

# NEEDLE STICK INJURIES IN NURSES AT A TERTIARY HEALTH CARE FACILITY

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## ABSTRACT

**Objective:** This study was aimed to assess the frequency and factors associated with Needle Stick Injuries (NSI) in nurses of a tertiary health care facility.

**Methodology:** This cross-sectional descriptive study was conducted in Combined Military Hospital Lahore in June-July 2012. Responses were obtained via a self-administered questionnaire with close-ended questions about the knowledge of the nurses regarding hazards of NSI, their frequency, and methods they practice to prevent them. The data was analyzed using SPSS-16. Chi-square test was applied and p-value was fixed at 0.05 to be statistically significant.

**Results:** Out of 118 nurses who participated, all were aware of the occupational hazards of their profession when they joined nursing. Sixty Five (55%) got NSI and 38(58%) of those were injured at the time of recapping the syringe. Sixty Nine (58.5%) did not use gloves while administering injections. After getting stuck by a contaminated needle, 100% squeezed out the blood from the area and 45(69%) out of 65 nurses cleaned the wound with a spirit swab. Only 13(20%) out of 65 consulted a physician regarding safety measures after NSI and 35(53%) had screening for Hepatitis-B Virus (HBV). Seventy Eight (66%) of the total 118 nurses were immunized against HBV.

**Conclusion:** Needle-stick injuries are highly prevalent among nurses, and prevention is the most effective way to protect nurses from infectious diseases which these injuries can transmit. Mandatory reporting to the concerned authorities, proper follow up, screening of nurses after NSI and promotion of safety measures against it should be greatly encouraged.

**Key Words:** Needle-stick injuries (NSIs), Nurses, Pakistan.

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## INTRODUCTION

Needle-stick injury is caused by needles that accidentally puncture the skin, introducing blood or other potentially hazardous material in the body of

healthcare workers, during their duties. It can be a hollow-bore needle or sharp instruments, like needles, lancets and contaminated broken glass. According to a local study conducted at Ghurki Teaching Hospital, it is the most important occupational health hazard in nurses with alarmingly high rates. It is therefore important to plan and implement strategies for spreading awareness regarding risks associated, as only 33(42%) out of 77 are aware of the occupational hazards when they join nursing<sup>1</sup>.

Needle-stick injury is the top health and safety concern of nurses worldwide, after stress<sup>2</sup>. Nurses have the highest rate of needle-stick injury among healthcare workers due to their maximum exposure to the needles and other sharp instruments<sup>3</sup>. According to the policy of the NHS in the UK, it is compulsory when staff sustain a needle-stick injury to report the incident<sup>4</sup>. In a study conducted at Shiraz University of Medical Sciences Iran, 71.1% sustained needle-stick injury and 82% of them failed

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to report<sup>5</sup>. In Pakistan the reported incidence of needle-stick injuries is 0.29% in consultants, 24.5% in trainees, 44.7% in house officers and 16.3% in nurses<sup>6</sup>. Occupational exposures to percutaneous injuries are a substantial source of infections with blood borne pathogens among healthcare workers. There are more than 20 blood-borne pathogens that can be transmitted from contaminated needles or sharps, including hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV)<sup>7</sup>. In the UK, a small but significant number of health care workers have developed potentially life-threatening diseases. Since the late 1990s, 11 health staff have contracted hepatitis C from needle jabs and five HIV transmissions have also been confirmed<sup>8</sup>. The risk of transmission of HIV following a hollow needle injury is approximately 0.3%, compared with 3% for HCV and 30% for HBV<sup>8</sup>, with annual transmission of 66,000 infections with HBV, 16,000 with HCV, and 1,000 with HIV worldwide. In a study conducted at Jinnah postgraduate medical center Karachi, there was serological evidence of hepatitis HBV virus and/or HCV infections in 31% of the studied population. Four percent were reactive for HCV infection, 7.5% for HBs Ag infection and 25.43% for anti-HBc (total); none was HIV positive<sup>9</sup>. Other five studies also documented the transmission of hepatitis C to healthcare workers. Two were from Japan and one each from the United States, Spain and Kuwait. One additional study was from Taiwan. In all there were 329 exposed persons, and the overall transmission rate was 4.3%<sup>10,11</sup>. More than 80% of the needle-stick injuries can be prevented through the use of safety devices and effective safety programs. A large number of injuries by contaminated sharp devices can be prevented by implementing suitable educational programs regarding disposal of sharp devices, and by using safe needle devices.

