

# Needle-Stick, Sharp Injuries, and Its Related Factors among Nurses of Imam Reza Hospital, Kermanshah, Iran



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## ABSTRACT

**Background:** Nurses are at risk of injuries caused by sharp instruments in hospitals. The objective of this study was to investigate the frequency of injuries due to sharp instruments and its relevant factors among nurses of Imam Reza Hospital, Kermanshah, Iran.

**Methods:** This descriptive-analytic study was conducted on 258 nurses working at Imam Reza Hospital of Kermanshah, Iran, in 2013. The data collection measure was a researcher-made questionnaire, which its validity and reliability were verified. The obtained data were entered into SPSS, version 16 and were analyzed using the Chi-squared and ANOVA test at the significance level of  $P < 0.05$ .

**Results:** According to the findings, 73.3%(n=191) of nurses were exposed to sharp injuries at workplace. About 41.8% of cases occurred during the first year of nursing. Major injuries were caused by needle-sticks (73.3%) and then IV catheter (42.4%). About 43.5% of the observed injuries occurred while trying to recap the needle-sticks. Also, 38.52% of injured nurses performed the tests after injury screening, while 48.7% did nothing after being injured.

**Conclusion:** With regard to the findings of this study, human and environmental factors are effective on these exposures and environmental factors are much effective than human factors. It seems necessary to train the personnel, observe general precautions, and change wrong behaviors namely needle re-capping.

## Keywords:

Needle stick, Sharps injuries, Nurses, Iran

## 1. Background

**N**urses, physicians, and other healthcare workers are highly exposed to needle-stick and sharp injuries. Such injuries transfer some pathogens such as (human immuno-

deficiency virus) HIV, Hepatitis B virus (HBV), and Hepatitis C virus (HCV) (Meyer, Chuard & Regamey 2005; Moro et al. 2007; Martins et al. 2012). Approximately, 66000 cases of HBV, 1600 cases of HCV, and 1000 cases of HIV might occur worldwide among healthcare work-

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ers through their exposure to needle-sticks (Moro et al. 2007).

HBV is stable in dried blood for at least 7 days and HCV for at least 16 months. Thus, such pathogens can be transferred by sharp injuries (Costigliola et al. 2012). The results of some epidemiological studies show that sharp injuries contamination is prevalent in developing countries. About 600-800 thousands cases of needle-stick injuries occurred among healthcare workers (Siddique et al. 2008; Gholami et al. 2010). It is estimated that infectious diseases due to sharp injuries cost about \$ 1 million per person but the cost of preventing injuries is about \$ 3000 per person (Dement et al. 2004).

Despite much emphasis on the prevention of sharp injuries at work, they are among the potential risks for healthcare workers (Nagao et al. 2007). Annually, 100000 healthcare workers are exposed to contaminated arterial catheters (Moro et al. 2007). All healthcare workers, including physicians, dentists, nurses, lab technicians are exposed to sharp injuries (Alamgir et al. 2008). Among all medical workers in hospitals, nurses are more exposed to HIV, HBV, and HCV due to frequent injections and direct contact with fluids of patients. According to the studies in Europe regarding sharp injuries among healthcare workers, the majority of nurses (91%) are at risk (Ayranci & Kosgeroglu 2004).

Numerous patients, shortage of nursing staffs, and heavy workload are the causes that increase the sharp injury contamination risk among nurses (Perry, Parker & Jagger 2005). Haddadi, Afhami and Karbakhsh (2007) showed that 43.4% of staffs were exposed to HIV, HBV, and HCV one year before the study and nurses were in the majority group (Haddadi, Afhami & Karbakhsh 2007). Bijani, Sotudeh Manesh and Mohammadi (2011) reported that in one year, of 172 nurses working in Boalisina Hospital, 55 nurses were exposed to sharp injuries. The activities most related to sharp injuries include injection, medication, venipuncture, and contact with the fluid of patient (Martins et al. 2012).

