

# Comparison of knowledge, attitude, and practices regarding needle-stick injury among health care providers

Anitha Madhavan<sup>1</sup>, Anjana Asokan<sup>1</sup>, Anu Vasudevan<sup>2</sup>, Janeesh Maniyappan<sup>1</sup>, Veena K<sup>1</sup>

<sup>1</sup>Department of Microbiology, Govt TD Medical College, Alappuzha, <sup>2</sup>Department of Biostatistics, Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala, India

## ABSTRACT

**Introduction:** Needle-stick injury (NSI) is one of the most potential hazards for health care workers. They pose a significant risk of occupational transmission of blood-borne pathogens. The present study was done to determine the incidence of NSI among interns and nurses; their knowledge, attitude, and preventive strategies undertaken by the respondents after NSI. **Materials and Methods:** The cross-sectional study was done among interns and nurses in various departments of a tertiary care center in Kerala, India using a self-administered questionnaire. **Results:** The incidences of NSI among interns and nurses were 75.6% and 24.4%, respectively. The most common clinical activity leading to NSI among interns was blood withdrawal (42%) followed by recapping (29%). It was found that nurses had enough knowledge and followed better NSI practices and attitude than the interns. **Conclusion:** All the parameters analyzed were inadequate among the interns, indicating the need for continual awareness programs particularly during the preclinical years.

**Keywords:** Health care workers, interns, needle-stick injury, nurses

## Introduction

Needle-stick injury (NSI) is a major occupational health and safety issue faced by health-care professionals globally. They include wounds caused by sharps such as hypodermic needles, blood collection needles, intravenous (IV) cannulas, or needles used to connect part of IV delivery systems (Muralidhar *et al.*, 2010).<sup>[1]</sup> The Needle stick Safety and Prevention Act was signed into law in November 2000 and became effective in April 2001. (Kotwal, 2010; Foley *et al.*, 2003).<sup>[2]</sup> It is of grave concern because of the risk of acquiring blood-borne diseases such as hepatitis B, C, and HIV. World Health Organization in its World Health Report

2002 reports that out of 35 million health-care workers, 2 million experience percutaneous exposure to infectious diseases each year. Approximately 37.6% of hepatitis B, 39% of hepatitis C, and 4.4% of HIV/acquired immunodeficiency syndrome in healthcare workers around the world are due to NSIs.<sup>[3]</sup> Despite their seriousness as a medical event, NSIs have been neglected, most go unreported, and ICD-10 coding is not available. Hence, a low-injury rate should not be interpreted as a less serious issue (Camilla Rodrigues, 2010).<sup>[4]</sup>

The knowledge, attitude, and practices regarding NSI vary widely among health care workers (HCWs). With this background, the present study was conducted among the HCWs of our institute with the following objectives:

**Address for correspondence:** Dr. Anitha Madhavan, Department of Microbiology, Govt TD Medical College, Alappuzha, Kerala, India.

E-mail: anitha\_anoop@yahoo.co.in

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1. To assess and compare the level of awareness, attitude, and practices regarding NSIs, standard precautions, and safe injection practices among doctors and nurses in a tertiary care hospital.
2. To study the incidence and factors resulting in NSI among the two groups.
3. To assess hepatitis B immunization status in the study group.

### Materials and Methods

The data collection for the cross-sectional study was done using a self-structured questionnaire consisting of 27 multiple choice questions, which was used to assess the KAP of HCWs regarding NSI. The HCWs included 100 house surgeons and 100 staff nurses. The purpose of study was explained to each participant, and informed written consent was obtained from them before getting enrolled. Ethical clearance was obtained from the institutional ethics committee. An assurance was given that all information would be confidential and would not be used for any purpose other than research.

The initial part of the questionnaire comprised of demographic information of the participant such as occupation, age, sex, work experience, and marital status. Another section collected data about their vaccination status, incidence of NSI, reasons for not reporting NSI, knowledge and practice of universal precautions, and post-exposure prophylaxis (PEP).

The data were entered into MS-office Excel and analyzed using the statistical package, SPSS version 20. Comparison of variables between the different professions was made using Pearson's Chi-square test, and the *P* value for the same was calculated. The statistical significance was set at *P* < 0.05 for this study.