An online survey conducted by the American Nurses Association, 88% of nurses considered occupational hazards when deciding whether to continue their employment and/or whether to choose new employment settings<sup>12</sup>. The objective of this study was to estimate the frequency of needle-stick injuries in nurses and to assess the safety measures taken by them for prevention of disease transmission in our setup.

## METHODOLOGY

From May to July 2012, a cross sectional survey was conducted among female nurses working at Combined Military Hospital Lahore. A total of 118 female nurses who were working in the hospital at that time (June-July 2012) participated in this study. Informed consent was taken and only female nurses were included in the study, excluding the rest

of the paramedical staff. A pre tested self-administered questionnaire with close-ended questions was administered, which requested information on age, education, serving years, frequency of needle-stick injuries and measures adopted after this injury. The data was analyzed using SPSS-16. Results were given in the form of descriptive statistics and charts. Chi-square test was applied as the test of significance and *p*-value was fixed at 0.05 to be statistically significant.

## RESULTS

A total of 118 nurses participated in this study with a response rate of 100%. This survey was based on a self-administered questionnaire which was filled anonymously. Majority of the nurses, 51 (43%) belonged to age group 18-25 years, followed by 26-35 years age group which had 34 (28%), and 27 nurses (22%) were in age group 36-45 years. Only 6 (5%) belonged to age group of 46-55 years.

Their educational status was asked, there were 20 (17%) nurses that received Bachelor's degree, 6 (5%) had done their Masters qualification. One of them (0.8%) had done M.Phil (Figure 1).

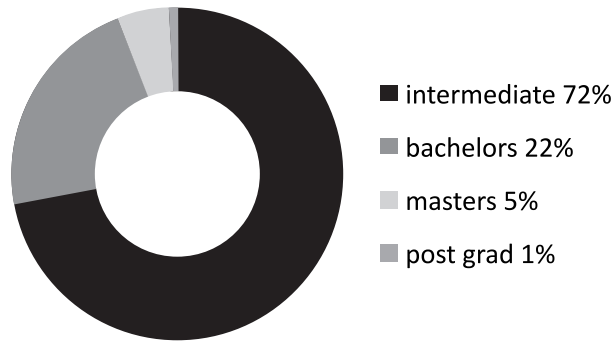
Out of 118 nurses, 65 (55%) got needle-stick injury and 38 (58%) reported it at time of recapping the syringe (Figure 2). Thirteen (20%) of them consulted a physician whereas 52 (80%) of them took self-treatment like squeezing out the blood from the site and cleaning the wound site with spirit swab.

Regarding knowledge about hazards, only 5 (4%) named Hepatitis B alone, 21 (18%) named Hepatitis B and C, and 92 (78%) knew about HIV infection. Regarding protective measures, only 49 (41.5%) of the participants used to wear gloves and 69 (58.5%) did not wear gloves while injecting the patient. It was noted that 63(53%) have screened themselves for Hepatitis B, 63 (53%) for Hepatitis C and only 3 (2%) have got screening for HIV. During our research when we asked about the safety measures taken by these nurses after needle-stick injury, it was noted that 100% squeezed out the blood, and afterwards 12 (18%) of the nurses washed the specific area after needle-stick injury and 69% nurses cleaned the area with a spirit swab.

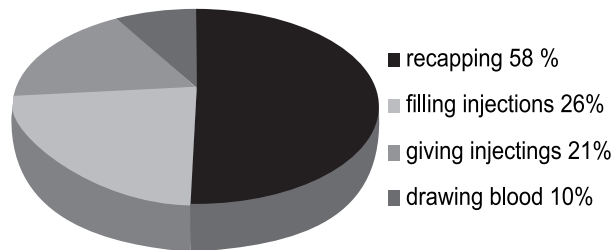
It is important to note that 53% of the nurses went for screening after a needle-stick injury, out of which 2 (5%) were diagnosed to have Hepatitis C and 47% did not go for further investigation as shown in Table 1.

