Original Article

Needlestick Injuries among Healthcare Workers: Why They Do Not Report their Incidence?

Farahnaz Joukar[1], Fariborz Mansour-Ghanaei[2], MohammadReza Naghipour[2], Mehrnaz Asgharnezhad[1]

[1]Caspian Digestive Diseases Research Center (CDDRC), Guilan University of Medical Sciences (GUMS), Rasht, Iran, [2]Gastrointestinal and Liver Diseases Research Center (GLDRC), Guilan University of Medical Sciences (GUMS), Rasht, Iran

Abstract

Background: Needlestick injuries (NSIs) among healthcare workers (HCWs) pose an important health challenge and several pieces of evidence show that in many cases HCWs do not report the injury. **Materials and Methods:** This multicenter descriptive cross-sectional study was performed in eight teaching hospitals of Rasht, Iran. Using consecutive sampling methods, 1010 nurses were enrolled from October 2014 to January 2015. A three-part self-administered questionnaire was used. It included questions on demographic features, NSI-related questions, and questions on the knowledge of hepatitis B and C viruses (HCV, HBV). **Results:** Among the 1010 participants, 580 (57.42%) showed a positive history of NSI; the total number of occurrences of NSI was 914. The major item causing NSI was the syringe with needle (315; 34.47%). In this way, NSIs occurred most frequently during recapping and injection [339 (37.10%) and 147 (16.10%), respectively]. Only 92 (10.07%) of all NSI positive participations had referred to the infection control units of their hospitals. The others mostly answered the question of "Why did you not report the incident?" with being too busy at work at the time of injury (140; 27.58%). The results showed that among participants with <5 years elapsed since their vaccination, the risk of NSI reduced to 60% [$p < 0.02$, odds ratio (OR) = 0.40, 95% confidence interval (CI) = 0.20–0.80]. **Conclusions:** It seems that NSI is still a major problem among nurses. Correspondingly, HCWs do not take the reporting system seriously and training them requires an ongoing activity in all hospitals.

Keywords: *Knowledge, needlestick injury, nurses, risk factor*

Introduction

Needlestick injury (NSI) among healthcare workers (HCWs) is still a global concern and poses a significant risk of occupational transmission of 20 bloodborne pathogens such as human immunodeficiency virus (HIV) and hepatitis B and C viruses (HCV, HBV).[1,2] NSI, based on the definition of the National Surveillance System For Healthcare Workers (NaSH), is any percutaneous injury, penetration of skin resulting from a needle or other sharp object, which has been in contact with blood, tissue, or other body fluids prior to the exposure.[3] The United States (US) Centers for Disease Control and Prevention (CDC) estimates that about 600,000–1,000,000 NSIs occur annually.[4]

Multiple risk factors have been proposed in different studies for NSI incidents such as improper use of protective equipment (like failure to use suitable-sized gloves), working in surgical or intensive care units, insufficient work experience, young age, and low knowledge level of bloodborne diseases.[5,6] In many studies, needle recapping, unsuitable needle disposal, intravenous cannulation, and setting of drips are the most frequent activities causing NSIs.[7] A strong point for the importance of NSIs prevention protocols is that both postexposure laboratory tests and prophylaxis and any treatments for such infections are responsible for direct costs and heavy financial burden on the society.[2,7] Unfortunately, the magnitude of the NSI risks and the practices associated with it has not been well understood among HCWs, especially in developing countries.[8]

Several studies have declared that, although the prevalence of bloodborne pathogens in many developing countries is high, documentation of such exposures in these countries is negligible.[7,8] For example, only 4% of the worldwide prevalence of occupational HIV infection is reported from sub-Saharan Africa, in which about

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Address for correspondence:
Prof. Fariborz Mansour-Ghanaei, Gastrointestinal and Liver Diseases Research Center (GLDRC), Guilan University of Medical Sciences (GUMS), Razi Hospital, Sardar-Jangle Avenue, Rasht, Iran.
E-mail: ghanaie@yahoo.com

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70% of the world's HIV-infected population lives.[8] This is tangible evidence on the reporting system. Many studies have been conducted on occupational NSI exposures,[1-10] but the reason why HCWs do not report incidents of sharp injuries is not clear yet. It seems that factors such as heavy work, fear of job loss, and lack of knowledge about the NSI importance are the most important points for none reporting. Further studies are required to determine the cause of this behavior. In the present study, the factors related to NSIs among nurses were assessed.

Materials and Methods

This was a multicenter descriptive cross-sectional study. Through consecutive sampling methods, 1836 available nurses with a direct day-to-day management of patients working in different wards in eight teaching hospitals of Rasht (the capital of Guilan province, located in the north of Iran) were invited to this study from October 2014 to January 2015. These nurses had a history of at least 6 months of work experience and were vaccinated from 1 to 10 years ago with hepatitis B vaccine according to the routine immunization schedule (3 doses in the time intervals of 0, 1, and 6 months). The response rate was 55% and 1010 nurses who agreed to participate were included. Sample enrollment, data gathering, and data entry were supervised by a research assistant.

