DOI: 10.7860/JCDR/2015/16729.6965

Original Article

Microbiology Section

The Frequency, Causes and Prevention of Needlestick Injuries in Nurses of Kerman: A Cross-Sectional Study

ABBAS BALOUCHI[1], HOSEIN SHAHDADI[2], SUDABEH AHMADIDARREHSIMA[3], HOSEIN RAFIEMANESH[4]

ABSTRACT

Introduction: The needlestick injuries can cause the transmission of infectious diseases. Compared to other members of the community of health care nurses are at great risk of needle stick injury because of their frequent performance with vein punctures and taking care of patients suffering from different infectious diseases.

Aim: The main aim of this study was to assess Prevalence, causes and preventive of Needle Sticks injuries among nurses in Kerman (south of Iran).

Materials and Methods: This cross-sectional study was conducted from December 2014 to March 2015 on 240 nurses employed in two hospitals of Kerman. Sampling was performed through simple random sampling. Data gathered through a researcher made questioner. Data analysed by use descriptive analytical testes.

Results: From the nurses' perspective the main physical and human causes of needlestick injuries were syringe needles (82) and crowded wards (74). The majority of the nurses believed the most effective method to prevent needlestick were training (82).

Conclusion: Due to the high prevalence of injuries caused by sharp objects in nurses, needlestick injuries are suggested to be recorded in special forms and their causes to be checked by the Infection Control Committee. Since syringe needle heads and angiocatheter are the main causes of needlestick injuries, providing safe medical equipment should also be emphasized.

Keywords: Communicable diseases, Infection Control Committee, Prevalence

INTRODUCTION

An annual of 600,000 to one million health care workers experience injuries caused by sharp objects [1]. These injuries can cause the transmission of infectious diseases, such as hepatitis C and B, HIV, brucellosis, skin gonorrhea, herpes, malaria and syphilis [2,3]. The transmission rate of infection per injury is between 6-30% for hepatitis B, 3% for hepatitis C and 0.3% for HIV [4]. According to the Center for Disease Control and Prevention, only 10% of these injuries are reported. In developing countries, which have the highest global prevalence of HIV, the prevalence of needle stick injuries is also at the highest level [5]. Studies report an annual of 100,000 injuries caused by sharp objects in nurses in the UK [6]. The cost of one instance of injury caused by sharp objects varies from 51 to 3766 dollars, depending on a number of factors, including the type and method of injury, the infection developed, the diagnostic tests performed and the treatment measures taken [7]. Within the community of health care workers, nurses are at a greater risk of needle stick injury compared to others due to their frequent performance of injections and venipuncture and the providing of care to patients infected with hepatitis C and B and HIV [8]. The heavy workloads, inadequate nurse to patient ratio, frequent shifts and excessive fatigue are among the factors contributing to an increased prevalence of needle stick injuries among nurses, especially in developing countries [9]. Overall, nurses comprise the group of health care workers that experience the highest rate of injuries caused by sharp objects [10]. The results of a study conducted in Korea showed that 67.3% of nurses had experienced syringe injuries [11]. In the few studies conducted on this subject in Iran, the prevalence of needle stick injuries was reported as 20% to 70% among working nurses [12]. Given the significant mortality rates and complications associated with infections caused by injury with sharp objects among hospital personnel, especially nurses, the present study was conducted to make up for the lack of adequate information and studies on this subject in Iran.

AIM

The aim of this study was assess the frequency, causes and prevention of needlestick injuries in nurses in Kerman (south of Iran).

MATERIALS AND METHODS

This cross-sectional study was conducted from December 2014 to March 2015 on 240 nurses employed in two hospitals of Kerman. Sampling was performed through simple random sampling. The study inclusion criteria consisted of having a bachelor's degree and a minimum work experience of three months at the ward. A researcher-made questionnaire designed using the views of experts in relevant fields and the review of similar papers was used to collect the data [8,12]. The questionnaire was composed of three parts. The first part assessed participants' demographic information, including age, gender, marital status, work experience, the average number of shifts per month and the average number of work hours per week. The second part examined three factors, including the physical causes of needle stick injuries among the nurses through the assessment of seven items (needle, scissors, scalpel, angiocatheter, syringe cartridge, suture needle and pin). The human factors responsible for needlestick injuries among nurses through the assessment of nine items (crowded wards, lack of interest, distraction, stiff unyielding boxes filled to capacity, carelessness, fear, fatigue, needles left unattended and using hand instead of tools) and the methods for preventing needlestick through the assessment of five items (training, caution, proper needle disposal, proper resting and other items). The questionnaire was distributed among ten infection experts for confirming its validity and among 15 nurses participating in the pilot study for determining the reliability of its content, which was confirmed by a Cronbach's

alpha of 0.75. The nurses submitted their informed consent for participating in the study. The study was approved by the Ethics Committee of Zabol University of Medical Sciences.