When these nurses were inquired about their vaccination status, it was noted that only 78 (66%) of the

**Figure 1: Educational status**



**Figure 2: Frequency of NSIs occurring during:**



**Table 1: Safety measures taken after a needle-stick injury by the respondent nurses**

Safety measures taken after NSI	Frequency of respondents who took them	Frequency of respondents who took them	Frequency of respondents who did not take them	Percentage or respondents who did not take them
None	2	3		
Washing with saline	12	18	53	81
Cleaning with spirit swab	45	69	20	30.7
Using plaster bandage	0	0	65	100
Squeezing out the blood	65	100	0	0

**Table 2: Comparison of our results with NSI frequency of HCW in neighboring countries**

Country Study	Population	Number of participants	% with NSI
India <sup>13</sup>	HCW	79	53%
India <sup>14</sup>	HCW	266	63%
India <sup>15</sup>	Internist	238	37.4%
Iran <sup>16</sup>	Nurses	180	63.3%
Iran <sup>17</sup>	Anaesthesia personnel	203	31.7%
Our study	Nurses	118	55%

**Table 3: Cross-tabulation of needle stick injury with socio-demographic profile**

Socio-demographic profile	Needle-stick injury			X2
	Yes	No	Total	
Age group				X2= 4.12 Df=3 p= 0.24
18 – 25	32	19	51	
26 – 35	14	20	34	
36 – 45	16	11	27	
46 – 55	03	03	06	
Total	65	53	118	
Education	Yes	No	Total	X2= 2.62 Df=3 p=0.45
Intermediate	49	36	85	
Bachelors	14	12	26	
Masters	02	04	06	
Post graduate	00	01	01	
Total	65	53	118	
Years of service	Yes	No	Total	X2=3.64 Df=2 p=0.162
01 – 10	37	28	65	
11 – 20	17	22	40	
21 – 30	10	4	13	
Total	65	57	118	

nurses were vaccinated against HBV, 24 (20%) were partially vaccinated against HBV and 18 (15.2%) were not vaccinated at all.

A comparison of frequencies of NSIs in our research, with studies conducted in other countries is shown in table 2.

Table 3 shows cross-tabulation of NSI with socio-demographic profile with chi-square value and degree of freedom.

## DISCUSSION

Needle-stick injuries are a hazard for people who work with hypodermic syringes and other needle equipment and place healthcare workers at a high risk of infections. In USA, the annual rates of occupational blood exposure were highest for nurses and midwives (6.5 per 100 compared to 3.5 of overall), and nurses tend to be exposed 4.27 times more often than physicians<sup>18</sup>. The majority of needle-stick injuries (NSIs) are by injections during blood sampling, recapping and disposing needles and also handling trash. Factors that increased risks of transmission of HIV, include a deep wound, visible blood on the device, a hollow-bore blood-filled needle, use of the device to access an artery or vein, and high-viral-load status of the patient.<sup>19, 20</sup>. Our study has shown

that the maximum number of needle-stick injuries occur at the time of recapping the syringe; followed by injuries during filling the injection, while giving injection to the patient; and while drawing of blood. These results are in contrast to a study carried out at Aga Khan Hospital, Pakistan which reported that more than half of the injuries (52.8%) occurred while drawing the blood samples or injecting the medicine<sup>21</sup>.

Under reporting of NSI is also a major problem. In our study, the needle stuck injuries reported to higher officials has been improved as compared to documented rate of 7% in other reports published earlier by Alam<sup>22</sup>, however, it is still far below to that reported by Manzoor (49.4%)<sup>1</sup>.