### Results

The respondents included 100 interns and 100 nurses. Among interns, 42 (95.5%) were males and 58 (37.2%) were females.

The majority of the nurses were females 98 (62.8%). The mean age of interns and nurses were 24.38 ± 1.21 and 33.77 ± 7.16, respectively. There is statistically significant difference in the age between the two groups (*P* value < 0.001).

It was observed that interns had more knowledge regarding the correct definition of NSI (61%) and standard precautions (57.1%) when compared to nurses [Table 1]. This was found to be statistically significant.

When 58.4% of nurses were aware that not to recap was the most important measure to prevent NSI, only 41.6% of doctors agreed to the same (*P* value < 0.002). Only 38% of interns were aware of the fact that NSI was a reportable event, and 42.7% of them followed the correct method of needle disposal (*P* value < 0.001).

The practice of using PPE especially gloves by interns was comparatively lower than in nurses [Table 2]. Approximately, 73.8% interns followed the practice of recapping (*P* value < 0.001). In our study, 75.6% of interns experienced NSI during their 12 month internship period. Of them, 53.9% got NSI more than once when compared to nurses (*P* value < 0.001).

The PEP practices followed by the study group were also analyzed and tabulated [Table 3]. Hepatitis B vaccination status of the respondents showed that only 71 (53.8%) interns, and 61 (46.4%) nurses were completely immunized. Among them, only 40.4% interns and 59.6% nurses have checked their anti hepatitis B surface antigen titre.

The data regarding attitude to NSI events among the study group show that the nurses have better attitude scores [Table 4].

When 69% of doctors agreed that NSI is under reported [Table 3], the reasons for non-reporting were analyzed [Table 5]. Busy schedule of the interns gave them inadequate time to

**Table 1: Knowledge parameters related to NSI**

Knowledge parameters	Interns	Nurses	Total	<i>P</i> value
NSI definition	86 (61%)	55 (39%)	141 (70.5%)	<0.001
Standard precautions	72 (57.1%)	54 (42.9%)	126 (63%)	<0.006
Infections transmitted through NSI	90 (51.1%)	86 (48.9%)	176 (88%)	NS
Important measure to prevent NSI is no recapping	52 (41.6%)	73 (58.4%)	125 (62.5%)	<0.002
Needle discard into appropriate container after use	70 (42.7%)	94 (57.3%)	164 (82%)	<0.001
Reporting NSI to authority	38 (38%)	62 (62%)	100 (50%)	<0.001

All parameters are presented as numbers (%)

**Table 2: Practices related to NSI**

Practice parameters	Interns	Nurses	Total	<i>P</i> value
Wear gloves before venipuncture/injections	66 (46.2%)	77 (53.8%)	143 (71.5%)	NS
Recap needles before discarding	76 (73.8%)	27 (26.2%)	103 (51.5%)	<0.001
One hand method of recapping done	57 (45.2%)	69 (54.8%)	126 (63%)	NS
Avoid PPE during emergency procedures	67 (55.4%)	54 (44.6%)	121 (60.5%)	0.041
NSI experienced during 1 year	59 (75.6%)	19 (24.4%)	78 (39%)	<0.001
Got NSI more than once	69 (53.9%)	59 (46.1%)	128 (64%)	<0.001

report (34%). The most common cause of non-reporting among the nurses was the thought that it was a minor injury (43.6%)

The reporting status in our study group [Figure 1] shows that 68% of interns and 49% of nurses failed to report the incident.

Among the various practices analyzed causing NSI, venipuncture (42%) and giving injections (26%) were found to be the most common procedure resulting in NSI among interns and nurses, respectively [Figure 2].

Overwork appeared to be the most common cause for NSI among interns (33%) and nurses (36.1%) [Figure 3].

The various sources of information regarding the prevention of NSI [Figure 4] when assessed show that 49% of nurses followed the infection control guidelines, whereas 36% interns relied on their senior colleagues.

### Discussion

The results of the present study highlight the KAPs following NSI in a tertiary care teaching hospital in South Kerala, India.