STATISTICAL ANALYSIS

The data obtained were analysed in SPSS (Statistical Package for Social Sciences) version 20.0. Descriptive statistical indicators such as frequency distribution, frequency percentage, mean and standard deviation were used to describe the data. Depending on the nature of the variables examined, the chi-square test, Spearman's correlation coefficient and the *t*-test were used to investigate the relationship between needlestick injuries and other variables. The level of significance for the data was set at $p<0.05$.

RESULTS

From the total of 240 questionnaires distributed, 200 were completed. The questionnaire's response rate was 83.3%; 172 participants (86%) were female and 28 (14%) were male; 169(84.5%) were married and 31(15.5%) were single. Participants had a mean age and standard deviation of 31±6.7, an age range of 18 to 52, and a work experience of 9.3±3.7 years, 29.6±4.7 shifts per month and 48.6±6.7 work hours per week. The results of the study showed that, from the entire population studied, 72 participants (36%) had no history of needlestick injuries while the others reported having experienced instances of needlestick injuries during the past year; 78 nurses (39%) reported one instance of needlestick injury, 34 (17%) reported two to three instances, eight (4%) reported four to five instances and eight (4%) reported more than five instances of needle stick injury during the past year. The main physical cause of needlestick injuries was syringe needles (82) and scissors (33) [Table/Fig-1]. From the nurses' perspective, crowded wards (74) and lack of interest (30) were the main causes of injuries, while fatigue, needles left unattended and the use of hands instead of instruments were less responsible for the incidence of needlestick injuries [Table/Fig-2]. As for the methods of preventing needlestick injuries among nurses, the majority of the nurses believed the most effective methods to include training (82) and precautionary measures (51); [Table/Fig-3]. The first steps taken after the incidence of a needlestick injury were to wash the hands with water and soap (n=150), reporting to the head nurse (n=21), washing the hands with Betadine (n=14) and vaccination (n=15), in respective order. As for the time during which needlestick injuries had occurred, 73 nurses (36.5%) reported it to be the morning shift, eight (4%) the evening shift and 119 (59.5%) the night shift. The results of Spearman's correlation coefficient test showed no statistically significant relationships between the history of needlestick injuries and variables including work experience, age and the number of shifts per month (p-value>0.05). [Table/Fig-4]. The chi-square test also showed no significant relationships between the history of needlestick injuries and gender (p-value=0.63) [Table/Fig-5]. The results of the *t*-test showed no significant differences between the average hours worked per week in nurses who had a history of needlestick injuries and in those without such a history (p-value=0.51) [Table/Fig-6].

Physical causes of needle stick	Frequency	%
Needle	82	41
Scissors	33	16.5
Scalpel	24	12
Angiocatheter	20	10
Syringe cartridge	19	9.5
Suture needle	12	6
Pin	10	5

[Table/Fig-1]: Frequency and percentage of physical causes of needle stick

Human causes of needle stick	Frequency	%
Crowded wards	74	37
Lack of interest	30	15
Distraction	20	10
Stiff unyielding boxes filled to capacity	19	9.5
Carelessness	16	8
Fear	15	7.5
Fatigue	13	6.5
Needles left unattended	8	4
Using hand Instead of tools	5	2.5

[Table/Fig-2]: Frequency and percentage of human causes of needle stick

Methods for preventing needle stick	Frequency	%
Training	82	41
Caution	51	25.5
Proper needle disposal	37	18.5
Proper resting	26	13
Other	4	2

[Table/Fig-3]: Methods of needle stick prevention

Variables	Correlation Coefficient	p-value
Work experience	-0.022	0.0759
Age	0.003	0.965
Shift in month	0.022	0.765

[Table/Fig-4]: Correlation between history of needle sticks, work experience, age and shift per month