The participants were given a briefing on the aim of the study, were asked not to disclose their identity, and were assured that this survey is only for research purposes. Each participant completed a self-report questionnaire consisting of yes/no questions and some open-ended questions. A panel of experts of the Gastrointestinal and Liver Diseases Research Center (GLDRC) of Guilan University of Medical Sciences, Iran, determined the face and content validity of the developed and standardized questionnaire. The questionnaire consisted of three parts. Part A: Part A consisted of questions on demographic features including gender, age, working experience (years), occupational department (specialty), and time elapsed since vaccination. Part B: The second part included NSI-related questions, including the history of training received on NSIs, times of NSI, shift work event, latex gloves use, type of needle, stage of occurrence, and postexposure immediate response. The reasons for not reporting NSI incidence included: I was so embarrassed; I do not know how to report these incidents; NSI occurred before the procedure began; I was too busy at the time of injury; I feared its influence on my employment; I did not know it must be reported; I thought it was not so important; I was sure that they would not do anything for me. Part C: The final part consisted of 26 questions on the knowledge of HBV and 22 on the level of knowledge on HCV infection. This specifically designed section has been reported to be acceptable to almost all responders in a pilot study, with a Cronbach's alpha coefficient of 0.7 for hepatitis B knowledge and 0.8 for hepatitis C knowledge. In addition, a coefficient correlation of higher than 0.8 was calculated using test/retest reliability. In our previous research article,[11] a total score of less than mean was considered as unsatisfactory, whereas higher than mean was considered as satisfactory knowledge.

All analyses were performed using Statistical Package for the Social Sciences software (version 20, IBM Corporation, Armonk, NY, USA) on Windows 8. Frequency, percentage, and mean were used to describe the participants with relevant variables using tables. To compare the relationship between variables and the occurrence of NSI, the Chi-square test was used and odds ratios (OR) were calculated using logistic regression. A p value of < 0.05 was considered statistically significant.

Ethical considerations

This study was reviewed and approved by the Ethical Committee of GLDRC of Guilan University of Medical Sciences (Number EP. 3.115.2014). Written informed consents were obtained from all HCWs.

Results

Among 1010 study participants, 94% were women and most of them (39.34%) were between 30 and 39 years of age. Moreover, 580 (57.42%) participants showed positive history of NSI in the past 12 months and, because some participants had experienced NSI several times, the total NSI occurrence number was 914. Table 1 shows the demographic features of both NSI positive and NSI negative nurses. As presented in this table, in regression analyses, among participants with <5 years elapsed since their vaccination, in comparison with those with 5–10 years elapsed since their vaccination, the risk of NSI reduced to 60% [OR = 0.40; 95% confidence interval (CI) = 0.20–0.80, p = 0.02].

Most of NSI positive participations (544; 93.80%) had been participated in NSI training workshops before NSI occurrence, but most of them (788; 86.20%) did not use latex gloves during their work time. Morning shifts showed the highest proportion of NSI incidence (581; 63.60%). The major item causing NSI was the syringe with needle (315; 34.47%), and the second most frequent device was the winged butterfly needles (282; 30.85%). NSIs occurred most frequently during recapping (339; 37.10%) and injection (147; 16.10%). When NSI occurred, most of the nurses washed the injured site with water and soap (197; 21.40%), and pressed it to promote bleeding (193; 21.10%). Using antiseptic alcohol or betadine is the third most frequent reaction to NSI (172; 18.50%). Only 92 (10.07%) of all NSI positive participations had referred to the infection control units of their hospitals. The others mostly answered the question of "Why did you not report the incident?" with, being too busy at work at the time of injury (140; 27.58%) [Table 2].

