Epidemiological Aspects of Needle Stick Injuries among Nurses in a Military Hospital

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ABSTRACT

The most frequent way of transmission of various diseases such as HBV, HIV and HCV is exposure to sharp tools. The purpose of this work was to identify epidemiological aspects of Needle Stick Injuries among nurses. In this cross - sectional study 100 nursing staffs in a military hospital were chosen as a sample. Personal and professional information collected by a valid and reliable questionnaire, and data were analysed using SPSS 17 software. The prevalence of occupational exposure to sharp tools of hospital waste was 41%. Mean age and mean of experience years in nurses were 34.7± 5.88 and 10.99 ± 5.52 years respectively. About 63% of nurses in disaster reported the matter to the Committee on Hospital Infection Control. Most impressed by the syringe needle was 46.3%. Working load and needle recapping were the main causes of the damage due to exposure to the sharp objects, 26.8 and % 31.7 respectively. The relationship between occupational exposure to hospital sharp tools and age, experience, education and place of work was significant with P= 0.006, 0.017, 0.027 and 0.008 respectively. According to the complications of sharp tools, reduction of sharp components requires regular training courses for staff, proportion of the number of work shifts, strict implementation of treatment protocols, modification of the current inaccuracy procedures, access to adequate equipment's and safe and an effective mechanism for reporting of occupational accidents in all of the sectors.

Keywords: Epidemiological, Needle Stick, Injuries, Military Hospital, Nurses

INTRODUCTION

The most hazardous conditions of threatening the nurses' health are the injuries resulting from contaminated cutting equipment during operations. [1-5]. According to high numbers of injections, unsafe transport of sharp wastes has created many problems [6]. Despite repeated exposure of health care personnel with sharp objects, there are many ways to reduce and protect against such damage. To be the first, occupational exposures must be well understood and then preventive measures and control procedures should be used [7]. This imposes direct and indirect costs to the public health systems [8]. One transmission from this type of exposure can be cost of one million dollars to impose the public health system, while the cost of preventive measures is one-third of that amount [9]. Needle stick injuries in the body are not only the main risk of infection among health care workers, but it could impose for at least 6 months worry, anxiety and fear of workplace to the health personnel or their families [10-12]. The most prominent risk occupational group among health care workers is nurses which more than 50% of them during their service are at least 1 time come in contact with blood or body fluids of patients [9, 13-16]. In several studies, the incidence of injuries from sharp objects has been reported equal to 4 per person per year [15, 17-19]. This usually occurs during using or disposing of sharp instruments [20].So proper disposal of sharp objects is important, and in case of non-compliance and safety, and accidents can cause serious damage to the health care staff [21]. International health organizations have published guidelines for the prevention of diseases and infections transmitted through blood and body fluids, which can serve as a standard of care for occupational exposure to blood and body fluids used [22], due to the high cost associated with the control of infections and complications of injuries caused by sharp tools in hospital personnel [15]. Some studies in Iran indicated that the knowledge about prevention strategies in Health workers was not optimal [23] and some others showed a high rate of NSIs; however, there are a few official report on exposure rate among

Iranian nurses [6, 24] and the incidence of NSIs and its epidemiological aspects, especially in Military centers, Therefore, this study was designed to determine the rate of NSIs among nurses in an Iranian military hospital.

MATERIALS AND METHODS

This cross-sectional study was conducted on 100 randomly selected nursing staff of operating room, CCU and ICU, emergency, surgery and internal ward in one of Hospitals in Tehran, in 2012. The inclusion criteria for the employee were to first perform at least six consecutive months of nursing services. Second, they did not participate in the similar research before. Data was collected by a reliable and valid questionnaire. Questionnaires were distributed and collected anonymously. The questionnaire consisted of demographic characteristics of the participants including age, gender, work history, Vaccination history and the details of their lifetime occupational exposure to needle stick or/and body fluids. Participants were also asked whether they usually recapped the used needles or not, and whether they had reported their exposure to the appropriate authorities. The validity of the questionnaire was evaluated by reviewing the existing questionnaires. Furthermore, for assessing the reliability of the questionnaire a pilot study was also carried out. Variables studied included age, gender, working experience, number of exposures, shift work, and the post-exposure immunization status. For ethics and integrity, the questionnaire was completed without profile of nurses, and data was gathered confidential. SPSS 17 software was used for statistical analysis, t test and chi-square test was used.

