

Investigating the Extent of Damage Caused by Sharp Instruments Contaminated with Patient's Blood in Operating Rooms of Educational Centres of Mazandaran University of Medical Sciences in 2018

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ABSTRACT

Background: Injuries caused by sharp instruments are known as a major occupational hazard to healthcare workers. Therefore, this study was conducted to determine the degree of damage caused by sharp instruments contaminated with patient's blood in operating rooms of educational centres of Mazandaran University of Medical Sciences in 2018.

Method and Material: This research was a descriptive cross-sectional study that 97 employees of the operating rooms of Mazandaran University were randomly selected. The instrument of this research was a questionnaire consisting of two sections, demographic information as the first part and the second part was about the occurrence of damage caused by sharp tools of operating room spaces, the frequency of work shift during damage, etc. After collecting information, the data were analysed by SPSS software 16 and using descriptive statistics such as mean and standard deviation as well as Chi-square test.

Results: The results showed that in terms of the type of tools causing damage, the most common instruments are needle tip (52%), suture needles (22%), Scalpel (15%), Angiocate (8%) and other instruments such as scissors and surgical knives (3%). There was a significant relationship between the number Needle stick injuries and variables of age, gender, work experience, work hours per week and the level of being interested in working ($p < 0.05$), but there was no significant relationship between the number Needle stick injuries and the education level ($p > 0.05$).

Conclusion: The results of this study showed that more than half of the operating room personnel were exposed to Needle stick injuries. Therefore, due to the complications and the probability of suffering from blood-borne diseases and high level of injuries in the operating room, conducting training classes and developing educational programs for activating committees to control infections and planning for the use of prevention methods and reporting and daily control of it seems to be necessary.

Key words: Needle stick, Sharp devices, Operating room personnel

HOW TO CITE THIS ARTICLE: Ali Pahnabi, Zeinab Bazari Jamkhaneh, Samere Rasouli, Rana Ab Jar, Ali Morad Heidari Gorji*, Investigating the extent of damage caused by sharp instruments contaminated with patient's blood in operating rooms of educational centres of Mazandaran university of medical sciences in 2018, J Res Med Dent Sci, 2018, 6(6): 175-179

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Received: 11/12/2018
Accepted: 20/12/2018

INTRODUCTION

Sometimes, Surgical Knives and Needle stick can cause serious infectious diseases among health centre staff through serious skin and tissue damage. Therefore, it facilitates the transmission of blood-borne diseases [1]. Needle stick injuries are the most widespread types of injuries caused by sharp instruments and all the employees of the health system are exposed to this risk and have drawn people's attention to increase the job

security of health care workers [2]. These injuries can put healthcare workers at risk of exposure to infections such as AIDS and hepatitis B, C, through blood-borne infections [3,4]. In fact, the damage caused by sharp instruments contaminated with patient's blood is one of the most important causes of transmission of this disease [5]. The transmission of these pathogens to health workers and patients can happen through non-sterile injections; injuries caused by contaminated sharp devices and recast the needle [6]. In the meantime, the risk of exposure to sharp injuries is higher among operating room personnel [7,8]. The share of developing countries from these injuries is 90% [9]. The Bakaeen et al. study in the United States found that 93% of Needle sticks have happened in

the operating rooms of hospitals under study [10]. Also, according to the results of these studies, 80 to 90% of the transmission of infectious diseases to the health centre staff is related to the needle sticks [11]. It is also worth noting that the use of safety equipment at the workplace by the health centre staff and maintaining job safety can reduce 80 percent of these injuries and 90% can be prevented by proper training [12]. Diseases transmitted to health care workers through sharp instruments can easily be avoided in case of using them properly and providing adequate training and less risky instruments and job support. If they do not take necessary measures, in addition to the risk of infection among health care workers and the risk of giving up and leaving their job due to fear of disease, it can cause harmful social and economic consequences for each country [13]. The community also faces high mortality through infectious diseases [14,15]. The present research solution is to develop training programs and increase the participation of staff and health officials as well as prevention and take more control over activating infection control groups in health care centres and hospitals. Lack of information and personnel's lack of knowledge about prevention methods of these injuries is one of the major causes of this damage in health centres. Therefore, the aim of this study was to determine the level of harm caused by sharp instruments contaminated with patient's blood in the operating room of Mazandaran University of Medical Sciences in 2018. It is hoped that damages caused by these injuries be reduced by increasing the level of awareness and taking them into account seriously.

METHODS

This descriptive cross-sectional study was carried out at Mazandaran University of Medical Sciences (ethical code: IR.Mazums.96.S.70) in order to investigate the injuries caused by sharp instruments contaminated with patient's blood in the operating room of Mazandaran University of Medical Sciences in 2018. Personnel working in operating rooms of Mazandaran University of Medical Sciences were the research sample of this study including 125 members that 97 individuals were selected through

random stratified sampling. The instrument of this research was a questionnaire consisting of two sections; demographic information as the first part and the second part was about the occurrence of damage caused by sharp tools of operating room spaces, the frequency of work shift during damage, etc. After collecting information, the data were analysed by SPSS software [16] and using descriptive statistics such as mean and standard deviation as well as Chi-square test.

