



Original Research Article

## **Knowledge, Beliefs and Practices of Medical Interns Regarding Injection Safety, Standard Precautions and Needle Stick Injuries: A Cross Sectional Study from a Tertiary Care Hospital of Delhi**

Priyanka<sup>1</sup>, Anita Shankar Acharya<sup>2</sup>, Jyoti Khandekar<sup>2</sup>

<sup>1</sup>Assistant Professor, Community Medicine, Subharti Medical College, Meerut.

<sup>2</sup>Professor, Community Medicine, Lady Hardinge Medical College, New Delhi.

Corresponding Author: Priyanka

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### **ABSTRACT**

**Background:** Standard precautions and safe injection practices as defined by WHO should be followed by every health care professional.

**Objectives:** 1. To study the knowledge, attitude and practices of interns regarding injection safety, standard precautions and needle stick injuries. 2. To determine the perceived reasons for not following standard precautions. 3. To study the incidence and pattern of needle stick injuries 4. To determine hepatitis B vaccination status among interns.

**Settings and Design:** This was a cross sectional study which was conducted among interns in one of the premier tertiary care teaching hospital located in New Delhi during the first week of January, 2014.

**Materials and Methods:** All the medical interns (110) who completed their internship training on 31<sup>st</sup> December 2013 were interviewed with semi structured self reporting questionnaire after taking their informed consent.

**Statistical analysis:** Data entry and analysis was done in SPSS version 12 by a single investigator. Descriptive statistics and chi square test were used.

**Results:** Satisfactory knowledge about WHO criteria for safe injection, complications of unsafe injections and steps for prevention of NSIs was found in 10%, 51.8% and 66.4% interns respectively. Almost half of them (50.8%) always washed hands and almost all (99.1%) always used gloves before giving injections. 87.3% never recapped needles. All the interns were vaccinated against hepatitis B. Incidence of NSIs was found to be 13.6%, satisfactory action immediately after the injury was taken in 88.9% cases. 19.4% interns reported the incidence. The mean time between injury and reporting was 53 minutes.

**Key words:** injection safety, standard precautions, needle stick injuries, interns, knowledge, attitude, practices.

### **INTRODUCTION**

Safe Injection Practices are a set of recommendations within Standard Precautions, which are the foundation for preventing transmission of infections during

patient care in all healthcare settings. [1] As defined by the World Health Organization, a safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste

that is dangerous for the community. Unsafe injection practices put patients and healthcare providers at risk of infectious and non-infectious adverse events and have been associated with a wide variety of procedures and settings. This harm is preventable. [2]

Standard precautions are basic level of infection control precautions which are meant to reduce the transmission of bloodborne and other pathogens and these should be followed by every health care professional. Health care workers are at risk of getting blood borne infections like hepatitis B, hepatitis C and HIV, the most common route of transmission being accidental injury by contaminated needles. [3] Thus, Needle stick injuries represent an important occupational health hazard for all health care workers.

Medical interns are at increased risk of getting needle stick injuries because they are actively involved in patient care activities and they don't have enough of experience as they are at very early stage of their professional career. They should be aware about safe injection practices and standard precautions as they form an important aspect of their occupational health. Their knowledge and practices regarding this aspect is important because correct awareness and healthy practices at their initial stage of career building will go a long way in their professional life.

Keeping all these points in mind, this was planned and conducted with the following objectives:

1. To study the knowledge, attitude and practices of interns regarding injection safety, standard precautions and needle stick injuries.
2. To determine the perceived reasons for not following standard precautions.
3. To study the incidence and pattern of needle stick injuries among medical interns.

4. To determine the status of hepatitis B vaccination among interns.

## **MATERIALS AND METHODS**

**Study design:** This was a cross sectional study which was conducted among medical interns in the first week of January, 2014.

### **Settings:**

The study was conducted in one of the premier tertiary care teaching hospital located in New Delhi. All the medical interns (110) who completed their internship training on 31<sup>st</sup> December 2013 were enrolled in the study in the first week of January 2014.

### **Study instrument:**

The study was carried out with the help of an anonymous, semi structured self reporting questionnaire which was pre tested on a group of interns currently doing their internship who were not a part of the study group. The study tool had questions about their knowledge about safe injection practices, diseases transmitted by unsafe injections, steps for prevention of needle stick injuries. Their practices regarding standard precautions and needle stick injuries were also assessed. Those with history of needle stick injuries were also asked about their response to the injury.

