

## The Prevalence of Needle sticks injuries among health care workers at a hospital in Tehran

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### ABSTRACT

Needle stick injuries (NSIs) are one of the most significant and preventable hazards in relation to Healthcare workers (HCWs). Such injuries have been shown to be of high prevalence within developing countries. To determine the prevalence and circumstances pertaining to the occurrence of NSIs among HCWs employed at a special hospital. The study conducted was a cross-sectional study on HCWs and was carried out in one of Tehran's special hospitals in the year 2012. In this study, in order to identify and determine hazardous potential due to needle stick, HFMEA method was chosen. This resulted in the collection of 240 valid and reliable questionnaires. The validity and reliable nature of the questionnaires was confirmed by experts and by means of the test re-test method. The gathered data was analyzed with SPSS software, version 16. From the analysis of the data it was shown that, a total of 97 (40.42%) HCWs had suffered NSIs in the last year. The patient ward showed the highest prevalence of NSIs (47.42%) in the hospital. Nurses had the highest risk of suffering NSIs (56.7%) in comparison with the other occupational groups. All in all 175 NSIs occurred for the 240 HCWs trialed during the selected period of clinical practice. Of those that received injuries, only roughly 1 in 3 (38.14%) reported it to their infection control officer. Just over a quarter (26.80%) of the injured HCWs used post exposure prophylaxis (PEP) against HIV. Almost all (88.75%) of the HCWs had received a safe injection course. In general, NSIs and their subsequent underreporting are commonplace among hospital healthcare professionals. Significantly, more than two-thirds of the injured HCWs did not use post-exposure prophylaxis (PEP) against HIV. Improved prevention and reporting strategies are needed if the occupational health and safety of healthcare workers is to improve.

**Key words:** Injury, Needle stick, Healthcare workers (HCWs), Hospital

### INTRODUCTION

Needle stick injuries (NSIs) are common work-related injuries among health care workers and due to their high risk factors are of significant concern [1]. Data from the WHO and others sources show on average that four NSIs occur per worker each year within Eastern Mediterranean and Asian populations [2]. The 35 million people worldwide that make up the health care workforce, represents in all 12% of the working population [3].

The transmission of infections from an infected patient to a HCW via NSIs include: Hepatitis B (3-10%), Hepatitis C (3%) and HIV (0.3%) [4]. The main factors that increase the transmission risk of infections include deep wounds, visible blood on devices, hollow-bore blood- filled needles, the use of a device to access arteries or veins, and the high

viral load status of patients [5,6]. In developing countries where resources are lacking, the number of injuries is greater (3.7 injuries per person/year) [7]. EMR submitted via the WHO reporting the incidence of NSIs showed an occurrence of around 50% for all HCWs in 2002 [8]. The NSIs were shown not only to be a major risk of infection transmission to HCWs but in addition resulted in a minimum of 6 months of stress to HCWs and their families while they waited to get the all clear [9].

Despite the high occurrence of NSIs, numerous preventive methods are available in order to decrease the manifestation of this problem. To begin with, occupational exposures must be accurately determined and then in accordance with it, practical preventive control methods should be applied. In this way related risk factors can also be

identified to help prioritize and better focus on the problem in hand. This assessment is one of the strengths of current study along with it is a novelty for a developing country. The aim of this study was to determine the prevalence and circumstances relating to NSIs among HCWs in a special hospital in Tehran, Iran.

## MATERIAL AND METHODS

The present study is a cross-sectional study that focuses on determining the frequency of NSIs, their characteristics and before/after measures relating to the injuries acquired at the investigated hospital. In this study, in order to identify and determine hazardous potential due to needle stick, HFMEA method was chosen. Research process with five steps, including the method of preparation, the team describes the process of risk analysis and implement corrective actions were implemented (9).

Selected hospital, with 345 teaching staff and medical personnel, expertise more than 40 years, has been studied. In addition, using statistical analysis the associated risk factors were also determined. Upon analysis, 335 Hospital staff with the likelihood of exposure to needle stick injuries and thus having the required inclusion criteria was studied. In all 240 questionnaires were collected. The collected questionnaires were a self-administered consideration relating to studies that had been accommodated to a national situation. The dissemination and collection of the questionnaires were done manually. In order to increase the participation of employees, two weeks prior to study, several posters were installed on the boards and walls of the hospital building. The internal consistency of the questionnaire was calculated on a total of 19 subjects that were similar to the original ones. The overall reliability coefficient for the questionnaire used in the experiment was 0.895. Eight experts from among the academic staff confirmed the validity of the test. The content validity ratio (CVR) and content validity index (CVI) was calculated for questionnaire. Identical figures of 0.90 and 0.75 in

terms of CVI and CVR values were achieved upon analysis of the questionnaire, respectively.