RESULTS

The prevalence of occupational exposure to hospital sharp objects was, 41% (41 patients). Among nurses with occupational exposure in 16 nurses (39%), and 9 nurses (22%) have reported one, two and three or more times of exposure to sharp instruments, respectively. Sixty nine (69%) of the nurses were female and 31 (31%) were male. Prevalence of exposure in male and female nurses, were 68.3% and 31.7%, respectively. A chi-square test showed that this difference was not statistically significant (P = 0.899). The average age of participants was 34.7 ± 5.8 years and the range of age was 22 to 60 years. Youngest Nurse at the time of exposure was 25 years and the oldest was 44 years old. The mean age of exposed and non-exposed groups was 32.78 ±5.14 and 36.03±6.03 years, respectively. This difference was statistically significant (p<0.05) (Table 1).

Table 1: The comparison of mean and standard deviation of age and experience in hospital nurses with occupational exposure and non- exposure

Group / Variable	NSIs)Mean ± SD(	No NSIs)Mean ± SD(	Independent Samples Test	P-value
Age (year)	32.78 ± 5.14	36.03 ± 6.03	2.81	0.006
work experience (year)	9.41 ± 4.99	12.08 ± 5.64	2.43	0.017

The average work experience years were 10.99 ± 5.52, range 1 to 27. Average work experience was 4.99 ± 9.41 and 5.64 ± 12.08 years in exposed and non-exposed participants respectively. This difference was statistically significant (05/0 p <), (Table 1).

Considering educational status, nurses were classified into four categories: diploma, associate, bachelors and master's degrees. Bachelor's degree with greater frequency of 66 participants (66%). Participants with lower educational level had higher occupational exposure (P = 0.027). An exposure rate among educational classes is showed in Fig. 1.

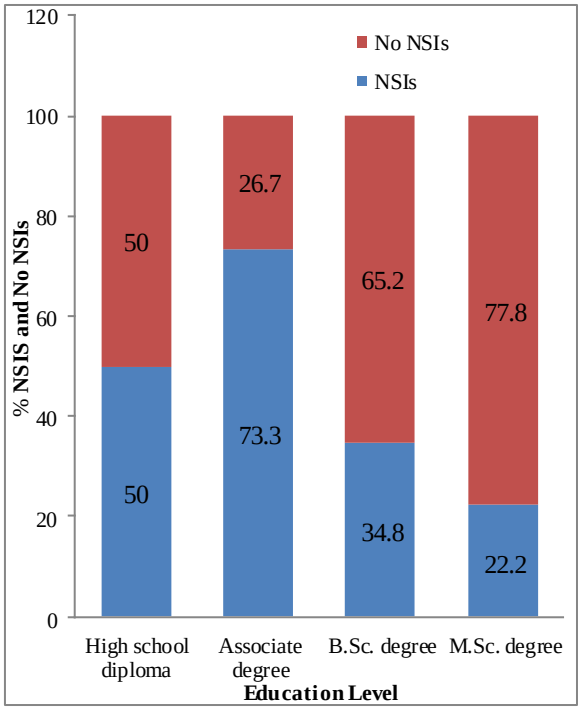

Fig 1: Injuries from sharp objects in different groups of nurses in the first 6 months of 1392

Most of occupational exposures have been happened in the operation room (39%), surgery ward (19.5%), Emergency ward; CCU and ICU, each with 14.6% and internal ward (12.2%). A chi-square test showed

that this difference was statistically significant (P = 0.008).

Most of occupational exposure have been happened among nurses working at the morning shift (56.1%), the exposure rate in other shifts was 17.1% 14.6% and 12.2% for rotation, evening and night, respectively. The difference was not statistically significant (P = 0.119). Considering type of instrument which led to exposure, syringe and IV needles, with 46.3% and 24.4% respectively, had the highest rate of occupational exposure. Needle re-capping and blood, with 31.7% and 24.4% respectively, were the greatest opportunity to bring about exposure. The results showed that the work load and fatigue and drowsiness with 26.8% and 22%, respectively, were the most frequent cause of injury and occupational exposure to sharp tools (Table 2).