Improvement of work condition can reduce the increasing risk of sharp injury among nurses (Clarkes, Sloane & Aiken 2002). In addition, some measurements such as at-service training, work safety, lower work shifts, and no injection during fatigue of staff can reduce sharp injury contamination in hospitals (Trim et al. 2003; Azar-Cavanagh, Burdt & Green-McKenzie 2007; Smith et al. 2006a). As B hepatitis vaccination is the only way to prevent sharp injuries contamination, vaccination of medical group, especially nurses is of great importance

(Bijani, Sotudeh Manesh & Mohammadi 2011). In the study done by Mohammad Nejad et al. (2009) in Imam Khomeini Hospital in Tehran (2009), sharp injuries was 47.05%, 82.4% of nurses vaccinated against hepatitis. After sharp injury, 96.9% of nurses washed their hands and 12.5% took drug against HIV.

Hospital accidents are of great importance due to their great life, financial, and social damages. The first step to improve preventive measurements is recognition of effective factors on their occurrence. As the sharp injury risk is common among nurses, determining frequency and the causes of sharp injuries can lead to taking measures to reduce contamination risk. The objective of the study was to determine the frequency of sharp injuries and relevant factors among nurses in Imam Reza Hospital in Kermanshah, Iran, in 2012 and evaluate their performance during these injuries.

## 2. Materials & Methods

The study method was a descriptive-analytic and cross sectional design. It was conducted in Imam Reza Hospital affiliated to University of Kermanshah Medical Sciences, Kermanshah, Iran, in 2012. The researchers referred to all clinical units of Imam Reza Hospital as the greatest health educational center in the west of Iran. A total of 258 nurses were chosen as study sample. For data collection, a researcher-made questionnaire in 3 parts was designed. The first part consisted of 9 items on demographic data, the second part with 15 items on exposure to sharp injury, and the third part with 7 items about risky factors. The questionnaire validity was verified by content validity through the evaluation of texts and approval of experts. Its reliability was 76.8% by test-retest method after completing the questionnaires by 16 nurses.

In this study, some personal questions were asked, so some subjects may not respond to some questions. To solve this problem, the subjects were offered required explanations and assured that the information was confidential and there was no abuse of their responses. The inclusion criteria were working in Imam Reza Hospital during the study. The exclusion criteria comprised not responding the questions or delivering incomplete questionnaires. The data entered into SPSS, version 16 and were analyzed using the Chi-square and ANOVA test at the significance level of  $P < 0.05$ .

## 3. Results

The results showed that of 258 participants, 203(78.4%) were females and 56(21.6%) were males. The mean(SD)

**Table 1.** Relationship between demographic variables and needle-stick or other sharp injuries among nurses.

Effective factors on injuries		Injured n (%) or M (SD)	Non-injured n (%) or M (SD)	Total	P-value
Age		32.42(6.09)	32.31(6.07)	31.99±6.05	0.614
Gender	Female	156(76.8)	47(23.2)	203(100)	0.025
	Male	35(62.5)	21(37.5)	5(100)	
Marital status	Single	80(74.8)	27(25.2)	107(100)	0.434
	Married	111(73)	41(27)	152(100)	
Degree	Associate	0(0)	2(100)	2(100)	0.057
	BSc	181(75.5)	62(25.5)	243(100)	
	MSc	10(71.4)	4(28.6)	14(100)	
Work place ward	Internal	57(73.1)	21(26.9)	78(100)	0.141
	Surgery	47(85.5)	8(14.5)	55(100)	
	ICU	60(68.2)	28(31.8)	88(100)	
	Emergency and operation	27(71.1)	11(28.9)	38(100)	
Position	Head nurse	9(69.2)	4(30.8)	13(100)	0.103
	Staff nurse	7(50)	7(50)	14(100)	
	Nurse	175(75.4)	57(24.6)	232(100)	
Clinical experience		8.41(6.09)	32.42(6.49)	32.42(6.09)	0.874

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**Table 2.** Relative and absolute frequency distribution of samples based on the causes of not reporting injury to supervisor or infection control expert.