The questionnaire was made up of four parts and contained questions relating to: demographic data, pre-exposure, time of exposure and post exposure. In this study, descriptive statistics including the mean and percentage were used, in addition to statistical analysis. The calculations were performed using SPSS software version 16.

## RESULTS

A total of 240 (71.64%) HCWs completed the questionnaire. The form was in the main completed by females (74.58%) and the majority of them (67.92%) of had graduated with a BSc degree. Just over half of the HCWs studied were nurses (53.33%) and slightly over a quarter (27.92%) of the HCWs had worked less than one year in the profession. The main body of HCWs 159 (66.25%) and those injured 68 (42.77%) belonged to the less than 30 age group. The internal part of the index finger of the right hand was the most injured part of the body with 88 (90.72 %) cases recorded (Table1).

The results (Table 2) showed that 97 (40.42%) of the NSI injuries occurred in the last year. Most of NSIs 38 (42.42%) had taken place in the patient room. The other wards of the note showing a high rate of incidence where the operating room 19 (46%), the emergency room 10 (58%), ICU 8 (30%), Laboratory 2 (11%) and others 14 (51%). Rotate groups (Work shift) accounted for the highest proportion of the injuries 52 (47%).

More than half (57.73%) of the HCWs sustained at least one injury, over a third (39.17%) suffered more than two and up to five injuries, only a few HCWs (3.10%) were injured more than five times. The other wards of the note showing a high rate of incidence were Syringe needles accounted for the highest proportion of the injuries 50 (50.51%). Of the HCWs that were injured only 37 (38.14%) reported the fact to their infection control officer and supervisor. Only 26 (26.80%) of the injured HCWs used post exposure prophylaxis (PEP) against HIV following their NSI (Table 3).

**Table 1:** Personal characteristics and Comparison of results of NSI surveillance among HCWs that suffered NSIs within the last 12 months and those not exposed to such injuries

Personal factors		NSIs (N=97)	No NSIs (N=143)	Total (N=240)	Chi-square	P value
		n (%)	n (%)	n (%)		
Age (Years)	≤30	68(42.77%)	91(57.23%)	159(66.25%)	1.24	0.537
	31-40	25(36.76%)	43(63.24%)	68(28.33%)		
	41-60	4(30.77%)	9(69.23%)	13(5.42%)		
Gender	Female	72(40.22%)	107(59.78%)	179(74.58%)	0.011	0.917
	Male	25(40.98%)	36(59.02%)	61(25.42%)		
Education Level	Middle school	0(0.0%)	4(100%)	4(1.66%)	17.42	0.034
	High school diploma	9(30%)	21(70%)	30(12.50%)		
	Associate degree	7(33.33%)	14(66.67%)	21(8.75%)		
	B.Sc. degree	64(39.26%)	99(60.74%)	163(67.92%)		
	Medical of Doctor	20(90.91%)	2(9.09%)	22(9.17%)		
Occupational Groups	Nurses	55(42.97%)	73(57.03%)	128(53.33%)	20.418	0.005
	Assistant medical officer	9(37.50%)	15(62.50%)	24(10%)		
	Surgeon	4(80%)	1(20%)	5(2.08%)		
	General physician	16(53.33%)	14(46.67%)	30(12.50%)		
	Anesthesia technician	4(36.37%)	7(63.63%)	11(4.59%)		
	Operating room technician	6(60%)	4(40%)	10(4.17%)		
	Laboratory technician	2(13.33%)	13(86.67%)	15(6.25%)		
	Other	1(5.88%)	16(94.12%)	17(7.08%)		
Work experience (years)	<1	37(55.22%)	30(44.78%)	67(27.92%)	8.97	0.062
	1-3	19(37.25%)	32(62.75%)	51(21.25%)		
	3-5	17(33.33%)	34(66.67%)	51(21.25%)		
	5-10	9(30%)	21(70%)	30(12.50%)		
	>10	15(36.59%)	26(63.41%)	41(17.08%)		
Hand usually used	Right hand	88(40.18%)	131(59.82%)	219(91.25%)	0.057	0.811
	Left hand	9(42.80%)	12(57.20%)	21(8.75%)		

