Artículo de investigación

An 8-year surveillance of occupational exposure caused by sharp instruments and needle sticks in Velayat Burn Injuries Hospital during 2008-2016

Supervisión de 8 años en la exposición ocupacional causada por instrumentos afilados y pinchazos de agujas en el Hospital de Lesiones por Quemaduras de Velayat durante 2008-2016

Vigilância de 8 anos da exposição ocupacional causada por instrumentos cortantes e picadas de agulha no Hospital Velayat Burn Injuries durante 2008-2016

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Abstract

Needle stick injury is one cause of infection incidence due to blood or body fluids that can lead to infectious diseases such as Hepatitis, Aids and even death in affected people. This study aimed to determine the injuries caused by splash, sharp object and needle stick. This descriptive cross-sectional study was conducted in Rasht Velayat Burn Injuries Hospital. Data collection was conducted with demographic form and occupational exposure-related injuries and review of occupational records of injured people which analyzed by SPSS software. The results of reviews showed a total of 129injured people during an 8-year-period among them 75% was nurses and 25% was service workers. Most injured people aged between 30 to 40 and 37% of them had a 1 to 5 year working experience and finger was the most injured organ. The most injuries occurred in morning shift between 10 to 12 am followed by 12-14 pm or 18-20 pm. Considering this fact that a desirable Frequency Severity Indicator (FSI) is FSI<1, investigations showed that this figure was 1% in 2015 and the most injuries were observed in this year in August. Considering the epidemic and variation of workplace accidents, holding a judicial and

Resumen

La lesión por punción con aguja es una de las causas de la incidencia de infecciones debidas a la sangre o los fluidos corporales que pueden provocar enfermedades infecciosas, como Hepatitis, SIDA e incluso la muerte en las personas afectadas. Esta investigación tuvo como objetivo determinar las lesiones causadas por salpicaduras, objetos afilados y pinchazos con agujas. El estudio descriptivo de corte transversal se realizó en el hospital de lesiones por quemaduras de Rasht Velayat. La recolección de datos se realizó con la forma demográfica y las lesiones relacionadas con la exposición ocupacional y la revisión de los registros ocupacionales de personas lesionadas que se analizaron mediante el software SPSS. Los resultados de las revisiones mostraron un total de 129 heridos durante un período de 8 años, de los cuales el 75% eran enfermeras y el 25% eran trabajadores de servicios. La mayoría de las personas lesionadas de entre 30 y 40 años y el 37% de ellas tenían una experiencia laboral de 1 a 5 años y el dedo era el órgano más lesionado. La mayoría de las lesiones ocurrieron en el turno de la mañana entre las 10 y las 12 am, seguidas de las 12-14 pm o las 18-20 pm Teniendo en

health training courses for both employees and employers with respect to acquaintance of safety principles and technical protection seems necessary in order to decrease work-related injuries and human resource retention.

Keywords: occupational exposure, training, safety principles, puncture injuries.

cuenta este hecho de que un indicador de gravedad de frecuencia (FSI) deseable es FSI <1, las investigaciones demostraron que esta cifra fue del 1% en 2015 y la mayoría de las lesiones se observaron en este año en agosto. Considerando la epidemia y la variación de los accidentes en el lugar de trabajo, realizar cursos de capacitación judicial y de salud para empleados y empleadores con respecto al conocimiento de los principios de seguridad y protección técnica parece necesario para disminuir las lesiones relacionadas con el trabajo y la retención de recursos humanos.

Palabras clave: Exposición laboral, formación, principios de seguridad, lesiones por punción.

Resumo

A lesão por punção com agulha é uma das causas da incidência de infecções por sangue ou fluidos corporais que podem causar doenças infecciosas, como hepatite, AIDS e até morte nas pessoas afetadas. O objetivo deste estudo foi determinar as lesões causadas por respingos, objetos pontiagudos e punções com agulha. Este estudo descritivo, transversal foi conduzido no hospital de queimadura de Rasht Velayat. A coleta de dados foi realizada com a ficha demográfica e as lesões relacionadas à exposição ocupacional e à revisão dos registros ocupacionais das pessoas lesadas que foram analisadas através do software SPSS. Os resultados das revisões mostraram um total de 129 lesões durante um período de 8 anos, dos quais 75% eram enfermeiros e 25% eram trabalhadores de serviço. A maioria das pessoas lesadas entre 30 e 40 anos e 37% delas tinham uma experiência de trabalho de 1 a 5 anos e o dedo era o órgão mais lesionado. A maioria das lesões ocorreu no turno da manhã, entre as 10h e as 12h, seguida das 12h às 14h ou 18h20. Considerando este fato, um indicador de severidade de frequência desejável (FSI) é FSI <1, as investigações mostraram que esse número foi de 1% em 2015 e a maioria das lesões foram observadas neste ano em agosto. Considerando a epidemia e a variação de acidentes no local de trabalho, parece necessária a realização de cursos judiciais e de treinamento em saúde para empregados e empregadores, quanto ao conhecimento dos princípios de segurança e proteção técnica, para reduzir as lesões e acidentes relacionados ao trabalho. a retenção de recursos humanos.