FINDINGS

The participants' mean age in this study was 35.87 years with a standard deviation of 6.5. The average and standard deviation of the work experience of the operating room personnel in the educational centres of the university was 14.62 ± 4.54 . 60% of the staff was satisfied with their job and 40% were dissatisfied. 10% had a college degree, 75% had a bachelor's degree, and 15% had a master's degree. 80 out of 97 individuals working in the operating room had an experience of injury with sharp objects and the rest of them [17] didn't experience such injuries.

In terms of the type of tools causing damage, the most common instruments are needle tip (52%), Suture needles (22%), Scalpel (15%), Angiocate (8%) and other instruments such as scissors and surgical knives (3%) (Figure 1).

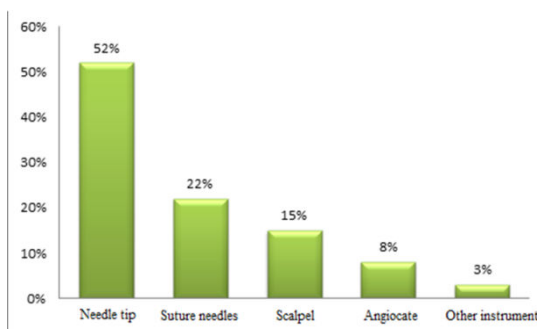


Figure 1: The frequency and causes of needle stick injuries

Table 1: The relationship between the frequency of needle stick injuries and demographic characteristics of the community

Demographic characteristics\Frequency of needle stick	Never		1-3 times		3-5 times		More than 5 times		p-value	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
Gender	Man	7	7%	15	15.64%	11	11.34%	10	10%	0.001
	Woman	3	3%	18	18.55%	16	16.49%	17	17.25%	
Age (years)	20-30	1	1%	8	8%	12	12.30%	14	14.43%	0
	31-40	3	3%	3	3%	10	10%	8	8%	
	41-50	5	5%	4	4%	7	7%	4	4%	
	Over 50	8	8%	6	6%	3	3%	2	2%	
	1-5	0	0%	11	11.34%	10	10%	8	8%	
Work experience (years)	6-10	3	3%	4	4%	6	6%	4	4%	0

	11-15	6	6%	3	3%	3	3%	1	1%	
	16-20	8	8%	1	1%	2	2%	0	0%	
	21-25	10	10%	0	0%	1	1%	1	1%	
	26-30	12	12.30%	0	0%	2	2%	0	0%	
Level of education	Primary school	6	8%	9	9%	10	10%	8	8%	
	Diploma	5	6%	8	8%	7	7%	6	6%	
	Bachelor	3	6%	5	5%	4	4%	7	7%	
	Masters	4	4%	6	6%	3	3%	2	2%	
	Ph.D	7	7%	5	5%	1	1%	0	0%	
Work hours per week	Less than 20 hours	5	5%	7	7%	9	9%	7	7%	0.06
	20-40 hours	7	7%	5	5%	10	10%	2	2%	
	40-60 hours	9	9%	8	8%	4	4%	6	6%	
	60-80 hours	5	5%	11	11.34%	3	3%	0	0%	
	80-100 hours	6	6%	9	9%	8	8%	0	0%	
	More than 100 hours	2	2%	4	4%	1	1%	4	4%	0.02
Being interested	Yes	22	22.68%	7	7%	8	8%	9	9%	
	No	5	5%	22	22.67%	15	15.34%	4	4%	0.001

RESULTS

Chi-square test was used to examine the relationship between demographic variables and the frequency of needle stick injuries (Table 1).

According to the p-value in studying the relationship between gender and the frequency of needle stick injuries that was equal to 0.001 and less than 0.05, it can be concluded that gender has a significant relationship with the frequency of needle stick injuries and women were more likely than men to suffer injury with needle stick. Considering the p-value in studying the relationship between age and the frequency of needle stick injuries that was equal to 0.000 and less than 0.05, it can be concluded that there is a significant relationship between these two variables and the results indicate that as the age of the staff was higher, the frequency of needle stick injuries was lower and personnel aged between 20 and 30 were more affected than the rest of the personnel. Regarding the p-value in studying the relationship between the variable of work experience and the frequency of needle stick injuries that was equal to 0.00 and less than 0.05, it can be concluded that there is a significant relationship between these two variables and as the personnel's work experience is higher the frequency of needle stick injuries is lower, and personnel with 1 to 5 years of job experience are more affected than the rest of the staff and the frequency of needle stick injuries significantly decreases among personnel with more work experience. According to the p-value in examining the relationship between the variable of working hours per week and the frequency of needle stick injuries that was equal to 0.02 and less than 0.05, it can be concluded that there is a significant relationship between these two variables so that there will be a

reduction in the number of needle stick injuries as a result of more weekly working hours. There was no statistical correlation between these two qualitative variables. There was a significant relationship between the variable of being interested in working and the frequency of needle stick injuries with p-value less than 0.05 and as the personnel were more interested in working, they are less likely to suffer from needle stick injuries. However, those who were not interested in their work and work environment experienced a higher number of needle stick injuries. There was no significant correlation between the level of education and the frequency of needle stick injuries with a p-value which is greater than 0.05.