History of Needle Sticks		Gender		p-value
Yes	128 (64%)	Male (%)	28 (14%)	0.63
No	72 (36%)	Female (%)	172 (86%)	
Total	200 (100%)	Total	200 (100%)	

[Table/Fig-5]: Relationship between history of needle sticks and gender

	Yes (%)	No (%)	p-value
History of Needle Sticks	128 (64%)	72 (36%)	0.51
Average worked per week (hour)	Mean (SD)	Mean (SD)	
	47.49 (14.40)	49.29 (20.84)	

[Table/Fig-6]: Relationship between history of needle sticks and average worked per week

DISCUSSION

According to the results, the majority of participants were female, which is consistent with a study conducted by Hassani Shokouh et al., [13] but not with the study conducted by Joneidi Jafari in military hospitals [12], which may be due to the higher number of female nurses in public hospitals. The results also showed that more than 64% of nurses have had at least one needlestick injury during the past year, which is consistent with the results of a study conducted in Pakistan [8], but not with the study conducted by A. Azap et al., [14], who found a lower rate for these injuries; these different results can be due to the differences in the study populations examined and the higher prevalence of infection prevention programs in place in the hospitals surveyed in the present study. The results also showed syringe needle heads to be the most common physical cause of needlestick injuries, which is consistent with the results of studies conducted by Vahedi, Nazmieh, Joneidi Jafari and Derek R. Smith [10,11,12,15]. The reason for the greater contribution of this factor to the injuries is that syringe needle heads are the most commonly-used sharp objects among medical staff and that nurses have the greatest contact with needle heads. Crowded wards and rushed performances were the main human factors responsible for needlestick injuries, and studies conducted by Vahedi and Rakhshani also identified heavy workloads, rushed performance and the lack of precaution as the main factors contributing to needlestick injuries

[6,10]. As for the time during which needlestick injuries had occurred, the results showed that the night shift (59.5%) exhibited the most frequent incidence of these injuries in the nurses, which is not consistent with the results obtained by Johnson and Connor and C. Voide, who reported the morning shift to exhibit the most frequent instances of the injury [16,17]. A possible reason for this disparity is the community and the environment that have been surveyed or the nurses' fatigue and sleepiness toward the end of the night shifts. The majority of nurses participating in this study claimed training (52%) and not rushing (42%) to be the best effective methods for preventing needlestick injuries; however, in another study, Hatcher argues that using a dedicated container for the disposal of needles can prevent up to 60% of the cases of needlestick injury [18]. As for the early post-injury treatment measures, the results showed that nurses' knowledge and practice is inadequate, as most of them had chosen only to wash their hands with soap and water as the primary measure and only a small number (n=21) had performed the four essential post-injury measures, i.e. bleeding, washing, dressing and reporting), which is consistent with the results obtained by Nazmieh [16]. This study has limitations, which must be addressed. This was a cross sectional study that reduced the ability of the study.

CONCLUSION

Due to the high prevalence of injuries caused by sharp objects in nurses, needlestick injuries are suggested to be recorded in special forms and their causes to be checked by the Infection Control Committee. Due to nurses' inadequate knowledge about the principles of dealing with needlestick injuries, holding training programs on this issue seems essential. Since syringe needle heads and angiocatheters are the main causes of needlestick injuries, providing safe medical equipment should also be emphasized.

ACKNOWLEDGEMENT

This study was funded by research department of Zabol University of Medical Science. We would like to thank all nurses who participated in this research.

REFERENCES

[1] Leliopoulou C, Waterman H, Chakrabarty S. Nurses failure to appreciate the risks of infection due to needle stick accidents: a hospital based survey. *Journal of Hospital Infection*. 1999;42(1):53-9.

[2] Himmelreich H, Rabenau HF, Rindermann M, Stephan C, Bickel M, Marzi I, et al. The management of needlestick injuries. *Deutsches Ärzteblatt International.* 2013;110(5):61.

[3] Riess EA, Weller CE. Method and devices for its employ for reducing disease-transfer risks. *Google Patents;* 2014.

[4] Elmiyeh B, Whitaker I, James M, Chahal C, Galea A, Alshafi K. Needle-stick injuries in the National Health Service: a culture of silence. *Journal of the Royal Society of Medicine.* 2004;97(7):326-27.