Palavras-chave: Exposição ocupacional, treinamento, princípios de segurança, lesões por punção.

Introduction

Hospitals are the most important and risky healthcare centers in every health system worldwide and human resources working in hospitals are at increased risk of different occupational risks (Shahbinezdad et al. 2017; Niosh, 2016). Occupational exposure is defined as contact with blood, tissue of others potentially infectious fluids that occur during the performance of job duties and sound logically expected are classified as occupational exposure (Himmelreich et al. 2013). All healthcare system providers that perform invasive measures are at high risk of acquiring various occupational exposures that lead to different infections and blood borne diseases considering their assigned job duties (Miraki et al. 2015; Hashemi et al. 2011).

Percutaneous injuries caused by blood-contaminated needles or sharp instruments are related to 20 bloodborne pathogens among body fluids caused by needle stick, percutaneous injuries from sharp devices or exposure of these harmful agents with mucosal membranes or damaged skin such as cracks, scratches, abrasions or dermatitis (Camacho-Ortiz et al. 2013; Kuhar et al. 2013). Generally, any kind of skin, eye, mucus or endoderm contacts with blood or other body

healthcare workers and virus infections including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are among the most prevalent and harmful agents (Hashemi et al. 2011; Abdulbaghi et al. 2014; Uchenna et al. 2016). The transmission risks of these infectious diseases from patient to healthcare workers are as follows: Hepatitis C (3%), Hepatitis B (30%) and HIV (0.3%) (Ingole et al. 2016). Sharp devices such as needles, scalpels, lancets and broken glass, sampling tubes and other instruments can cause transmission of bloodborne pathogen agents to body (Ingole et al. 2016). Researchers have shown that 60-80% of

nurses in developing countries do not formally report sharp instrument related injuries (Ingole et al. 2016) while this figure is below 40% in European countries (Frickmann et al. 2016). Based on conducted studies needle stick is the most prevalent way of injuries caused by sharp instruments (Panlilio et al. 2005; Who, 2002). Needle stick means the penetration of the skin by needles or other sharp instruments which have already been contaminated by blood, tissue or other body fluids. Needle stick related injuries account for 50-90% of transmission of infectious diseases from patients to healthcare staffs (Ghasemi et al. 2009; Aung et al, 2016; Ingole et al. 2016).

Healthcare personnel should be trained to totally avoid blood donation; uterus donation; pregnancy; breast-feeding and tissue donation especially during the first 6–12 weeks after exposure (Kuhar et al. 2013; WHO, 2002). Statistics show that more than 37% of Hepatitis B, 39% of Hepatitis C and about 5% of HIV/AIDS in healthcare workers around the world are due to needle stick injuries and more than 90% of these infections occur in developing countries (Ingole et al. 2016).

Developing countries BBPs (particularly HBV, HCV, and HIV), due to the high prevalence of such pathogens in developing countries, healthcare staffs in those countries are known to be at more risk of infection caused by sharp instruments (Talas and Kocaöz, 2015).

Based on mentioned issues it can be said that the results of this study are of great importance due to the urgent need for preventing measures and informing healthcare providers in order to reduce such occupational exposures. Therefore, the aim of this study is to investigate occupational exposures caused by sharp instruments and needle sticks in Velayat Burn Injuries Hospital in Rasht city.