Fifty one percent of the nurses have reported that they passed a training course and had sufficient information about how to work with sharp objects and how to deal with accidents and injuries and exposure to infected blood and secretions.100% of the participant had a full history of vaccination against hepatitis B. 63.4% of all affected nurses have reported the incident to the Hospital Infection Control Committee. 36.6% of affected nurses did not report the incident to the Hospital Infection Control Committee and just push toward the place of injury and wash it with soap and water.

Table 2: Frequency distribution type of instrument, Circumstances leading to the accident and the event of exposure to sharp tools

Type device	**N= 87 (%)**
Needles	40 (45.98)
Needle IVC	21 (24.14)
Scalp Vienna needle	13 (14.94)
Other cases (suture needle,types of thorns,ampoules and vials)	13 (14.94)
Circumstances leading to the accident	**N= 87 (%)**
Refresh needle cap	28 (32.18)
Bloodletting	21 (24.14)
Injection	17 (19.54)
Stitch	13 (14.94)
Other cases	8 (9.2)
Event due to injury	**N= 188 (%)**
The high volume of work	47 (26.41)
Fatigue and sleepiness	49 (21.91)
Imprudence and haste	(19.66) 35
Low quality tools	35 (19.66)
Lack of skills	13 (7.3)
The sudden movement of the patient	9 (5.06)

DISCUSSION

The results of this study showed that occupational exposure to sharp objects among nurses during their work was 41%. In several studies on the medical staff the exposure have been reported, As Nassiri and colleagues have reported the prevalence of 76.7% during one year [25] Zeighami and colleagues reported the incidence of, 10% [26]; Khalooei and colleagues [27], have reported the prevalence in nurses 33%. In Pakistan, Canada and South Koreathe prevalence among health care workers have been reported 94%, 72.4% and 79.7%, respectively [28-30]; Mohammad Nejad *et al*. in Tehran Imam Khomeini Hospital reported a prevalence rate of 47.05% among nurses during one year [31], Yarahmadi and colleagues in a hospital in Tehran in 1391 reported the prevalence of 40.42% in health care workers [7], Nsubuga *et al*. reported The prevalence of 82% [32]. Poorolajal *et al*. in 1383 reported the exposure for 240 cases per 1,000 people per year [33]. Ehsani *et al*. have reported, 45.12% in an Iranian Teaching Hospital [23].

Different levels of exposure reported in these studies may be due to some factors such as lack of a comprehensive and standard methodology to study in this area and the variable range of investigated exposures in several Iranian or foreign studies, different working patterns and differences in the presence or absence of a Registry and reporting system, and the appropriate response by infection control authorities, this issue can affect the motivation of exposed nurses for reporting and access to actual information. Besides differences in reported exposures can be related to Organization and available resources in multiple systems In some centers, As patterns and standards of personnel per hospital bed in some locations are different, as Poorolajal *et al*. have explained this issue as one of the causes of higher exposure rate in their study Compared to other studies. In the present study, 39% of nurses have reported at least one occupational exposure to sharp tools. This proportion has been reported in Khalooei *et al*. [27] 43%.

Our results show that, 100% of participants have had completed a vaccination against hepatitis, while this proportion have been reported 63.9% in Khalooei *et a.l* [27], 98.25% Zeighami *et al*. [26] 82.4% of Mohammad Nejad *et al*. [31], In a study conducted in Pakistan, 82.7% [28], and a study conducted at a teaching hospital in Arak 84.4%; In another study by Azadi *et al*. at a hospital in Tehran 95.5% [34] Other studies in Saudi Arabia [35], India [36] and Egypt [37] have reported as 82, 66 and 82.4%, respectively. The prevalence of occupational exposures in participants with a history of working in less than 15 years, 16 years and above, was 87.8% and 12.2%, respectively. The results of the present study are consistent with the results of Mohammad Nejad *et al*. [31]. These authors have reported that the exposure

rate is greater for participants with less than 5 years of work experiences (64.7%). According to Dement *et al*. young age is a common cause of injury [31], in Saudi Arabia half of the exposures occurred in the first three years of service [35]. Similar results by Yarahmadi in Iran [7] and studies in Turkey and the UK have been reported [1, 14]. The inverse relationships which have been reported in the present study and some other studies, between the amount of exposure and experience of individuals, may be due to incompatibility and lack of familiarity to the registry and reporting processes or the type studies design. As in some studies reported exposures were not related to a specific time period. So to be sure to avoid these inconsistencies in registering and reporting the exposures it is necessary to register at minimum Period of time, preferably at the end of each work shift by the authorities and registering and reporting processes must be defined as clearly as possible, and to set up training courses for low experienced personnel.