In our study, case definition of needle stick injury included any injury cause by a hollow bore needle which is the type of needle used for giving injections, putting IV line or drawing blood sample. The episodes of needle stick injuries were the number of needle stick injuries that were experienced by the interns.

The interns were informed about the purpose of study and their consent to participate was taken. The questionnaire was distributed to them and they filled it themselves in the presence of investigators.

Data entry and analysis was done in SPSS version 12 by a single investigator.

Descriptive statistics were used and chi square test was applied wherever applicable.

## RESULTS

**Table 1: Knowledge of interns regarding safe injection practices. (n=110)**

Satisfactory knowledge about	N	Percentage
WHO criteria for safe injections	11	10
Complications due to unsafe injections	57	51.8
Diseases transmitted by unsafe injections	110	100
Steps for prevention of needle stick injuries	73	66.4

Table 1 shows that only a small proportion (10%) of interns had satisfactory

**Table 2: Practices of interns regarding standard precautions. (n=110)**

Practices regarding:	Always N(%)	Most of times N(%)	Occasionally N(%)	Never N(%)
Washing hands	56 (50.9%)	38 (34.5%)	13 (11.8%)	3 (2.6%)
Wearing gloves	109 (99.1%)	1 (0.9%)	0	0
Recapping needles	0	1 (0.9%)	13 (11.8%)	96 (87.3%)

Table 2 shows that 56 (50.9%) interns always washed their hands before giving injections, while 38 (34.5%) did it most of the times, 13 (11.8%) did it occasionally and 3 (2.6%) never washed their hands before giving injections. The reasons for not always washing hands were heavy patient load and lack of time (79.6%), non availability of soap (14.8%), non availability of water (9.2%), not feeling it necessary to wash hands because they cleaned them with spirit or sanitizer (7.4%) or wore gloves (7.4%). 3 interns did not wash hands because they felt lazy to do so. Majority of them (99.1%) always wore gloves before giving injections while 0.9% did it most of the times. The reason for not using gloves regularly was stated as heavy patient load and lack of time to change gloves for every patient. Most of the interns (87.3%) never recapped needle after giving injections, 13 (11.8%) did it occasionally and 1 (0.9%) did it most of times. The reasons for recapping needles were, heavy patient load and lack of time to destroy needle (35.7%), non availability of needle destroyer (35.7%). 14.3% interns recapped needles because needle destroyer and

knowledge about the WHO criteria about safe injections, 51.8% had satisfactory knowledge about complications due to unsafe injections and majority of them (99.9%) knew satisfactorily about diseases which can be contracted by unsafe injections namely HIV, Hepatitis B and Hepatitis C. Almost two third interns (66.4%) had satisfactory knowledge about steps for prevention of needle stick injuries.

puncture proof container were placed at a distance from the site of giving injection. Surprisingly, 2 interns preferred recapping needles because they thought it would prevent them from needle stick injuries.

**Table 3: Knowledge of interns regarding safe disposal of injection related waste. (n=110)**

Correct Knowledge about disposal of *	N	Percentage
Needle	84	76.4
Gloves	102	92.7
Cotton swab	105	95.5
Broken ampoule	84	76.4
Syringe Wrapper	110	100

\*Multiple options were allowed

Table 3 shows that all the interns had correct knowledge about colour coded bag for disposal of syringe wrapper, while 95.5% and 92.7% had correct knowledge about colour coded bags for disposal of cotton swab and gloves respectively. Almost three fourth (76.4%) had correct knowledge about the same for needles and broken ampoules.

### Hepatitis B Vaccination Status

All the interns were vaccinated against hepatitis B, out of which 107(97.3%) were fully vaccinated while 3 (2.7%) were partially vaccinated. Out of these 3 interns, 2

were yet to complete their vaccination schedule while one had discontinued the schedule because she had forgotten to take booster dose.

### **Incidence and Response to Needle Stick Injuries**

Out of 110 interns, 15 had a history of needle stick injury in the last one year thereby making an incidence of 13.6%. 3 interns had suffered NSI twice while rest 12 suffered it once during the period of their internship. Hence there were 18 episodes of NSIs in the last one year. Out of these 18 episodes, satisfactory action immediately after the injury was taken in 16(88.9%) cases. Most of the injuries occurred while working in Medicine Department (44.4%) followed by Obstetrics and Gynaecology (44.4%), Surgery (16.7%), Orthopaedics (5.6%), Paediatrics (5.6%) and Psychiatry

(5.6%). Most of the injuries occurred while drawing patients' blood sample (61.1%), putting canula (16.7%) and destroying needle (11.1%). One episode of NSI occurred each when the interns were assisting in lumbar puncture and recapping needle. The incidence of needle stick injury was reported to authorities in 19.4% cases. All interns reported the incidence to the correct authority. One intern didn't report because the serology report of the patient was negative. The mean time between injury and reporting was 53 minutes. 94.1% interns reported the incidence within 2 hours. Out of those who reported, 11 (64.7%) were prescribed treatment, out of whom, only 4 (36.4%) completed the treatment. The reason for non completion of treatment was negative report of patient's serology.