Methods

This study was conducted from 2008 to the first half of 2016. All recorded cases by personnel in Velayat Burn Injuries Hospita during this period were investigated. Statistical population of this study includes all nurses, physicians, service personnel, office staffs and technicians. These include a total of 290 nurses, 14 emergency room staffs, 7 clinical staffs, 17 plastic surgery staffs, 18 VIP room staffs, 17 burning surgery staffs, 16 ICU staffs, 21 burning operation room and 27 reconstruction surgery staffs. It should be noted that all reported events by hospital personnel related to sharp injuries were included in this study. Frequency Severity Indicator (FSI), Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Safe-T-Score were used in this study which depends on factors like working time, Timax, vacations and sick leave that all have been recorded in Velayayt Hospital after 2013.

Findings

In the following, the number of occurred events from 2008 to 2016 is shown versus working experience, job position, injured organ, age and time (hour, month and year) of incidents. As can be seen in Fig. 1, incidents was mostly prevalent in staffs with 1-to-5-years working experience. Also, regarding job position, the most incidents belonged to nurses as can be seen in Fig. 2. Moreover, Fig. 3 shows the number of incidents and the most injured organs are fingers. Fig. 4 shows the age range of staffs versus frequency of occurred events. As can be seen, 30-to-40-years-old staffs had the most injuries. Fig. 5 shows the number of incidents versus time of incidence. As can be seen in this figure, the most injuries occurred in morning shift between 10 to 12 am. Work shifts in this hospital starts at 7:30 am and the peak time for these personnel is 10 to 12 am.

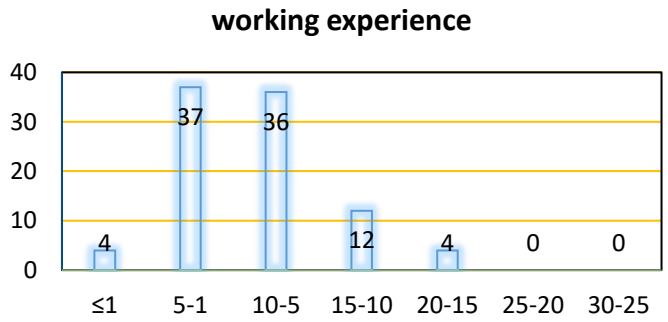

Figure 1: The number of sharp instruments related incidents in Velayat Hospital in an 8-years period versus working experience

