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Original

The Effects of Nurses' Personal and Professional Characteristics on Needle Stick Injuries

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ABSTRACT

Background: Nurses face many professional dangers such as needle stick injuries. This study investigated the effects of nurses' personal and professional characteristics on needle stick injuries. **Methods:** The present cross-sectional study was performed on 200 nursing staff in a hospital. The sampling method was the classified method. Participants were asked to complete a researcher-made questionnaire on personal characteristics (age, work experience, gender, marital status, and educational level) and job (work department, number of shifts per month, and type of work shift). Also, the number of their needle stick events was extracted from their medical records. **Results:** The prevalence of needle sticks was 45.5%. Based on individual characteristics, the mean age and work experience of people with a history of needle stick are significantly lower than people without a history of needle stick ($P < 0.03$). There was a significant relationship between needle stick history and educational level ($P < 0.00$). However, there was no significant difference between the two groups without and with a history of needle stick in terms of marital status ($P = 0.11$) and gender ($P = 0.13$). Based on job characteristics, there were significant relationships between the history of needle stick with the variables of type of work shift ($P = 0.00$) and the number of shifts per month ($P < 0.00$). **Conclusion:** Some personal and professional characteristics effective in needle sticking were identified. These findings can be used as a guide to prioritize individuals to take precautionary measures against needle sticking.

Keywords: Personal characteristics; Job characteristics; Nurses; Needle stick injuries

Introduction

One of the major dangers that threaten the health of health center staff is needle sticking. [1] Needle sticking means skin tissue damage by a needle, a piece of broken ampule, or other sharp object contaminated with blood and other secretions from the patient and often occurs during activities such as blood transfusions and blood products, sampling, discarding needles and sharp objects, and collecting excreted material. [2] Needle scarring can lead to the transmission of more than twenty types of diseases such as hepatitis B and C, AIDS, brucellosis, gonorrhea, herpes, malaria, and syphilis. [3] Statistics show that each health care provider suffers an average of four needles in a year. [4] In the United States, out of four million health care workers, four

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hundred thousand suffer from needle stick injuries each year. [5] This statistic is higher in developing countries, so that the rate of damage caused by needle sticks in Middle Eastern countries is about 50%. [6] Rezaei et al. Also conducted a systematic review and meta-analysis to estimate the periodic prevalence of needle stick injuries among nurses working in Iran and determined that the one-year periodic prevalence of needle stick injuries among Iranian nurses was 44%. [7] In addition to the risks to life, the needle stick carries heavy economic losses. Cooke and Stephens stated that in 2015, the average cost per needle stick injury was US $ 747. [8] Each year, $ 118 million to $ 591 million is spent in the United States testing and treating Needle Stick injuries. [9] In order to prevent such critical accidents, which are essential both in terms of severity and frequency, the causes of needle stick injury in medical personnel must first be recognized so that prevention strategies can be used based on them. Some of the causes of needle stick include: not paying attention to injection safety instructions, not using personal protective equipment properly, not separating hospital waste properly, not having enough concentration and accuracy during work, hurrying the work, crowding, congestion And high workload, poor condition and lack of cooperation of the patient during injections, lack of test program and lack of knowledge. Other essential causes of needle stick injuries cover personal and professional characteristics of individuals, which as an intermediate factor can cause mistakes and dangerous behaviors in individuals. In the following, several studies in this field will be mentioned. Ghasemi et al., in their 2017 study, state that color vision impairment, tracking impairment, near-abnormal heterophobia, and decreased contrast sensitivity is significantly associated with increased needle-stroke injuries. [10] Ghimire et al. also concluded in 2017 that the prevalence of Needle Stick injuries is strongly correlated with age, depression, social issues, alcohol consumption, and sleep patterns. [11] Jahangiri et al., in their study in 2016, concluded that there is a significant association between gender, working hours per week, and the number of shifts per month with the appearance of needle stick injuries. [12] A study by Rujput et al. in 2016 also showed that Needle Stick injuries are directly related to an individual's work experience and training. [13] In other professional accidents, these characteristics are always effective. Since the personal and professional characteristics of nurses with a history of needle sticks have not been comprehensively studied in previous studies, the present study was conducted to investigate the effect of personal and professional characteristics of nurses on the appearance of needle stick injuries in one of Iran University of Medical Sciences hospitals.

Method

Participators

This cross-sectional study was performed in 2016 on 200 nursing staff of one of the hospitals of Iran University of Medical Sciences. Inclusion criteria included having at least two years of work experience, no physical-mental severe health problems, and employment in the nursing staff. Exclusion criteria were the non-cooperation of participants. The subjects were selected based on the inclusion criteria by categorized sampling from surgical, ICU, pediatric, internal medicine, operating room, oncology, emergency, CCU, psychiatry, and nephrology. Before the study, the participants' moral satisfaction was given to the individuals, and the principal explanations were provided. Also, if people did not want to participate in the study, other people were replaced. The ethics committee has approved the stages of this study of the Iran University of Medical Sciences (IR.IUMS.REC.1398.761).

