated the needles from the syringe prior to disposal. It was also observed that 102 (90.7%) of the participants followed the right practice of throwing the used needles and sharps into the sharp bin.

Table 5: Association between knowledge and practice.

Knowledge and practice of not recapping needles				
	Present	Absent	Total	P value
Interns	42 (76.36%)	13 (23.64%)	55 (100%)	0.288 (Pearson Chi square value = 1.1)
PGs	37 (67.27%)	18 (32.73%)	55 (100%)	
Total	79 (71.81%)	31 (28.19%)	110 (100%)	
Knowledge and practice of wearing gloves during phlebotomy				
Interns	53 (96.36%)	2 (3.64%)	55 (100%)	0.003 (Pearson chi square value = 8.1)
PGs	43 (78.18%)	12 (21.82%)	55 (100%)	
Total	96 (87.27%)	14 (12.73%)	110 (100%)	
Actual practice of not recapping needles				
Knowledge of not recapping needles				
Present	79 (84.94%)	14 (15.06%)	93 (100%)	<0.001 (Fisher's exact value=24.5)
Absent	5 (29.41%)	12 (70.59%)	17 (100%)	
Total	84 (76.36%)	26 (23.64%)	110 (100%)	

In the study population, 40 (36.6%) participants had past history of NSI, all had the knowledge that NSI had to be reported; but only 13 (32.5%) reported the incident and availed treatment and this was found significant i.e., p value was <0.05. NSI was reported by 6 (10.9%) interns and 7 (12.7%) postgraduates.

Table 5, shows that interns have good knowledge as well as the practice of not recapping needles after use and wearing gloves during phlebotomy when compared to post graduates and this was found to be statistically significant. Those who had good knowledge also had good practice of not recapping needles after use when compared to those who had poor knowledge and recapped needles after use and this was also found to be statistically significant.

DISCUSSION

HCWs especially in the beginning of the professional carrier like interns and postgraduates face stressful clinical situations putting them at increased risk of NSI at their work place. The incidence of NSI was common occupational hazards among HCWs and its showing an upward trend. In this study, among the 110 participants, 50% were interns and the remaining 50% were postgraduates perusing various postgraduate courses in the Hospital providing tertiary health services in Bangalore, South India.

In this study, 101 (91.8%) participants knew about the WHO Universal Precautions to prevent NSI, but none were able to enumerate more than three personal protective equipment's. This showed that most of the participants did not have complete knowledge about the guidelines and precautions of preventing NSI. A cross-sectional survey conducted by Sharma et al using a self-administered questionnaire among HCWs, 94.7% were aware about standard precautions and 91.5% knew about the procedure for reporting of NSI.[7]

Transmission of infections by NSI can be prevented by wearing well-fitting, sterile gloves when drawing blood and by practice of hand hygiene.[15-17] In a study from Ireland reported about 80% used gloves during phlebotomy and disposal of sharps.[9] In this study, 85 (77.3%) of the study participants mentioned that they did wear glove while manipulating the bin containing sharps.

The international guidelines reports that the safest way to dispose of a used needle is to immediately place it in a sharps disposal container to reduce the risk of needle sticks, cuts and punctures from loose sharps.[18] Clearly there is a gap between knowledge and practice of recapping needles among the study participants.

Guidelines also mention that, never remove a hypodermic needle from the syringe by hand, this may result in accidental needle stick cuts or punctures and needles and sharps must be discarded into bin labeled 'sharps'.[19,20]

Only 13 out of the 40 (36.4%) reported the incident. In general the incidence of NSIs are underreported and in this study only one third report NSI. The guidelines for the reporting of a NSI are, it should be reported immediately.[21] In a similar study from Mexico among the medical faculty and students 56.7% of students had at least one NSI, 44.5% of them reported NSI.[22] The risk

factors for NSI were the feeling of being rushed by someone else, fatigue, night duties, females being the first to get punctured and males having more number of punctures, which was similar to the response given by the participants in this study. In another study from China, NSI were significantly associated with psychosocial characteristics like influence at work, job insecurity, poor quality leadership and poor social support.[23]

A study from Malaysia hospital revealed that the overall prevalence of needle stick or sharps injuries was 23.5%.[24] Staff nurses had the highest prevalence (27.9%). The causes of NSI in 58% of cases were caused by hypodermic needle and 27.2% cases were due to recapping. A cross-sectional study from Pakistan revealed, 64% of HCWs were exposed to at least one NSI during their career and among them 73% reported NSIs for two or more times which was not the case in our study.[25] HCWs had inadequate practices regarding standard precautions such as availability of gloves/protective cloths (40%) and infection control guidelines/protocols (10%) respectively in their working places.

A study done in a tertiary care hospital in Delhi, India among resident doctors, interns, nurses and technicians revealed that 79.5% of them had an NSI at some point in time of their career whereas it was about 36.5% in our study.[7] In the same study, of the HCWs who received an injury, only 70 (27.5%) reported it to a supervisor or senior whereas in our study 36.4% had reported the NSI. Most of the injuries (34.0%) occurred during recapping whereas in our study 27.2% of NSI occurred due to recapping. In this study, fatigue was one the important reasons for occurrence of a NSI.

In another study group in Delhi, it was found that practice of recapping needles was prevalent among HCW's (66.3%) whereas in our study 23.6% of the individuals recapped needles after use.[26]

In a study of in Bangalore, around 27.5% HCWs had an accidental needle stick injury in the last one year compared to the 36.5% in this study.[27]

Recapping and inappropriate disposal of needles have been reported to be the most common actions during which HCWs sustain NSI.[28] In our study, most of the injuries occurred (85%) during procedures rather than recapping (11.3%) or disposal of sharps (3.7%).

In a study in Mumbai, 50% of the affected individuals reported the occurrence to concerned hospital authorities whereas in our study only 36.4% reported incidence of NSI.[29]

CONCLUSION

The prevalence of NSI among medical interns and postgraduates was 36.3%. It was also noticed that the students were partially aware about the diseases transmitted by NSI and appropriate methodology for disposal the used needles and sharps. Female participants fared better that the male participants and the interns had both better practices as well as knowledge in comparison to postgraduate students. Although postgraduate students by themselves had an exceptional knowledge of NSI they quiet did not practice what they knew. The causative factors for a NSI were multifactorial. There is an urgent need to educate HCWs especially young professionals like medical students, interns and postgraduates about Universal Precaution and NSI as their health and the future of health industry of this country depends on them.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Vijay C, Joe A, Ramesh N. Knowledge of needle sticks injuries and its prevention among interns and post graduate students working at a tertiary health care centre, Bangalore. Int J Community Med Public Health 2017;4:2443-8.