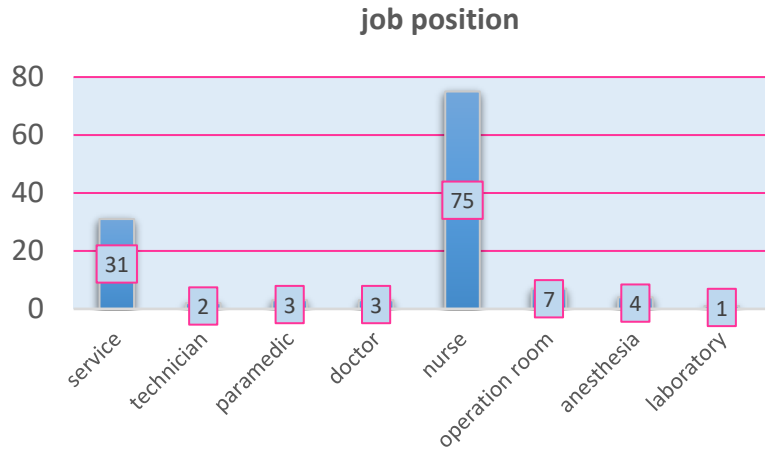

Figure 2: Incident frequency versus job position

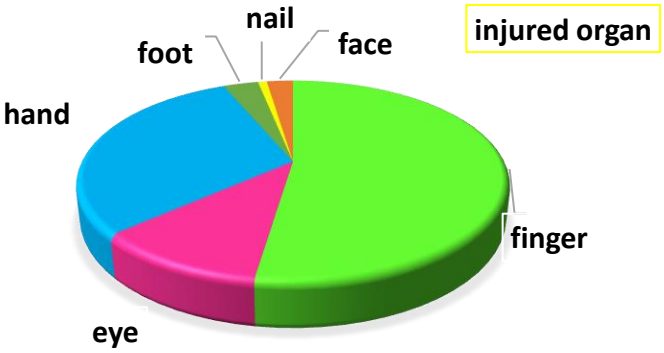

Figure 3: Incident frequency versus injured organ

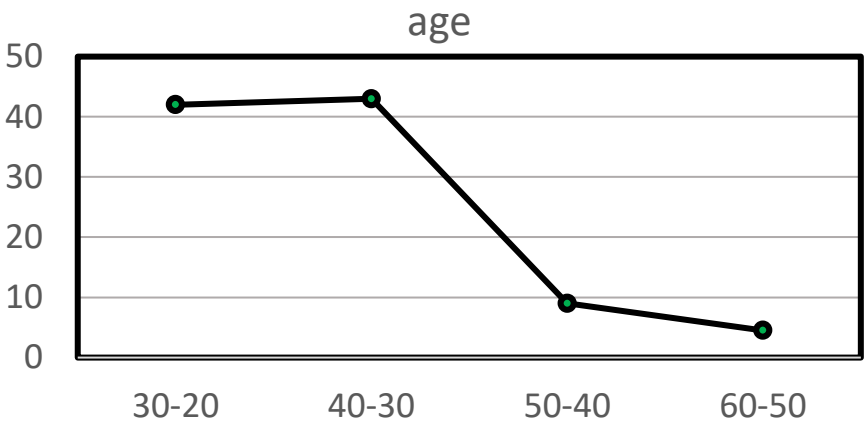

Figure 4: Staffs' age range versus frequency of incidents

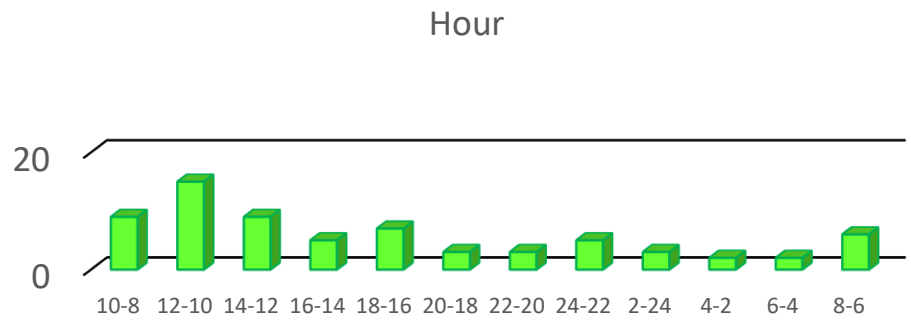

Figure 5: Incident frequencies versus time of incidence

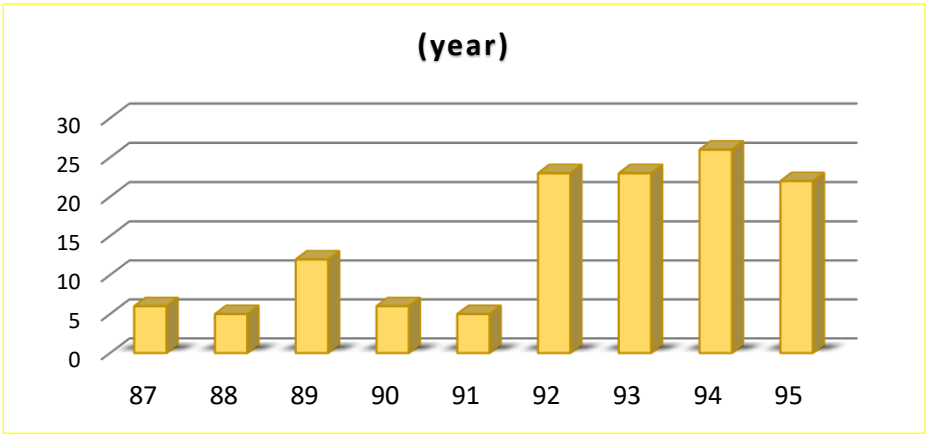

Figure 6: Incident frequencies versus year of incidence

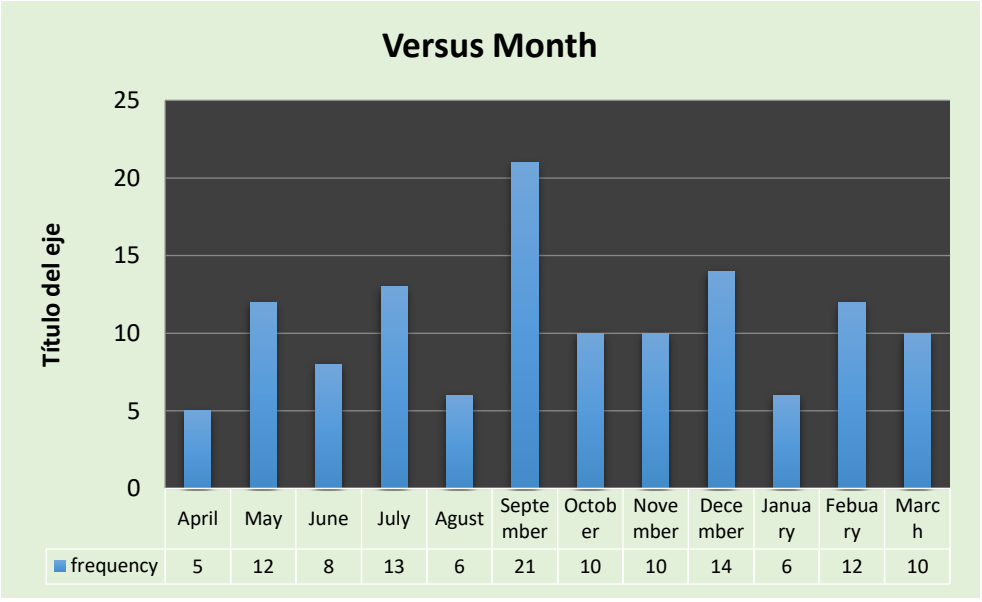

Figure 7: Incident frequencies versus month

Fig. 6 shows frequency of incidents versus of the year of incidence. As can be seen in this figure, the most incidents occurred during 2015-2016 with 26 reported injuries. Also, as can be seen in figure 7, the number of incidents was higher in August. This higher incidence rate does not have any special reason and can mostly be attributed to individual factors.

In the following, all reported incidents from 2008 to 2016 in Velayet hospital will be investigated.

Considering that recording injuries have often been conducted by healthcare staffs, injuries like burning, shock, contusion, bruising and fracture have not been reported except for 2016. For this reason, most of recorded injuries during ab 8-years period are related to needle, cut, and exposure to blood and other body fluids. Most of incidents were observed among nurses. However, there is not any accurate data regarding other job positions like technician and service staffs. Working time, Timax, vacations and sick leave in Velayat hospital have been recorded only after 2013. Therefore, incidents occurred after this year is investigated in the following.