Table 1: Questionnaire section I: Demographic features

Characteristics	Total (1010) *n* (%)	NSI (580) *n* (%)	No NSI (430) *n* (%)	df	OR (95% CI)	Exp (B)	*p*
Age group							
<30 (years)	353 (35.35)	212 (36.50)	141 (32.80)		Ref.		
30-39 (years)	399 (39.34)	222 (38.30)	177 (41.20)	1	1.51 (0.85-2.70)	3.10	0.10
40-49 (years)	205 (20.10)	120 (20.70)	85 (19.80)	1	1.31 (0.74-2.33)	1.60	0.30
50 (years)<	53 (5.21)	26 (4.50)	27 (6.20)	1	1.50 (0.81-2.75)	1.50	0.10
Gender							
Men	62 (6.00)	33 (5.70)	29 (6.68)		Ref.		
Women	948 (94.00)	547 (94.30)	401 (93.32)	1	1.15 (0.68-1.94)	0.50	0.50
Occupational ward							
Pediatric	54 (5.30)	37 (6.59)	17 (4.00)		Ref.		
Emergency	135 (13.40)	76 (13.48)	59 (13.60)	1	1.36 (0.71-2.62)	1.10	0.20
Internal medicine	391 (38.70)	204 (35.59)	187 (43.50)	1	0.84 (0.53-1.34)	1.50	0.40
Obstetrics	23 (2.30)	18 (3.80)	5 (1.20)	1	0.71 (0.49-1.02)	0.50	0.07
Surgery	185 (18.30)	109 (18.89)	76 (17.70)	1	1.99 (0.70-5.65)	1.20	0.10
Operation room	43 (4.30)	28 (4.87)	15 (3.50)	1	0.98 (0.64-1.50)	0.50	0.70
ICU, CCU, Dialysis	179 (17.70)	108 (16.78)	71 (16.50)	1	1.16 (0.57-2.33)	1.60	0.50
Working experience							
<5 (years)	366 (36.20)	201 (34.60)	165 (38.40)	1	0.79 (0.60-1.06)	0.80	0.10
5-10 (years)	232 (23.00)	130 (22.50)	102 (23.70)	1	0.83 (0.60-1.15)	0.80	0.70
>10 (years)	412 (40.80)	249 (42.90)	163 (37.90)		Ref.		
Time elapsed since vaccination							
<5 (years)	37 (30.50)	17 (2.90)	20 (4.70)	1	0.40 (0.200.80)	0.40	0.02
5-10 (years)	973 (69.50)	563 (97.10)	410 (95.30)		Ref.		

n: Frequency; %: Percentage; NSI: Needlestick injury; OR (CI): odds ratio (95% confidence interval); ref: reference; ICU: Intensive care unit; CCU: Coronary care unit; $p<0.05$=Significance

In general, the mean (SD) knowledge score of all study participants regarding HBV and HCV was 15.23 (2.65) and 12.40 (3.27), respectively. Table 3 shows the HBV and HCV knowledge level among all nurses. Approximately 50% of participants obtained a score lower than the mean for HBV and HCV (55.40 and 52.80%, respectively). The knowledge of HBV and HCV was higher than the mean in 42.90 and 48.60% of NSI positive cases, respectively [Table 3].

Discussion

NSI is one of the important health hazards that HCWs face daily in the hospitals. In this study, more than half of the participants had experienced injury with sharp instruments and some of them had experienced NSI incidences several times. This rate is higher than some Iranian studies[12] and lower than some other Iranian surveys.[13-15] The present research sample size was bigger than these studies, and this is the advantage of the present study results and the cause of their higher reliability. The other advantage was that we did not count only NSI positive individuals, but we recorded all NSI incidences during 1 year (580 participants with a total incidence of 914). Although most NSI positive cases had participated in NSI training workshops before, half of them obtained HBV and HCV knowledge scores of lower than the mean and most of them did not use latex gloves during work, which is recognized as an important defense strategy. Similar to other surveys,[6,12] morning shifts showed the highest proportion of NSI incidences which may be because of the high load of patients in those hours. The major devices causing NSI were syringe with needles, winged butterfly needles, and IV catheter stylet. This may be due to the high level of use of these devices in our hospitals. Furthermore, NSIs occurred most frequently during recapping and injection. The findings of the present study were similar to others conducted in Iran.[16] Adib-Hajbaghery and Lotfi have reported that injecting, blood sample collection from a restless patient, and recapping needles are the most dangerous interventions resulting in NSIs and that most of the injuries occurred on morning shifts.[12] Moreover, in their study, the syringe with needles was responsible for about half of NSI incidences.

In the current study, among participations who had been vaccinated in <5 years, the incidence of NSI was significantly lower. It seems that more recent vaccinations may be linked to more consideration of protocols among them. When NSI happens, most of the nurses washed the injured site with water and soap, pressed it to promote bleeding, and used antiseptic alcohol or betadine. Similar to our findings, in some other surveys,[12-14,17,18] the most common actions taken after NSI were compression of the site and washing the area with soap and water. Among the present study participants, only 10.07% of all NSI positive cases had referred to the infection control units of their hospitals. The others mostly responded to the question of "Why did you not report