Data collection

At this stage, to data collection, with the permission of the hospital management, the nursing office was referred, and individuals were asked to complete a

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questionnaire of personal and professional characteristics. In this questionnaire about the parameters of age, work experience, ward (surgery, ICU, pediatrics, internal medicine, operating room, oncology, emergency, CCU, psychiatry, and nephrology), number of shifts per month (less than 20 shifts per month, 20 Up to 25 shifts per month, 26 to 30 shifts per month and more than 30 shifts per month), type of work shift (fixed shift and rotating shift), gender (male or female), marital status (single or married) and educational level (Diploma, bachelor's degree and above) were asked. Also, the number of needle stick events of the associates was extracted from their medical records, including the history of needle stick injuries and the number of needle stick injuries.

Analysis of data

For data analysis, first, the data were entered in SPSS software (version 22) and then analyzed using independent t-test and one-way analysis of variance. Data were described using descriptive methods, including frequency distribution tables, graphs, and descriptive indicators.

Results

This descriptive cross-sectional study was performed in 2016 on 200 nurses in one of the hospitals of Iran University of Medical Sciences. The mean age of the subjects in the two groups without history and with a history of needle stick was 35.44±7.62 and 32.30±5.62 years, respectively. Also, the average work experience of individuals in the two groups with history and body of needle stick history was 10.61±6.78 and 8.20 ±5.06 years, respectively. The independent t-test showed that the mean age and work experience of participants with a history of needle stick were significantly lower than participants without a history of needle stick (P <0.03). Table 1 shows the frequency of individuals in groups with history and no needle stick history based on other personal and professional characteristics. Among the study participants, (53.5%) 108 had no history of needle stick, and 92 had a history of the needle stick. Among these individuals, (35%) 70 were single, and (65%) 130 were married. Also (57.5%) 115 were female and (42.5%) 85 were male. Based on the results, (10.5%) 21 individuals had a diploma, (82%) 164 had a bachelor's degree, and (7.5%) 15 individuals had a master's degree. In addition, (66%) 132 people had rotational work shifts, and (34%) 68 people worked in fixed shifts. (12%) Twenty-four participants worked less than 20 shifts per month, and the number of nurses who had 20 to 25 shifts per month, 26 to 30 shifts, and more than 30 shifts, was equal to 64 (32%), 64 (41.5%), and 29 (14.5%) 29, respectively. The frequency of these individuals without and with a history of needle stick is presented in Table 1. The chi-square test results showed that there is a significant relationship between the history of needle stick and the type of work shift (P = 0.00). However, there was no significant difference between the two groups without a history and with a history of needle stick in terms of marital status (P = 0.11) and gender (P = 0.13). Also, the results of the Mann-Whitney test showed that the relationship between needle stick history with education level variables and the number of shifts per month is significant (P <0.00).

The frequency of individuals without and with a history of needle sticks in different hospital wards is also presented in Table 2. The results of the Mann-Whitney test showed that the two groups without and with a history of needle stick were significantly different from each other in terms of work (P = 0.02). The highest frequency of needle stick history was related to emergency, operating room, and internal medicine departments.

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Table 1. Frequency of individuals in groups without and with a history of needle stick based on personal and professional characteristics

Variable		Participants without a needle stick history		Participants with a needle stick history		P value
		Frequency	Relative frequency	Frequency	Relative frequency	
Marital status	Single	25	23.1	45	48.9	0.11
	Married	83	76.9	47	51.1	
Gender	Female	54	50.0	61	66.3	0.13
	Male	54	50.0	31	33.7	
Educational level	Diploma, degree and above	12	11.1	9	9.8	<0.01
	Bachelor	81	75.0	83	90.2	
	Masters	15	13.9	0	0.0	
Type of work shift	Fixed	46	42.6	22	23.9	0.02
	Rotating	62	57.4	70	76.1	
Number of shifts per month	Less than 20 shifts per month	14	13.0	10	10.9	<0.01
	20 to 25 shifts per month	36	33.3	28	30.4	
	26 to 30 shifts per month	43	39.8	40	43.5	
	More than 30 shifts per month	15	13.9	14	15.2	

Table 2. Frequency of individuals in different wards of the hospital

Ward	Participants without a needle stick history		Participants with a needle stick history	
	Frequency	Relative frequency	Frequency	Relative frequency
Surgery	9	8.9	7	7.6
ICU	18	16.7	7	6.7
Pediatrics	22	10.4	6	6.5
Internal medicine	3	2.8	14	15.2
Operating room	3	2.8	15	16.3
Oncology	13	12.0	8	8.7
Emergency	13	12.0	17	18.5
CCU	2	1.9	10	10.9
Psychiatry	16	14.8	5	5.4
Nephrology	9	8.3	3	3.3
Total	108	100.0	92	100.0