In this study, job positions were investigated individually for each year because of different working hours. Job positions in this hospital include physicians, anesthesiologist, operation room technician, nurse, auxiliary nurses staffs, office staffs, service staffs and hospital keepers. In addition, since working hours of auxiliary nurses and nurses and also anesthesiologist and operation room technician were similar, they were regarded the same in calculations. Moreover, overtime is not defined for staffs in this hospital. Therefore, it was excluded from tables and formulas. Frequency Severity Indicator (FSI), Frequency Rate (FR), Severity Rate (SR) and Incidence Rate (IR) were calculated with (1)-(4) formulas:

$$\mathrm{FR} = \frac{1000000 \times injuries\ in\ a\ given\ period}{Hours\ worked\ by\ all\ employees\ in\ that\ peirod} \quad (1)$$

$$\mathrm{SR} = \frac{1000 \times (number\ of\ lost\ hours\ due\ to\ injury\ in\ a\ certain\ period\ )}{Hours\ worked\ by\ all\ employees\ in\ that\ peirod} \quad (2)$$

$$\mathrm{IR} = \frac{1000 \times (injuries\ in\ a\ given\ period)}{average\ at\ risk\ workers\ in\ that\ period} \quad (3)$$

$$\mathrm{FSI} = \sqrt{\frac{\mathrm{FR} \times \mathrm{SR}}{1000}} \quad (4)$$

In above formulations, every incident was considered as a lost working day due to the lack of recorded data about lost days caused by incident. In this study, vacations and working hours of staffs were investigated from 2013 to the first six months of 2016 and they are investigated separately in the following:

2013: the total number of occurred incidents was 22 cases in this year including 14 needle stick, cut and exposure to body fluids among nurses; 6 needle stick and cut in service staffs; 1 needle stick in anesthesiologist and 1 needle stick in auxiliary nurses. Total working time in this year was 288518 hours which obtain by subtraction of sick leave hours and vacations from total working hours. Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Frequency Severity Indicator (FSI) in this year were 76.25, 0.076, 76.65 and 0.0761, respectively.