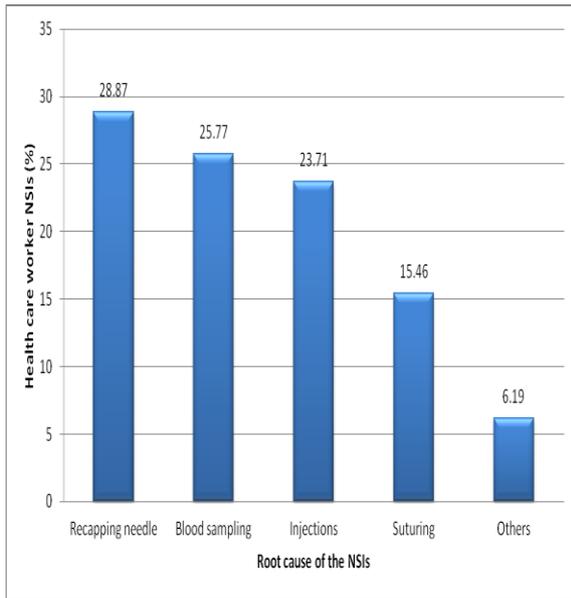
**Table 2:** HCWs afflicted with NSIs throughout the last 12 months

		NSIs (N=97)	No NSIs (N=143)	Chi-square	P value
<b>Location occurrence (where NSIs occurred)</b>	<b>Patient room</b>	38(42.42%)	52(57%)	18.76	0.009
	<b>Operation room</b>	19(46%)	22(54%)		
	<b>Emergency room</b>	10(58%)	7(41.34%)		
	<b>ICU</b>	8(30%)	18(69%)		
	<b>Laboratory</b>	2(11%)	16(89%)		
	<b>Others</b>	14(51%)	13(48%)		
	<b>No answer</b>	6(28.6%)	15(71.4%)		
<b>Work shift</b>	<b>Morning</b>	23(30%)	54(70%)	6.98	0.1
	<b>Afternoon</b>	1(50%)	1(50%)		
	<b>Night</b>	9(45%)	11(55%)		
	<b>rotate</b>	52(47%)	58(53%)		
	<b>Morning-afternoon</b>	10(45%)	12(52%)		
	<b>Afternoon-night</b>	2(22%)	7(77%)		

**Table 3:** Comparison of results of NSI surveillance within the last 12 months based on Number of NSIs, Device Involved and reporting [NSIs(N=97)]

<b>Number of NSIs (N=175)</b>	1	56(57.73%)
	2-5	38(39.17%)
	5>	3(3.10%)
<b>Device Involved</b>	Syringe needles	50(51.55%)
	angiocath	21(21.65%)
	Suture needles	15(15.46%)
	Lancet	2(2.06%)
	Others	6(6.19%)
	No answers	3(3.09%)
<b>Post-exposure prophylaxis (PEP) against HIV</b>	No	71(73.20%)
	Yes	26(26.80%)
<b>NSIs reported</b>	Not reported	60(61.86%)
	Reported	37(38.14%)

A large percentage of NSIs (28.86%) happened during the process of needle recapping (Fig 1).



**Fig 1:** Root cause and NSI prevalence during the last 12 months

In the opinion of the participants, the main perceived cause of the injuries was work load 34 (31.5%). (Table 4)

**Table4:** Perceived origin of NSIs in the last 12 months

Perceived original injuries	HCWs with NSIs
Work load	34(31.5%)
Carelessness	31(28.7%)
Fatigue	20(16.7%)
Patient shake	18(18.5%)
Lack of skill	2(1.9%)
Lack of PPE	1(0.9%)
Lack of disposal storage	1(0.9%)

213 (88.75%) of the HCWs had received a safe injection course and 27 (11.25%) had not. All 240 of HCWs that took part in the study conducted were vaccinated against HBW. 228 (95%) HCWs used PPE during the injection process and 238 (99.16%) used safety boxes as a method of disposal (Table 5).