About awareness towards NSIs, 4% knew that only HBV could be transmitted via contaminated needles while 18% knew about both HBV and HCV and 78% were aware that HIV could also be transmitted through infected needles. Our results shows that awareness is much better than those shown by Manzoor<sup>1</sup> but in the KAP study at Aga Khan Hospital, Karachi the overall knowledge of participants regarding the potential transmission of Hepatitis B, C and HIV was high<sup>21</sup>. In present study, 58.5% nurses failed to use gloves while injecting which shows an improved practice than from previous study done

by Manzoor<sup>1</sup>, but comparably high to Canadian rates where failure to wear gloves by nurses constituted only 17%<sup>23</sup>. The results of our study has revealed that after getting stuck by a contaminated needle 100% of the nurses first squeeze out the blood. 69% of the nurses cleaned the wound with a spirit swab, 18% washed the area with soap and water and 3% did not take any safety measures. In another study it is shown that needle-stick injuries occurred during all work shifts and all the nurses self-treat and self-medicated their wounds while a small minority consulted the physicians<sup>24</sup>.

This study revealed that 53% of the needle stuck nurses went for HBV screening, while 53% for HCV and 2% for HIV showing an alarmingly low number of nurses going for screening than from study conducted at Ghurki Teaching Trust Hospital<sup>1</sup>. Following an injury, 28% of the nurses did not go for screening at all. The risk of infection transmission from infected persons to non-immune persons through an injury with a sharp instrument has been estimated to be between 6% to 30% for HBV, between 5% to 10% for HCV, and 0.3% for HIV<sup>17</sup>. 66% of our subjects had been vaccinated against HBV while 34% were still un-vaccinated and prone to get infected. It is estimated that the prevalence of Hepatitis B in our population is 3–4% and Hepatitis C is 6%. This means that a considerable number of Health Care Workers are at potential risk of infections with blood-borne pathogens after a needle-stick injury.

When socio-demographic data of the participants was cross tabulated with the frequency of NSIs and chi squared test was done, the p-value for all the parameters (i.e. age, educational status and years of service) came out to be >0.05 according to which we failed to reject our null hypothesis showing that there is no significant relation between these parameters and frequency of NSIs.

Thus needle-stick injuries and the associated biological hazards, are one of the most important problems in the health care workers. The small sample size and only one setting of a hospital are the main limitations of this study. Therefore, more studies should be conducted to assess the frequency of NSIs and to identify the risk factors. Given the serious and even fatal consequences of sharp injuries and limited effectiveness of the post exposure therapies, it is crucial that measures to prevent sharps injuries be adopted. At the Clinical Centre at the National Institutes of Health in Bethesda an intensive training programme began in late 1987, with initial training efforts continuing for about a year, involving the use of universal precautions while dealing with the body fluids<sup>25</sup>. Therefore, it is high time to introduce

disposable syringes and other safety devices as their use in the developed world has reduced the number of Needle-Stick Injuries significantly.

Our survey shows that a lot of steps are to be taken in order to reduce the chances of NSIs among our nurses. As NSIs, due to needle recapping were most frequently noted in this study, educating the nurses regarding ways to prevent NSI that is complying with standard universal precautions, discouraging needle recapping and proper disposal of sharps seem most important preventive steps. Improving hepatitis B vaccination is also of great importance in this regard.

## CONCLUSION

On the basis of our study, we came to the conclusion that NSIs are highly frequent among nurses despite the fact that most of them are aware of the hazards and risks of NSIs.

## RECOMMENDATIONS

Nurses should be aware of their occupational health hazards through career counseling. To reduce NSIs, effective planning may include training of nurses regarding proper use and disposal of sharps, precautions, screening programmes, reporting of NSIs and safety measures afterwards. Infection control centre should be established. Reporting to the concerned authorities must be encouraged for accurate estimation of the situation. It should be mandatory for all nurses to get immune-prophylaxis against Hepatitis B before entering into clinical setting. Needle-stick injuries can be prevented by applying “Universal precautions” as a safety measure in all hospitals.

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#### CONTRIBUTORS

AK conceived the idea, planned and wrote the manuscript of the study. HF, MDS, TA and TQ helped in the data acquisition and write up of the manuscript. All the authors contributed significantly to the research that resulted in the submitted manuscript.