2014: the total number of occurred incidents was 23 cases in this year including 14 incidents among nurses; 6 cases in service staffs and 4 cases in operation room technicians. Total working time in this year was 270320 hours. Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Frequency Severity Indicator (FSI) in this year were 85.08, 0.085, 80.139 and 0.085, respectively.

2015: the total number of occurred incidents was 26 cases in this year including 20 nurses; 2 physicians and 4 service staffs. Total working time in this year was 253958 hours. Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Frequency Severity Indicator (FSI) in this year were 102.379, 0.102, 95.59 and 0.1, respectively.

2016: the total number of occurred incidents was 22 cases in the first six months of the year including 9 nurses; 1 laboratory staffs; 3 operation room technician, 1 anesthesiologist; 3 service staffs, 3 physicians, a auxiliary nurses and 2 technicians. Total, working time in this year was 253958 hours. Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Frequency Severity Indicator (FSI) in this year were 86.62, 0.086, 76.65 and 0.086, respectively.

Safe-T-Score index: Safe-T-Score index is obtained from following equation:

$$\text{Safe} - \text{T} - \text{Score} = \frac{\text{FR(now)} - \text{FR(Past)}}{\sqrt{\frac{\text{FR (Past)}}{\text{worker-hours(now)}/200000}}} \quad (5)$$

From 2013 to 2014, this index is obtained as 0.006 considering 8-hours work day and 4.97 considering 24-hours work day. For 8-hours work day, this coefficient ranges from -3 to +3 which means changes are not significant and they can be contributed to chance. For 24-hours work day, this coefficient is higher than +3. Therefore, it can be said that FR has got worse compared to 2013.

From 2015 to 2016 (the first six months) this index was obtained as -0.0098 for 8-hours word day and -0.012 for 24-hours work day. For both groups (8-hours and 24-hours work day) this index ranges from -3 to +3 which means changes were not significant and they can be contributed to chance.

Interpretations of incidents for 2013 to 2016 are shown in figures 8-11. As can be seen in these figures, Frequency Rate (FR), Severity Rate (SR), Incidence Rate (IR) and Frequency Severity Indicator (FSI) was higher in 2015 due to the higher number of incidents compared to other three years.