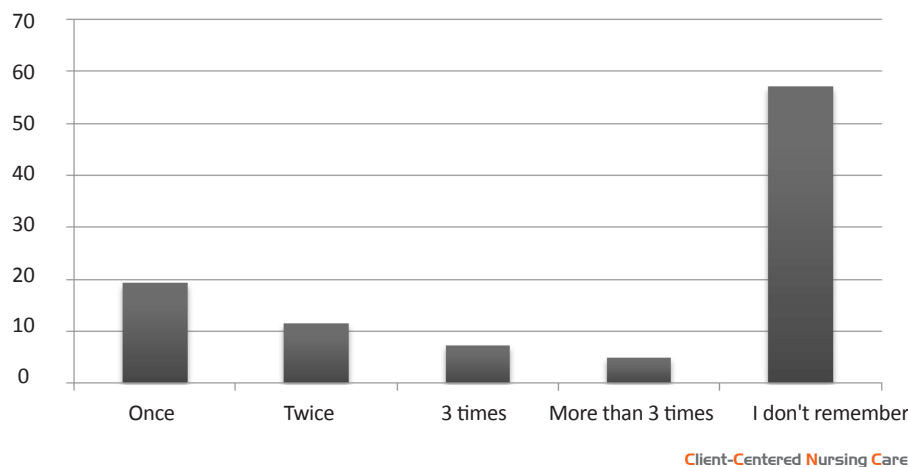
Statistical index	Causes of not reporting injury	F	
		n	%
	I was not aware of reporting method.	6	7.5
	I didn't know to whom I report?	8	10
	I was not aware of the significance of reporting.	8	10
	I was not sure about the injury significance.	21	26.3
	I had no time to follow the injury.	25	31.3
	I didn't think, serious risk exists.	31	38.8
	There was no person or place to report.	9	11.3
	Reporting was useless.	17	21.3

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**Table 3.** Relative and absolute frequency distribution of subjects in terms of injury factor.

Statistical index	Injury factor	F	
		n	%
	Needle-stick	140	73.3
	Angiocatheter	81	42.4
	Blade	9	4.7
	Stitch needle	15	7.9
	Others	5	2.6

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**Figure 1.** Relative frequency distribution of subjects in terms of frequency of sharp injuries in the past year of study.

age of participants was 32.31, their mean(SD) clinical work experience was 8.45(5.79) years, and mean(SD) extra work was 82.47(48.42) hours in month. The majority of subjects were married (58.7%), had BA degree (93.8%), working in ICU (34%), with rotational shift (78.4%) (Table 1).

The majority of subjects (73.3%) were exposed to sharp injuries at work place. About 64%(n=166) of injuries occurred in the recent year, of which 19.3% experienced at least one exposure to sharp injuries at work place in the last year (Figure 1). The results showed that 62.2% of samples mentioned their first action after sharp injuries as “pressing the wound site”. About half of the subjects (48.7%) did nothing after sharp injuries at work place.

Regarding the relationship between demographic factors and injuries, there was only a significant association between the sharp injuries and gender ( $P=0.025$ ) and the number of injuries was higher among female nurses. In this study, it was shown that 43% of subjects did not report the sharp injuries to the supervisor or infection control staff. They stated the major cause of no report as “I didn’t think I was seriously in danger” (38.8%) (Table 2). In this study, nurses stated the major causes of injuries as needle-stick (73.3%) and then angiocatheter (42.4%) (Table 3).

#### 4. Discussion

The results of the present study showed that frequency of needle-stick and sharp injuries was 73.3%(n=191) among nurses of Imam Reza Hospital. Of which, 64%(n=166) occurred in the recent year. Frequency of these injuries was reported different in similar studies in Iran and

other countries. In the study of [Mohammad Nejad et al. \(2009\)](#) on nurses of Imam Khomeini Hospital in Tehran, 47.5%(n=32) of nurses were exposed to sharp injuries during their activities. In the study of [Nasiri et al. \(2005\)](#), 76.7% of healthcare workers were exposed to sharp injuries in the past year. In the study of [Bijani, Sotudeh Manesh and Mohammadi \(2011\)](#) on 172 nurses in Boalishina Hospital of Qazvin, the results showed that 32%(n=55) of them were exposed to sharp injuries in the past one year. In the study of [Ayranci and Kosgeroglu \(2004\)](#), 62.9% of nurses had reported sharp injuries at least once. According to a study by [Park et al. \(2008\)](#), nurses had experienced most of the injuries after physicians.

Nurses are exposed mostly to sharp injuries due to spending much time with patients, injection and invasive intervention for patients. In addition, extra work and frequent shifts can increase injury and based on complications of these injuries, training should be given to nurses to reduce these damages.