In the present study the occupational exposure was 40.6% and 41.9%, in men and women, respectively and there was no significant difference between them. Our result was consistent with Yarahmadi *et al*. [7] that have reported that there was no significant relationship between frequency of exposure and gender (40.22% and 40.98% in men and women, respectively). In contrast Poorolajal *et al*. in 1383 [33] have reported a significant relationship between exposure and sex and the frequency of exposure in females has been reported in approximately 28.3% compared with 18.3% in men. Zeighami *et al*. [26] have reported the prevalence of occupational exposure to needle 10.6% and 3.7% in males and females, respectively. The results demonstrate that, the highest frequencies of exposure were reported from operating room (39%). In Khalooei *et al*. [27] study most frequently were reported from surgical ward (29.6%). In the present study the frequency of exposure in the surgical and internal wards, were 19.5% and 12.2%, respectively which is in agreement with other studies [38, 39]. In the present study, in consistent with other studies [27] the highest prevalence of occupational exposure was in the morning shift (56.1%) and 63.4% of nurses have reported the exposure to the Infection Control Committee. Mohammad Nejad *et al*. reported this proportion to as 68.08% [31] while other studies conducted in Iran reported from 23.6%, 30.5%, 45.2% and 54.5% [17, 26, 27, 40]. In United States 84% of occupational exposures in nurses are reported [41]. In a study conducted in Pakistan [28] No Exposure had to have been reported. The causes of no reporting, in the present study, in consistent with other study [31] were the lack of information on how to report (21.96%) and time consuming process (14.64%). In our study, inconsistent with other studies [27, 31, 42, 43] 32.18% of accidents and injuries caused by sharp items and needle recapping. These results emphasise on the necessity of paying more attention to the healthcare personal Recapping practice. In line with other studies [17, 27], after recapping, phlebotomy (24.14%) were the most common situation leading to exposure by the nurses.

In our study, the most frequent type of instrument causing needle stick was a syringe needle (45.98%). This proportion has been reported in other studies as 62%, 43.57%, 37.5% , 73% , 52% , 70.1% [17, 25, 27, 30, 43, 44].

In the present study, the work load, fatigue (and drowsiness), carelessness, lack of skill and the suddenly patient movement, were the most common causes of injury with 26.41%, 21.91%, 19.66%, 19.66%, 7.3% and 5.06% , respectively. Aghadoost *et al*. [43] have reported the most common causes of injury were carelessness, fatigue and work-related stress, with 32.4%, 29.4% and 14.6% respectively. Vahedi *et al*. [44] also have reported the work load and carelessness 30.34% and 27.74%, respectively, are the most common causes of injury.

One of the limitations of the present study was restricting the study of nurses. Given that the best way to protect against the damage caused by sharp devices is the use of safety equipment, therefore, for future studies we recommend that at first present medical staff first and then introduce the necessary safety equipment and training the staff at medical centers started using these tools and re-examined the prevalence.

CONCLUSION

Due to the high rates of injury caused by sharp and cutting objects and in order to reduce its affects, the following actions are recommended: prevention of injuries, dealing with the objects under observation of hospital infection control committee, set up a registration system, regular reporting of occupational accidents in hospitals, planning and having a needle-stick protocol, accurate measurements of serum viral markers and formation of separate personnel health records for each employer. Regular and periodic training of employees with the aim of considering health and safety principles and management of sharp devices is very important. Preventive measure such as vaccination and integration strategies for reporting injuries caused by sharp devices is essential. The existence of a registration system, for reporting and active management of occupational exposures, with a focus on hospital infection control committee can play an effective role in reducing the incidence. On the other hand, appropriate workload and using high

quality and standard equipment, should be seriously considered.

ETHICAL ISSUES

Ethical issues such as plagiarism have been observed by the authors.

AUTHORS' CONTRIBUTIONS

All authors collaborated equally.

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The authors have no conflicts of interest to declare.

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