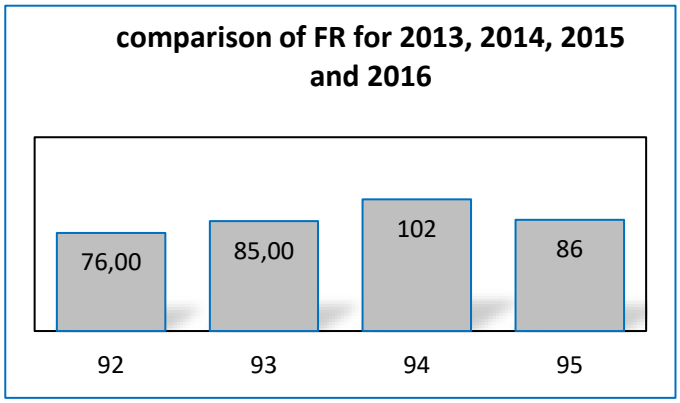

Figure 8: Comparison of frequency rate for 2013, 2014, 2015 and 2016

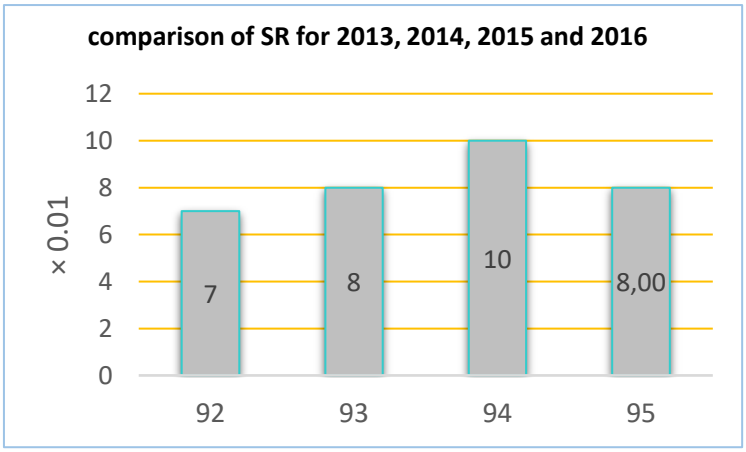

Figure 9: Comparison of severity rate for 2013, 2014, 2015 and 2016

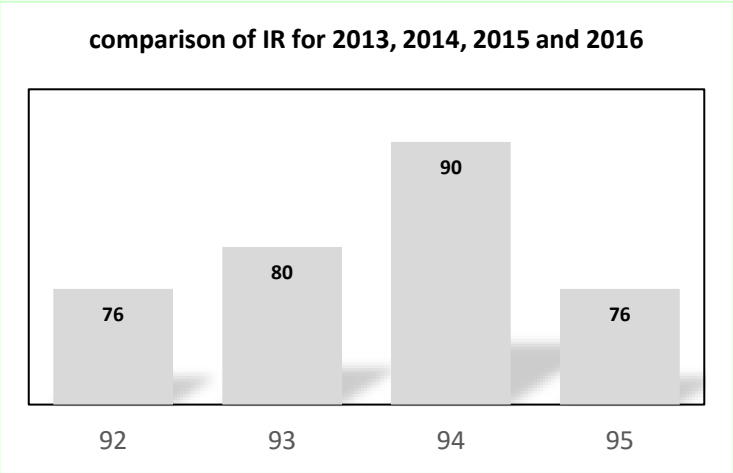

Figure 10: Comparison of incidence rate for 2013, 2014, 2015 and 2016

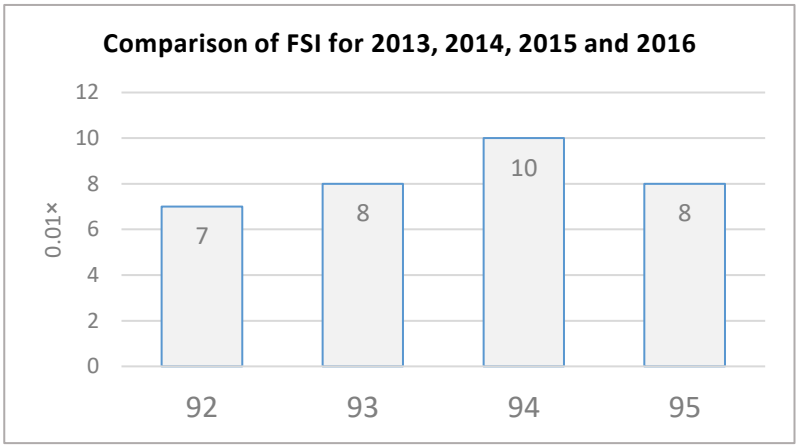

Figure 11: Comparison of frequency severity indicator for 2013, 2014, 2015 and 2016

Discussion

As can be seen in Fig. 1, the number of incidents was higher among staffs with 1 to 5 years working experience. Also, according to Fig.2, most of incidents occurred for nurses. A total of 117 nurses are currently working in Velayat hospital in 3 work shifts and so they have occupied most of job positions in this hospital. Therefore, higher incident frequency among nurses can be due to their higher population. Other reasons may be due to exhaustion, lack of enough sleep, mental conflicts, high number of patients etc. Also, nurses are responsible for patients' care after medical examinations and injections, blood sampling, washing and dressing wheals all conducted by nurses. This means they are at higher risks of infectious agents. Fig. 3 shows the frequency of incidents versus body organs. As can be seen, fingers are the most frequent organs. The reasons may be as follows:

1. Nurses are responsible for patients' injections.
2. Auxiliary nurses do injections along with nurses.
3. Service staffs are responsible for transporting and collecting surgical packing instruments and taking them for cleaning and sterilizing. Also, they are responsible for collecting infectious wastes which may be containing uncapped needles.
4. During waste disposal, separation and their transportation to the autoclave, there is a risk of exposure to uncapped needles.

Fig. 4 shows the age range of staffs versus frequency of incidents. It can be observed that 30-to-40-years-old staffs had the most incidents. Most of studies have reported a reversed relationship between working experience and incident frequency. Therefore, lack of enough experience can be one possible reason for higher incident frequency in this age group. The second

reason may be disregarding the instructions. Another possible reason may be due to unreported incidents by more-experienced staffs.

Fig. 5 shows incident frequency versus the time of incidence. It can be seen that incidents were more frequent from 10 to 12 am. Work shifts in this hospital starts at 7:30 am and the peak time for the personnel is 10 to 12 am due to higher patient referrals.