The present study showed that the mean(SD) age of the nurses was 32.31(6.07) years and 42.1% of them had clinical experience of 5-9 years. Also, the mean(SD) clinical experience of the subjects was 8.45(5.79) years. In similar studies, sharp injuries were prevalent among young and low experienced forces ([Haddadi, Afhami & Karbakhsh 2007](#); [Bijani, Sotudeh Manesh & Mohammadi 2011](#)). Presumably, giving clinical responsibilities to young staff and managerial positions to experienced personnel (and with fewer contacts with patients) are the causes of high prevalence of sharp injuries among young forces. This study showed that sharp injuries were higher among female nurses ( $P=0.025$ ). In other studies, there

was no significant association between injury and gender (Haddadi, Afhami & Karbakhsh 2007; Smith et al. 2006b; Bijani, Sotudeh Manesh & Mohammadi 2011). The causes of injuries in female forces are due to their lower physical ability, fatigue, anxiety, stress of work, and loss of concentration.

About 62.2% of subjects mentioned their first action after sharp injuries at work place as “pressing the wound site”. About half of the subjects (48.7%) performed no action after sharp injuries. The results of studies showed that pressing wound site to take out blood had no effect on infection (Koohestani, Baghcheghi & Rezayee et al. 2010). Thus, other methods as washing hands and prophylaxis treatments should be done to reduce contamination.

The present study showed that more than half of the subjects (57%) reported the injury to a supervisor or infection control staff and this was consistent with the results of Bijani, Sotudeh Manesh and Mohammadi (2011) study in Qazvin (60%). In the studies of Smith et al. (2006b) and Martins et al. (2012), a few staffs did not report sharp injuries because of unawareness, insignificance of injury cases, or the fear of being accused of having no clinical skill. In our study, many staffs reported injury cases due to the high cause of informing authorities, holding at-service training, and preventive or prophylaxis treatments.

In this study, the most important causes of not reporting were lack of risk perception (38.8%), no time for follow up (31.3%), not sure of injury significance (26.3%), and useless reporting (21.3%). In the studies done by Mohammad Nejad et al. (2009) and Azadi and Anoosheh (2007), the most important causes of lack of report were dissatisfaction with follow up, lack of knowledge of reporting process, lack of risk perception, and much work. This problem can be solved by training healthcare workers regarding correct reporting process and explanation of special importance of diagnosis and treatment.

In the present study, most of the injuries occurred during venipuncture (45%) and needle recapping (43.5%). The highest injury was due to needle stick (73.3%) and then angiocatheter (42.4%). These findings are consistent with the results of similar studies. In the study of Gholami et al. (2010), the major injuries was due to needle-stick (47.3%) and angiocatheter (19.9%). In the study of Vahedi et al. (2006), needle-stick created 43.7% and angiocatheter 35.3% of injuries. According to the study of Mohammad Nejad et al. (2009), the most common cause of injury was needle recapping (46.9%).

As nurses have much work in hospitals such as serum administration, antibiotic therapy, and intravenous treatments; This group is highly exposed to needle-stick injury. Also, high work load and resulting fatigue in work shifts can increase risk of injuries. In this study, only 38.2% of injured nurses performed the appropriate tests such as HBS Ag, HIV Ab, and HCV Ab, also 12.6% mentioned counselling with physicians, 8.9% received B hepatitis vaccination, 1.8% hyperimmunoglobulin, and 1% anti-HIV medication. Finally, about 48.7% did not perform any action.

The results showed that performance of majority of the nurses was not suitable regarding the first action after needle-stick injury. The first step was washing the hands with soap and water and normal saline in cases of mucosal contact with the patients. The studies show that pressing wound for bleeding does not decrease disease transmission risk and it also contaminates the environment (Sepkowitz 2000). Unfortunately, the results of study showed that in 47.8% of needle-stick injuries, nurses failed to do any action such as washing the wound site and following up sending tests to the patient. The educational and learning strategies should be changed in this regard. Raising awareness about the risk of needle-stick injury and contact with mucous can reduce the number of injuries and increase reporting cases.

In conclusion, the results of the present study showed that different factors were involved in sharp injuries and the most important factors included high work load, hastening, carelessness with needle-stick and sharp objects, as well as crowded environment. Thus, different human and environmental factors are implicated in these injuries and the share of environmental factors is higher. The prevention of this health risk should be on priority for authorities.

## Conflict of Interests

The authors declared no conflict of interests.

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