**Table 4: Distribution of interns according to their knowledge regarding safe injection practices and history of needle stick injuries**

Knowledge regarding	H/O Needle stick injury		Chi Square	P value
WHO criteria for safe injections	Yes	No		
Satisfactory	01	10	0.214	0.643*
Not satisfactory	14	85		
Steps for prevention of needle stick injuries				
Satisfactory	04	69	12.261	0.000**
Not satisfactory	11	26		

\*Not significant

\*\*Highly significant

Table 4 shows the distribution of interns according to their knowledge regarding safe injection practices and history of NSI. The association between knowledge about steps for prevention of NSI and history of NSI was found to be statistically highly significant by applying chi square test ( $p < 0.001$ ) which means that history of NSI was less common in those having satisfactory knowledge about steps for prevention of NSIs. However, no significant association was found between knowledge regarding WHO criteria for safe injections and history of NSI.

### **DISCUSSION**

This study showed that the knowledge, attitude and practices of medical interns regarding injection safety, standard precautions and needle stick injuries were found to be unsatisfactory. The interns were at high risk of exposing themselves to needle stick injuries. Their knowledge regarding WHO criteria for safe injections was very poor. The knowledge was considered satisfactory if they could tell at least two out of the three WHO criteria for safe injections i.e. safety for recipient, safety for provider and safety for community. Our study shows only 10% interns had satisfactory knowledge regarding this. Our results are poor as compared to another

study which shows 22.8% awareness about these criteria. [4]

The knowledge regarding complications of unsafe injection was considered satisfactory if they could tell at least two most common complications i.e. transmission of infections and local injury or reaction. This knowledge was found to be satisfactory in only almost half of the respondents (51.8%).

Almost two third interns (66.4%) had satisfactory knowledge about the steps for prevention of needle stick injuries. Never recapping the needle and never trying to touch or bend needle after use are most important steps for prevention of needle stick injuries and the knowledge was considered satisfactory if they could tell at least these two measures. In a study conducted on medical interns in Kolkata, 83% were aware that needle should not be recapped or bent after use while knowledge regarding the same was 71% as reported by Maqbool Alam from Saudi Arabia. [5,6] Thus, interns in our study had lower levels of awareness regarding prevention of needle stick injuries which should be taken care of.

We also studied the practices of interns regarding standard precautions. Almost half of the interns (50.9%) always washed their hands before giving injections while 2.6% interns never did so. Washing hands is an important standard precaution which is most commonly forgotten. The most common reason for not always washing hands was heavy patient load and lack of time (79.6%). This shows that interns have not realized the importance of hand washing. They should be educated regarding this and it should be emphasized that using sanitizer or wearing gloves cannot act as a substitute for hand washing. Also, administrative issues should be taken care of and soap and water should be made available at all health care settings.

Majority of interns (99.1%) always wore gloves before giving injections while 0.9% did it most of the times. The reason for not using gloves regularly was stated as heavy patient load and lack of time to change gloves for every patient. Most of the interns (87.3%) never recapped needle after giving injections, 13 (11.8%) did it occasionally and 1 (0.9%) did it most of times. Heavy patient load and lack of time to destroy needles was cited as an important reason for recapping needles. There is an urgent need to change attitude of interns and make them realize the importance of observing standard precautions. They should also be educated that recapping does not protect them from needle stick injuries but can lead to increased chances of it. Hospital administration should be motivated to provide needle destroyer at the site of giving injections to address the availability issues. We did not find any respondent who never washed her hands or always recapped needles after use. Thus, our results are much better than other similar studies. A study from Kathmandu shows that 23% health care workers always wore gloves while 16% never wore them before giving injections [7] while in another study, 27% respondents always wore gloves before giving injections and 69% did so occasionally. [6] A study from Nigeria shows that 41.3% doctors always recapped needles, 30.4% occasionally did so and 28.3% never recapped [8] while a similar study done in Iran shows that 46% interns always recapped needles, almost two thirds did it occasionally and 4.3% never did it, only 6% interns always used gloves while 15% never used them before giving IV injections or handling blood samples. [9] Another study done in a tertiary care hospital of Delhi reports that two thirds of health care workers recapped needles after use [10] and in a study from Kolkata, 37.6% medical interns were not using gloves regularly and one third of

them reported recapping of needles. [5] Other authors have reported the reasons for not following universal precautions as lack of availability of materials (42.1%), lack of time (28.9%) and laziness by interns (13.2%). [11]