The study focused on two groups of HCWs who formed the major working group in the hospital. The incidence of NSI in interns was 75.6%. This data correspond with several

reports from India.<sup>[5-7]</sup> This is probably owing to their lack of experience and busy schedules. Moreover, the interns are expected to do routine blood investigations, IV insertion, and suturing procedures in a teaching hospital as ours. This along with the high patient load and long working hours may be the other contributing factors.<sup>[8,9]</sup> In our study, the incidence of NSI in nurses was found to be 24.4%. Studies from India and other countries also reported low frequency of NSI (17.1% to 26.2%) among nurses than doctors.<sup>[10,11]</sup>

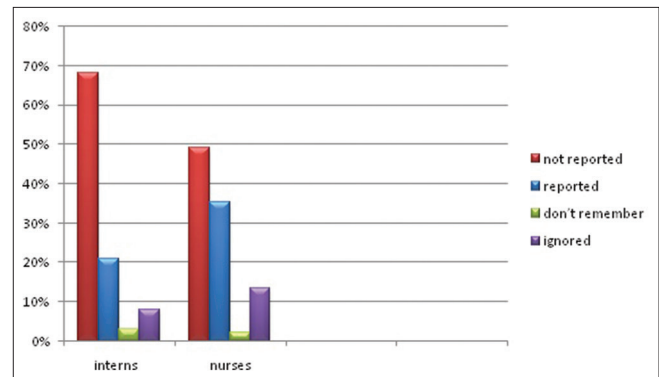
We observed that 53.9% of interns and 46.1% of nurses experienced NSI more than once (*P* value < 0.001). This is quite high when compared to the study conducted by Angadi *et al.* (42%)<sup>[12]</sup> and Fullerton *et al.* (21.9%).<sup>[13]</sup>

We also found that knowledge about universal precautions [Table 1] was higher (57.1%) among interns. This result differed from K. Vaz, D. McGrowder *et al.* in which 90% of nurses were more knowledgeable than other HCWs.<sup>[14]</sup> The knowledge of proper disposal of needles was also significantly low among interns. This may be owing to lack of training on proper biomedical waste management during the orientation or pre-internship classes. Very few interns (38%) knew the correct authority to whom they should report following NSI. These rates are far less (48% doctors and 95.5% nurses) when compared to the study done by Aradhana Bhargava *et al.*<sup>[15]</sup>

**Table 3: Post-exposure prophylaxis (PEP) practices**

PEP	Response given	Intern	Nurses	P value
Rinse with soap and water after NSI	Yes	60 (44.4%)	75 (55.6%)	0.017
	No	40 (61.5%)	25 (38.5%)	
Hepatitis B vaccination taken	Yes	71 (53.8%)	61 (57.4%)	NS
	No	29 (42.6%)	39 (46.2%)	
Checked Anti-HBs titer	Yes	23 (40.4%)	34 (59.6%)	NS
	No	77 (53.8%)	66 (46.2%)	
Screened for viral markers of source and self	Yes	39 (44.3%)	49 (55.7%)	<0.001
	No	61 (54.5%)	51 (45.5%)	

\*NS=not significant



**Figure 1: Reporting status of needle-stick injury among HCWs**

**Table 4: Attitude related to NSI practices**

Attitude parameters	Always		Never		Seldom		Very often	
	I	N	I	N	I	N	I	N
Worried about NSI	45 (47.9%)	49 (52.1%)	8 (27.6%)	21 (72.4%)	28 (59.6%)	19 (40.4%)	19 (63.3%)	11 (36.7%)
More concerned on patient care	12 (28.6%)	30 (71.4%)	64 (65.3%)	34 (34.7%)	21 (50%)	21 (50%)	3 (16.7%)	15 (83.3%)
NSI is preventable	50 (40.7%)	73 (59.3%)	6 (85.7%)	1 (14.3%)	16 (61.5%)	10 (38.5%)	28 (63.6%)	16 (36.4%)
Report NSI immediately	77 (49%)	80 (51%)	5 (71.4%)	2 (23.1%)	10 (76.9%)	3 (23.1%)	8 (34.8%)	15 (65.2%)
NSI is most common event	50 (48.1%)	54 (51.9%)	5 (50%)	5 (50%)	14 (48.3%)	15 (51.7%)	31 (54.4%)	26 (45.6%)
NSI is neglected	24 (51.1%)	23 (48.9%)	14 (41.2%)	20 (58.8%)	17 (39.5%)	26 (60.5%)	45 (59.2%)	31 (40.8%)