DISCUSSION AND CONCLUSION

The results of this study showed that over the past year, about 34% of the operating room personnel of Mazandaran University of Medical Sciences suffered from needle stick injury at least once. This figure was reported in Heidari *et al.* study [1] in Projen and Lordegan Hospitals (74.3%) and in Rakhshani *et al.* [16] research among health care workers of Zahedan University of Medical Sciences (64.9%). The difference in the type of study and the combination of occupational categories or sample size and the duration of the study and the background of medical staff may be The probable cause of high prevalence of needle stick injuries in these studies. Martins *et al.* in their study, which was conducted among health workers in Portugal, stated that 64.5% of people had at least one experience of injury with sharp instruments in the last 5 years [17].

In a study conducted by Nasiri *et al.* in Mazandaran hospitals, they reported that about 76% of workers experienced needle stick injuries at least one time [18].

Smith and colleagues also reported that 50% of anaesthesiology residents also had at least one exposure to infected syringes [15]. In a study on nursing and midwifery students in Kerman University, Nohi *et al.* reported that 2.42% of students experienced needle stick injuries at least one time [19].

Other results of this study showed that 17.6% of personnel had experienced damage with harmful instruments more than 5 times. The results of the Mujeeb *et al.* study also showed that 58.8% of the operating room staff had more than 4 times exposure to needle stick injuries while only 36% were vaccinated [20]. In Ghasemi *et al.* study, it was also found that 55% of nurses and 53% of service personnel had experienced needle stick injuries over a 5-year period [21].

The results showed that in terms of the tools causing damage, the most common instruments are needle tip (52%), suture needles (22%), Scalpel (15%), Angiocate (8%) and other instruments such as scissors and surgical knives (3%) that were not compatible with the research results of Bakaeen *et al.* [10].

Like our paper, in a recent paper Sharp injuries in the studied hospital were common [22]. Therefore, an effective recording system and sufficient education on occupational safety must be implemented by the relevant institutions and hospitals. Moreover, it is crucial to take effective measures to manage sharp injuries and provide guidance for their prevention [22].

Another research like us showed [23] these results indicate that sharp instrument injuries have become a major occupational problem in mainland China. Attentions need to be paid to the issue and strategies for preventing such injuries are needed.

However, it was compatible with the research of Rakhshani *et al.*, and Heidari *et al.*, who reported that infected needle tip is the major cause of injury [1,16].

In the present study, factors influencing the frequency of needle stick injuries from the viewpoint of personnel are rushing, carelessness, busy shifts and tiredness during work and lack of personnel for more cooperation. It is necessary to standardize the ratio of staff to the hospital's bed so that being preoccupied with different matters will not cause carelessness about staff's health. On the other hand, empowering the personnel in managing time and avoiding the accumulation of tasks can overcome this problem to some extent [16].

In this study, in terms of gender, a significant difference was seen in the frequency of needle stick injuries and women were more likely to suffer from needle stick injuries which is consistent with shah's results, which reported women exposure twice as much as men and referred to women's engagement and responsibility as the reason of this issue [10]. However, it wasn't in line with Heidari *et al.* research results [1].

In terms of age, work experience, working hours per week, and being interested in working, there was also a significant relationship with the frequency of needle stick injuries but there was no significant relationship with the level of education. The outbreak of exposure to needle sticks injuries among people who had less than 5 years of work experience and were less than 30 years old was higher than the rest of the personnel. In other words, less exposure can be seen in those with more work experience which is compatible with the study of Rakhshani *et al.* [16].

LIMITATIONS

The data were collected retrospectively through participants recalling their experience. Even though we tried hard to select samples from various parts, selection bias could not be completely avoided. Smaller, lower-level, special and private clinics were left out. Traditional cultural differences in HCWs may be responsible for some discrepancies.

CONCLUSION

According to above mentioned matters and given that many patients are taken to hospital in an emergency and unpredictable situation so that personnel have no idea about their health status, the serious risk of needle sticks injuries are always threatening operating room personnel. Therefore, it seems that holding training classes and enhancement of protective facilities such as gloves, glasses, collecting and disposal of contaminated waste, creating a change in the behaviour and attitude of community members and doctors towards the demand and prescription of injectable drugs can be useful in improving the situation of the operating room staff.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests.

ETHICAL CONSIDERATIONS

Ethical issues were completely observed by the authors.

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