We assessed the knowledge of interns regarding biomedical waste disposal. Table 3 shows that all the interns had correct knowledge about colour coded bag for disposal of syringe wrapper, while 95.5% and 92.7% had correct knowledge about colour coded bags for disposal of cotton swab and gloves respectively. The level of awareness found in our study is better as compared to some other studies. Mukharjee et al have reported that only half (49.1%) interns had the correct knowledge about disposal of sharps. [5] In another study, only 17.6% respondents used puncture proof containers for disposing sharps [9] while 42.5% of interns were not aware of the correct method of disposal of needles and syringes in a study done in Raichur. [12]

Hepatitis B vaccination status was not satisfactory even after completing their one year of internship. This shows that interns have not taken hepatitis B vaccination seriously in spite of being advised regularly. Medical interns are at high risk of acquiring hepatitis B infection as they deal with infected patients and also are not experienced enough. Hence they should be educated and motivated to get themselves immunized against hepatitis B which is a deadly preventable disease. The vaccination status found in our study is much higher than other studies which show 60% to 90% immunization against hepatitis B. [6,7,9,13]

15 interns had a history of needle stick injury in the last one year out of which 3 interns had suffered NSI twice while rest 12 suffered it once during the period of their internship thereby amounting to 18 episodes of NSIs. Thus the incidence of needle stick

injuries comes out to be 13.6% in the last one year. This is almost the same as found in a study on medical students (14.1%) [13] and another study on medical interns (15.9%). [14] However, a study from Pakistan reports a higher incidence of NSIs (26.1%) out of which only 29.7% respondents reported it. [15]

Out of these 18 episodes, satisfactory action immediately after the injury was taken only in 16(88.9%) cases. Action was considered satisfactory if they immediately washed the wound with soap water and immediately reported the incidence to concerned authority for post exposure prophylaxis. A study conducted in a tertiary care hospital in Delhi shows that only 6.3% respondents took satisfactory action after NSI. [16]

Drawing patients' blood sample was the most common procedure during which needle stick injury occurred followed by putting IV canula, destroying needle and recapping needle. A study from Iran shows that 26.2% cases of NSIs occurred while taking blood samples while 15.4% occurred while recapping of needles. [17] In a study done in Jordan, 22.6% cases of needle stick injuries occurred during drawing blood samples, 11.3% during placing intravenous lines, 11% during recapping the needle, 10.5% during needle disposal. [18] Other authors have reported the proportion of NSIs because of recapping from 8.5% to as high as 34%. [14,16,19,20] Thus majority of NSIs occur when standard precautions are not followed. Proper training and re orientation of interns regarding this aspect is thus required.

19.4% interns with history of NSI reported to authorities. All interns who reported the incidence were aware of the correct authority to whom it should be reported. One intern didn't report because the serology report of the patient was negative. 94.1% interns reported the

incidence within 2 hours which is important as post exposure prophylaxis has to be started within 2 hours. The mean time between injury and reporting was 53 minutes. Thus the proportion of interns reporting the injury is quite small in our study. However, various other studies have shown this proportion from 7% to 51.4%. [6,7,15,16,21]

Out of those who reported, 11 (64.7%) were prescribed treatment, out of whom, only 36.4% completed the treatment. This shows a casual attitude of interns towards post exposure prophylaxis.

The main limitation of our study was the use of self administered questionnaire. The practices of interns were self reported and not directly observed. Their compliance for standard precautions might have been over reported thereby producing a more favorable picture than the real one.

## CONCLUSIONS AND RECOMMENDATIONS

It can be concluded from the results of our study that the knowledge, attitude and practices of medical interns regarding safe injections, standard precautions and needle stick injuries were not satisfactory. They were exposing themselves to the risk of occupational health hazards. There should be re orientation training of all interns about this aspect and it should be periodically re-enforced. The senior hospital staff should more rigorously supervise their practices and try to modify their hazardous behavior. All the reported cases of needle stick injuries should be followed for proper management and compliance. Provision of safety devices and other material for observing standard precautions should be ensured.

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