\*I=interns, \*N=nurses

**Table 5: Reasons for non-reporting of NSI**

Reasons for non-reporting	Interns	Nurses	P value
Fear of stigma and discrimination	3 (3%)	8 (8.5%)	<0.001
Unaware of reporting	13 (13%)	11 (11.7%)	
Was only a minor injury	30 (30%)	41 (43.6%)	
Too embarrassed to report	0	3 (3.2%)	
Lack of time to report	34 (34%)	16 (17%)	
Not bothered to report	20 (20%)	15 (16%)	

The recapping of needles is an age long tradition that has contributed to be a significant hazard to HCWs in developing countries.<sup>[16]</sup> The most important measure to prevent NSI is never to recap, and our interns were less aware regarding this. It also was observed that a significant proportion of interns (73.8%) still practice recapping [Table 2]. This is in accordance with reports from studies by Afa Zafar<sup>[17]</sup> and V Goel.<sup>[10]</sup> It was seen that only 46.2% of interns and 53.8% nurses wear gloves during phlebotomy and injections. A study conducted in St. Johns Bengaluru shows that 87.3% of interns wear gloves during phlebotomy.<sup>[18]</sup>

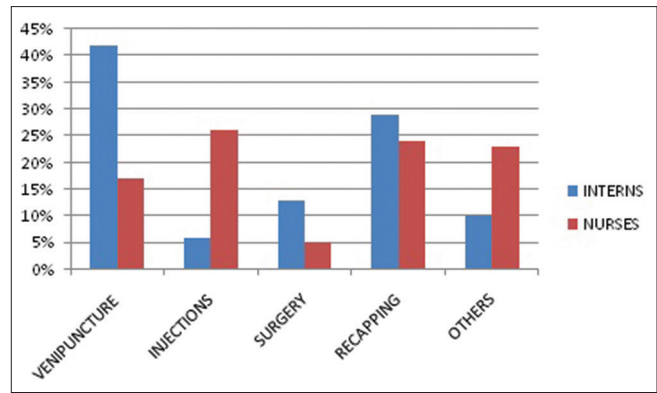
The recapping of needles comes only as the second most common cause for NSI among the study group [Figure 2]. Studies conducted in Delhi and Bengaluru report recapping as the most frequent cause of NSI.<sup>[19]</sup>

The immediate correct PEP practice of washing the wound with soap and water was followed by 44.4% of interns and 55.6% nurses only. These rates are comparatively low when compared to other studies.<sup>[19]</sup> Although a significant proportion of study group [Table 1] had knowledge of the infections transmitted through NSI, it was found that serological status for three major viral markers (HIV, HBV, and HCV) of source and self was not checked in 54.5% and 45.5% of interns and nurses, respectively [Table 3]. The lower vaccination status among HCWs in the study indicates the need for improving the awareness about hepatitis B vaccination. Similar finding was also reported in a study conducted in Tamilnadu.<sup>[20]</sup>

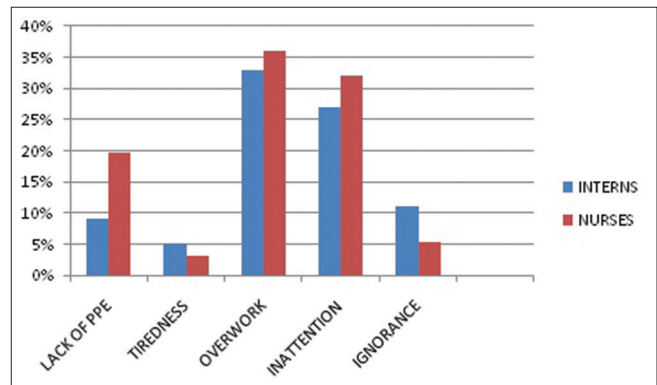
When the reporting status of HCWs was assessed, it was found that almost 49% of nurses did not report NSI [Figure 1] with atleast 13.5% totally ignoring the incident. This statistics of under-reporting is quite high when compared to studies done by Al Jarallah AM<sup>[21]</sup> and Mehdi Jahangiri *etal.*<sup>[19]</sup>