[5] Shoghli A, Mousavi Nasab N, Ghorchian F, Masoumi H, Momtazi S. Study of theNeedle Sticks Injury (NSI) among the Zanjan Educational Hospitals Staff. *ZUMS Journal.* 2013;21(85):131-41.

[6] Rakhshani F, Heidari M, Barati S. Prevalence of needlestick injuries among the healthcare professionals in Zahedan medical Sciences university. *Iranian Journal of Epidemiology*. 2009;4(3):87-91.

[7] Bijani B, Sotudehmanesh S, Mohammadi N. Epidemiological Features of Needle Stick Injuries among Nursing Staff. *Journal of Guilan University of Medical Sciences.* 2011;20(77):61-8.

[8] Afridi AAK, Kumar A, Sayani R. Needle stick injuries–risk and preventive factors: a study among health care workers in tertiary care hospitals in Pakistan. *Global Journal of Health Science*. 2013;5(4):85.

[9] Prakash K, Patel K. Epidemiology of needle-stick injuries in Mangalore. *Journal of Evolution of Medical and Dental Sciences.* 2012;1(3):128.

[10] Vahedi MS, Ahsan B, Ardalan M, Shahsavari S. Prevalence and Causes of needle stick injuries, in medical personnels of Kurdistan University's hospitals and dealing with such injuries due to contaminated sharp tools in 1383. *Scientific Journal of Kurdistan University of Medical Sciences.* 2006;11(2):43-50.

[11] Smith DR, Choe M-A, Jeong JS, Jeon M-Y, Chae YR, An GJ. Epidemiology of needlestick and sharps injuries among professional Korean nurses. *Journal of professional nursing.* 2006;22(6):359-66.

[12] Jonaidi Jafari NA, Shasti M, Izadi M, Ranjbar R, Ghasemi M. Evaluation of frequency of Exposure to Medical Sharp Devices among Nurses of a University Hospital. *Journal of Military Medicine.* 2008;10(2):119-28.

[13] Shokoh SJH, Ahmed M. The knowledge and practice of healthcare workers Army Hospitalin relation to injuries caused by needles and viral diseases transmitted in this way. *Ann Mil Health Sci Res*. 2003;1(2):119-24.

[14] Azap A, Ergönül Ö, Memikoğlu KO, Yeğilkaya A, Altunsoy A, Bozkurt G-Y, et al. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. *American journal of infection control.* 2005;33(1):48-52.

[15] Nazmieh H, Mirjalili M. Needle Stick Injuries in Nurses in Hospitals Affiliated to Shahid Sadoghi University of Medical Sciences. *Scientific Journal of Hamadan Nursing & Midwifery Faculty.* 2006;14(2):12-22.

[16] Johnston JJ, O'Conor E. Needlestick injuries, management and education: a role for emergency medicine? *European Journal of Emergency Medicine.* 2005;12(1):10-2.

[17] Voide C, Darling KE, Kenfak-Foguena A, Erard V, Cavassini M, Lazor-Blanchet C. Underreporting of needlestick and sharps injuries among healthcare workers in a Swiss University Hospital. *Swiss Med Wkly.* 2012;142:w13523.

[18] Hatcher IB. Reducing sharps injuries among health care workers: a sharps container quality improvement project. *Joint Commission Journal on Quality and Patient Safety*. 2002;28(7):410-14.

PARTICULARS OF CONTRIBUTORS:

1. Student, Department of Medical Surgical, Student Research Committee (SRC), School of Nursing and Midwifery, Zabol University of Medical Sciences (ZBMU), Zabol, IR Iran.
2. Faculty of Nursing and Midwifery, Department of medical surgical, Zabol University of Medical Sciences (ZBMU), Zabol, IR Iran.
3. Student, Department of Medical Surgical, Student Research Committee (SRC), School of Nursing and Midwifery, Zabol University of Medical Sciences (ZBMU), Zabol, IR Iran.
4. Student of Epidemiology, Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Mr. Hosein Shahdadi,
Ferdowsi St, Nursing and Midwifery Faculty, Zabol University of Medical Sciences, Zabol, IR Iran.
E-mail: hosienshahdadi@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: As Declared above.

Date of Submission: **Sep 29, 2015**
Date of Peer Review: **Oct 25, 2015**
Date of Acceptance: **Oct 28, 2015**
Date of Publishing: **Dec 01, 2015**