**Table 5:** Occupational safety training and preventive measures against NSIs among HCWs

Item	N (%)	
	Yes	No
Vaccinated Against HBW	240(100%)	0(0.00%)
Trained for safe injection	213(88.75%)	27(11.25%)
Using PPE during injection	228(95%)	12(5%)
Use safety boxes for disposal	238(99.16%)	2(0.84%)

## DISCUSSION

The undertaken study showed that over a third (40.42%) of the HCWs had sustained an NSI within the last 12 months and that 175 of the NSIs had occurred among the 240 participants during the observed period of clinical practice (Table1). The results indicate differences in exposure levels NSIs influenced by educational level and occupational groups, respectively Pvalue = 0.005, Pvalue = 0.034. Means that higher education increases the workload and responsibility therefore faced with NSI are more frequent. Differences of age, gender, and right or left hand in the face of changes NSI not show any significant effect (p value> 0.05). Hence, the number of NSIs suffered by the HCWs decreased significantly.

These outcomes are in accordance with findings of Ng yw *et al.* [10] who reported the lower prevalence of NSIs among HCWs in 2 Malaysian teaching hospitals (31.6% and 52.9% respectively).As shown by the study, nurses exhibited the highest risk of receiving NSIs 55 (43%) compared with the other occupational groups such as general physicians 16 (53%) and assistant medical officers 9 (37.50%). Overall, the pattern of reporting NSIs was consistent with other similar studies [11, 12 and 13]. In general, other occupational groups mostly do not carry out injections and as such their risk of acquiring an NSI is lower than that of nurses. In addition, the bulk of NSIs transpired in patient rooms and this is in agreement with other comparable studies [11].

Table 2 shows the results of NSI increased exposure in the patient room and operating room that were compared to other places. Because of workload, more service and care of patients the NSIs was significant (Value <0.05). However, because of same conditions and time of shift work, there was no significant difference (Value = 0.1)

This study shows that (table 3) the insufficient reporting of NSIs is a common occurrence among injured HCWs. Roughly two-thirds (61.86%) of

HCWs that suffered NSI injuries did not report the fact to their infection control officer and supervisor. More than two-thirds (73.20%) of the injured HCWs did not practice the use of exposure prophylaxis (PEP) against HIV following their NSIs. This finding is a similar those in other studies carried out elsewhere [14]. The most common reasons found for not reporting or the under reporting of incidences of NSIs are insufficient awareness and poor practices. The observed high level of under reporting suggests that HCWs requires education on prevention; in particular focusing on the importance of reporting all NSIs and the subsequent use of prophylaxis post-exposure to prevent blood-borne infections [15, 16, 17].

The conducted research found that (fig. 1) the process of needle recapping was the most common cause of injury (28.87%). With frequent use, and inadequate training facilities in needle recapping are the most effective on NSIs. The findings are consistent with those of Hanafi *et al* [11], who reported that the recapping or disassembly of the needles was the most common origin of the injury (36.00%) in the hospitals of the University of Alexandria [11].

In this study, excess work load during procedures (31.51%), carelessness (28.71%), fatigue (16.7%) and Patient shake (18.5%) lead to occupational NSIs. (table.4) Perceived origin of NSIs shows that two main factors, the work load and lack of care on the NSIs are respectively the highest possible outcome.

The current study showed that (table 5) the majority (88.75%) of HCWs studied had reported receiving information pertaining to safe injection methods and standard precautions. This particular finding is in stark contrast to a study undertaken by Askarian *et al* [18]. In this study all of the HCWs were vaccinated against HBW. However, the coverage rate of vaccination against HBW is nevertheless sufficient.

Despite the prevalence of the underlined injuries the potential to prevent them exists. NSIs can be avoided and controlled by eliminating the causes of such injuries. In order to reach this goal there is a need to set up an integrated safety and health system within all healthcare facilities. This system must regularly identify, evaluate and specifically control the problem at hand. To control this dilemma a hierarchy of control must be adhered to. This follows that the first steps which include the use of excessive injections must be eliminated. At a lower level the possibility of substituting injections for digestive drugs should be examined. Engineering control is vital and should be applied; for example providing syringes with safety features. Executive measures are of particular importance at all levels such as increasing the respite time of HCWs. Finally, the preparation of

personal protective equipment at the lowest level can help to decrease the frequency of NSIs. Providing essential training can be very useful in all control measures applied. The findings of this study can hopefully be utilized by hospital managers to aid them in controlling the problems involving NSIs.

## CONCLUSIONS

- This study showed that the under reporting of needle stick injuries are a common practice among affected health care workers.
- Most injured healthcare workers did not use post-exposure prophylaxis against HIV following their NSI.
- Improved prevention and reporting strategies are vital in order to increase the occupational health and safety for healthcare workers.
- In this study, age and work shift not influenced on NSIs.

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