Table 3. Frequency of number of needle sticks by nurses

Number of needle sticks	Frequency	Relative frequency
Time 1	19	20.7
Time 2	17	18.5
Time 3	15	16.3
Time 4	11	12.0
Time 5	12	13.0
Time 6	11	12.0
Time 8	7	7.6
Total	92	100.0

The frequency of needle sticks by nurses is also shown in Table 3. Based on the presented results, nurses had 1 to 7 times of needle stick exposure. According to the results, out of 92 participants who had a needle stick (20.7%), 19 individuals had experienced one needle stick once. The results also showed that only (7.6%) 7 participants experienced 7 Needle Stick accidents.

Discussion

The incidence of needle sticks in the participants was 45.5%. The study results of Ghasemi et al. in 2017 also show that the incidence of needle sticks in a studied hospital is 41.2%. [10] Rezaei et al. In 2017 in a study estimated that the one-year periodic prevalence of needle sticks among Iranian nurses is 44%. [7] In addition, Yarahmadi et al. conducted a study in 2013 to determine the prevalence of needle stick injuries among health care staff in a Tehran hospital, concluded that 40.42% of staff suffer from needle stick injuries. Moreover, the patient ward shows the highest prevalence of needle sticks, with 47.42% in the hospital. [4] The present study results are consistent with the results of other studies on the prevalence of needle sticks in Iran and show the high

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prevalence of needle sticks in our country. Due to its importance and dangerous consequences, it is necessary to identify the influential factors and pay serious attention to prevent this event. According to the present study results, the two groups with no history and no needle stick history were significantly different in terms of the work sector. The highest prevalence of needle sticks was related to the emergency room, operating room, and interior with 18.5%, 16.3%, and 15.2%, respectively. In 2013, Parsa Pili et al. also concluded that most needle injuries occur in the ICU and CCU. [14] The results of a 2017 study by Jakribettu et al. showed that most needle stick injuries occur during blood collection with 27% and invasive procedures with 21%. [15] In the wards such as the emergency room, ICU, and CCU, where the number of referred and patients is high and urgent action is needed, it is expected that the number of failures in the treatment staff will increase, and the needle sticks will rise. Operating room staff and internal departments are no exception to this rule and need to be highly focused on carrying out their activities. On the other hand, fatigue in these areas causes cognitive function to decrease, and people suffer from needle sticks. Therefore, the results obtained are reasonable. Also, the present study results showed that the mean age and work experience of people with a history of needle sticks were significantly lower than people without a history of needle sticks. Also, the results showed a significant relationship between the history of needle stick with variables of type of work shift, level of education, and the number of shifts per month. However, the two groups without and with needle stick history differed significantly in marital status and gender. Ghimire et al. determined in 2017 that there is a significant relationship between the prevalence of needle stick injuries and age. [11] A study by Fazili et al. In 2017 also shows that the prevalence of needle sticks is significantly higher in men. [16] Jahangiri et al. Also observed in 2016 a significant relationship between gender, working hours per week, and the number of shifts per month with needle stick injuries. [12] Rajput et al. found in 2016 that needle stick injuries were significantly associated with staff work experience and training. [13] Moreover, Parsa Pili et al. concluded in 2013 that there was a significant relationship between age, gender, work experience of fewer than two years, and education with the risk of needle injury. [14] Also, Cho et al. determined in 2013 that Needle Stick injuries are significantly correlated with factors such as poor work experience, poor work environment, and fatigue. [17] The results of these studies are approximately consistent with the results of the present study. Older people with more work experience have more expertise and have undergone more training, which may have helped prevent needle sticks. Increasing the number of shifts per month and rotating work shifts can also lead to chronic fatigue and burnout in the treatment staff, increasing needle stick injuries. Males are also more disposed to suffer from needle sticks due to their higher risk and more dangerous actions. However, the present study results showed that they are not different from females in terms of needle sticking, which can be due to similar observance of safety instructions by these two groups in this hospital.

Conclusion

The present study results showed that the prevalence of needle stick injuries in nurses of this hospital is high, which due to its serious consequences, it is necessary to control this type of event. The results showed that the prevalence of needle stick injuries in the hospital was high, particularly in the emergency room, operating room, and interior wards. According to the results, people with a history of needle sticks had a lower average age, less work experience, more shifts per month, and rotational work shifts than people without a history of the needle stick. Also, the results showed that the frequency of individuals with a history of needle stick

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was significantly higher in the group with a bachelor's degree than the diploma. This profile can be used as a guide to prioritize people to take precautionary measures against needle sticking.

Conflict of interest

The authors declare that they have no conflict of interest.

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Author's contribution

All authors contributed equally to the study.

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