Table 2: Questionnaire section II: NSI-related data

Characteristics	Total (*n* [%])
Number of NSIs	
Once	335 (57.80)
Twice	173 (29.80)
More than twice	72 (12.40)
History of training received on NSIs	
Yes	544 (93.80)
No	36 (6.20)
Shift work event*	
Morning	581 (63.60)
Evening	166 (18.20)
Night	167 (18.20)
Use of gloves during work time*	
Yes	126 (13.80)
No	788 (86.20)
Type of needle*	
Syringe	315 (34.47)
Suture	28 (3.07)
Winged butterfly	282 (30.85)
IV catheter stylet	203 (22.21)
Drug vial breakage	86 (9.40)
Stage of occurrence*	
On preparing	102 (11.20)
During taking blood	71 (7.80)
During injection	147 (16.10)
Patient's sudden movement	39 (4.30)
On pulling out	44 (4.80)
On recapping	339 (37.10)
On destroying needle into disposal container	126 (13.70)
Accidental prick from others	16 (1.70)
Devise left on floor, table, or desk	30 (3.30)
Postexposure immediate response*	
Washed by water only	28 (3.10)
Wash by water and soap	197 (21.40)
Use of antiseptic alcohol or betadine	171 (18.50)
Pressure on the site to promote bleeding	193 (21.10)
Immunoglobulin injection without a doctor's prescription	22 (2.23)
Antibody titration without a doctor's prescription	74 (8.10)
ELISA or PCR tests without a doctor's prescription	28 (3.10)
Checking of the HCV and HBV status of the patient	33 (3.30)
Reporting to the infection care unit of the hospital	92 (10.07)
Visiting a doctor	18 (2.00)
No care	66 (7.20)
The reason for not reporting the incidence of NSI in 488 people**	
I do not know how to report	53 (9.70)
NSI happened before the procedure began	101 (18.40)
I was too busy at the time of injury	140 (27.58)
I feared its influence on my employment	51 (9.60)
I did not know it must be reported	34 (6.28)
I thought it is not so important	47 (8.66)
I was sure that they would not do anything for me	68 (12.45)
The laboratory result was negative	40 (7.33)

NSI: Needlestick Injury; N: Frequency; %: Percentage. *Total NSI occurrences were 914 times and the percentages have been calculated with this record. **Respondents could choose several responders and the percentages have been calculated with these answers

Table 3: Knowledge level of HBV and HCV among all participations

Knowledge of HBV and HCV score (Mean)	Total (1010) *n* (%)	NSI positive (580) *n* (%)	NSI negative (430) *n* (%)	df	OR (95% CI)	Exp (B)	*p*
HBV (15.23)							
↓ Mean	560 (55.40)	331 (57.10)	229 (53.30)		Ref.		0.20
↑ Mean	450 (44.60)	249 (42.90)	201 (46.70)	1	1.16 (0.90-1.49)	1.10	
HCV (12.40)							
↓ Mean	533 (52.80)	298 (51.40)	235 (54.60)		Ref.		0.30
↑ Mean	477 (47.20)	282 (48.60)	195 (45.40)	1	1.14 (0.88-1.46)	0.80	

n: Frequency; %: Percentage; NSI: Needlestick injury; OR (CI): odds ratio (95% confidence interval); ref: reference; $p<0.05$=Significance; HBV: Hepatitis B virus; HCV: Hepatitis C virus

the incident?" with being too busy at work at the time of injury. Underreporting of sharps injuries by employees is documented in different types of literature.[9,11-14] Similar to the present findings, Bekele *et al.* have reported that nearly 6 out of 10 injuries were not reported and the main reasons were the time constraint, the sharps which caused injury were not used for a patient, and lack of knowledge that it should be reported.[8] On the contrary, Hashemi *et al*. reported that most needlestick injured staff were immediately referred to the hospital center to receive treatment and suitable infection control.[18] Unfortunately, HCWs do not take the reporting system seriously in Iran. Many studies have proposed different reasons for the lack of reporting of NSIs by HCWs.[12,14] Some of the HCWs think that such injuries have no life-threatening risks, they may fear the diseases they have potentially been exposed to, and they may have fear of the loss of their job security, and the time involved in follow-up. In addition, they may lack knowledge about the appropriate reporting method or the reporting procedures themselves may be inadequate. There are numerous strategies for NSIs prevention such as HCWs attending workshops, using tray or dishes to carry syringes, using sharp disposal containers, avoiding needle breakage or bending by hand, and not leaving syringes open.[17,19] The present study, while having much strength, also had some limitations. A specific time and place was not coordinated for filling the questionnaire, which might decrease the nonresponse rate, because the most prevalent reason for lack of responding was lack of time. In addition, the impact of memory on self-reports in this retrograde study should be considered.

Conclusion

In this research, it was revealed that NSI along with the failure to report this event is still one of the major problems among nurses. NSI preventive strategies should be a highly serious part of prevention programs in the workplace, and training of HCWs requires an ongoing activity at the hospital. It is recommended that every hospital develop a routine program (weekly or monthly) to deal with NSIs. Moreover, health programming and also facilities for prompt response and treatment of NSIs should be set up in every large hospital.

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Conflict of interests

Nothing to declare.

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