Approximately, 68% interns did not report NSI [Figure 1] and take adequate PEP. This is comparatively higher when compared to that reported by B Gurung<sup>[22]</sup> and Prakash KP.<sup>[23]</sup> This shows poor awareness on post-exposure prophylaxis practices among our study group. In a questionnaire-based study done in Egypt, it was seen that 74.7% HCWs did not report the injury to employee health services, and physicians were less likely to report an NSI as compared to other health-care professionals.<sup>[24]</sup>

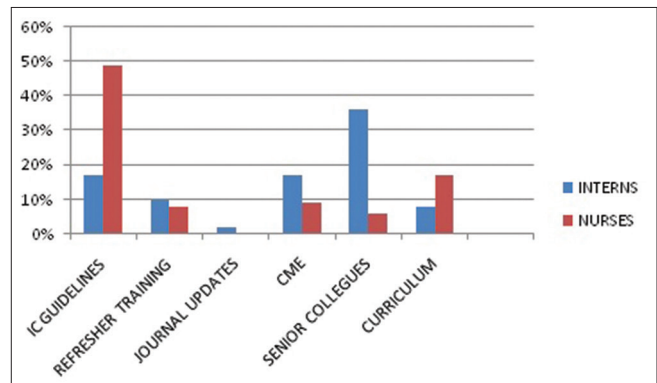
The results obtained after assessing the attitude parameters [Table 4] indicated that most of the HCWs were casual and



**Figure 2: Procedures resulting in NSI**



**Figure 3: Reasons for needle-stick injury**



**Figure 4: Source of information regarding prevention of NSI**

non-serious about the consequences of NSI. When 48.1% interns agreed that NSI is the most common event, and 51.1% totally neglected the incident.

Our being a tertiary referral teaching hospital, the interns do phlebotomy procedures. Their lack of experience and patient overload makes venipuncture (42%) the most common procedure resulting in NSI among them. Procedures such as giving injection (intramuscular, intravenous and subcutaneous) which is the duty of nursing staff makes them more prone to NSI (26%).

In this study, overwork [Figure 3] was significantly associated with occurrence of NSI, which is consistent with other studies.<sup>[25,26]</sup>

This finding confirms the need for keeping adequate working hours to reduce the risk of these injuries and infection with blood-borne pathogens.<sup>[27]</sup> Other important reasons included inattention and lack of PPE.

Infection control guidelines were cited as the most common source of information regarding prevention of NSI among nurses (49%). Information from senior colleagues (36%) and continuing medical education (CME) was the common source of information among interns [Figure 4]. Our study also shows that lack of awareness of infection control (IC) guidelines among interns may be owing to their lack of importance in the teaching curriculum.

When reasons for non-reporting of NSI was analyzed [Table 5], it was found that 34% of interns were too busy to report the incident and 43.6% of nurses thought that it was only a minor injury. Only a minor proportion of respondents reported fear of stigma and discrimination as a cause of non-reporting (11%), whereas this formed the main cause of non-reporting in other studies.<sup>[28]</sup> The KAP regarding NSI and PEP among HCWs is also relevant among the primary care physicians as they provide the bulk of medical services to a good majority of patients. Their job responsibilities include phlebotomy, block anesthesia, IV cannulation, laceration repair, etc., which makes them at risk for NSI. Therefore, this occupational risk is equally applicable to all doctors and nurses who form the most vulnerable group in medical profession.

## Conclusion

NSIs remain a major health hazard even in most of the Indian hospitals especially the ones that deal with high-patient load. To reduce the risks and effects of NSIs among interns, teaching programs for risk reduction should be included in the undergraduate teaching curriculum during the preclinical years that should be reinforced during each clinical posting. Authorities should direct the efforts toward training of HCWs, use of safety engineered devices, and decreasing patient load per HCW as these steps are most likely to benefit the existing situation.

## Limitations

The study was according to the self-reported data that can lead to information bias and social bias. By its nature cross-sectional study cannot establish temporal cause and effect relationships.

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## Conflicts of interest

There are no conflicts of interest.

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