According to the results of this study, needle stick was the most frequent type of sharp instrument related injuries among all working groups which is consistent with previous studies (Frickmann et al. 2016; Ingole et al. 2016; Muralidhar et al. 2010; Talas and Kokaoz, 2015; Rakhshani et al., 2009; Aghabeigi et al, 2015; Miraki et al. 2015; Shahabinezhad et al. 2017). The reason may be higher injections, blood sampling or Venipuncture compared to other operations such as suturing.

In addition, our findings showed that staffs with 1 to 5 years working experience with 28.6% had the most sharp-instrument-related injuries compared to others while the number of incidents for 5-to-10- years working experience was only one case less with 36 reported incidents. Considering that in most of studies there is a reversed relationship between the incidence of events with working experience, it can be said that findings of our study is consistent with Aghabeigi et al. (2015); Abdulbaghi et al. 2014 and Frickmann et al. 2016 as they found a reversed significant relationship between working experience and times of needle sticks. Talas and Kokaoz (2015) stated that lack of experience and appropriate technique of handling penetrating/sharp medical instruments can be the reason for higher rates of are probably responsible for the high proportion of Needle stick-sharp injuries among nursing students such a way that 65.5% of the students stated that the accidents had taken place due to their limited experience and even as many of them had a needle stick incident at the first time they have ever handled a needle. However, as Frickmann et al. (2016) state, we cannot answer the question whether the observed higher number of injuries in young and less-experienced staffs is due to less working skills or due to this fact that unpopular and labor-intensive intravenous procedures are likely to be shifted to new coworkers who are usually low-ranking in the hospital hierarchy. Moreover, more experienced and professional employees may have a needle stick incident too but they are less likely to report it. However, some studies have found different results. For example, Rakhshani et al. (2008)'s results were inconsistent with the present study as they found that the risks of injuries increased 5% for each year of working experience. Also, Uchenna et al. (2015) found that the incident frequencies among staffs with more than 10 years of working experience were significantly higher (91.3%) compared to less experienced staffs with less than 5 years of working experience (58%). Miraki et al. (2015) also found contradictory results as they found that staffs with 10 to 15 years working experience had significantly higher occupational exposure (needle stick). However, Shahrabadi et al. (2012) found that more than half of less experienced staffs had not reported their injuries. Therefore, it seems these results can be attributed to underreported accidents by less experienced staffs.

As our findings showed too, among different job positions, nurses with 58.1% had the most number of incidents which is consistent with most of previous studies (Frickmann et al. 2016;

Camacho-Ortiz et al. 2013, 2015; Uchenna et al. 2016; Ghasemi et al. 2009; Abdulbaghi et al. 2014). The possible reasons may be the higher number of nurses, multiplicity of job duties, exhaustion, and sleeplessness. In this line, Shahrabadi et al. (2012) investigated sharp instruments injuries among nurses in intensive and general wards. Their findings showed that most injuries occurred in patient's room and the lowest in the treatment room. Additionally, considering the high importance of nurses' role in hospitals and their high working sensitivity, they feel more pressure while doing their jobs and this can increase the possibility of self-injuries. In Ghasemi et al. (2009)'s study, frequency of needle stick injuries among service staffs and nurses was very close (53% and 55% respectively). However, considering the higher number of nurses compared to service staffs, needle stick injuries are still higher among nurses. They found that 51% of incidents occurred due to disturbing factors such as busy working shift, distraction and exhaustion. Also, Abdulbaghi et al. (2014) investigated the epidemiological aspects of occupational exposure among emergency room nurses in 5-year surveillance. The nurses' incident rate was obtained as 66.23% in this study and the most important reported reasons were busy wards, shortage of

work force and exhaustion. Miraki et al. (2015) investigated occupational exposures caused by sharp instruments and factors affecting its prevalence. They study four groups including nurses, auxiliary nurse, midwives and service staff and found the prevalence of occupational exposure as 88.5%, 83.9%, 77% and 88.9% respectively. These results is inconsistent with our study as we found lower prevalence of needle stick among nurses compared to auxiliary nurse, midwives and service staff. This can be due to this fact that nurses' knowledge about occupational exposure is generally higher compared to other groups. However, nurses have better status compared to other groups or even physicians regarding measures conducted for preventing occupational exposure. Also, Wick et al. (2008) found contradictory results with our study as physicians had the highest risk to experience needle stick injuries with 55.1% in their study. The reasons were reported as higher workloads and nonparticipation in training courses.

In addition, the results of this study showed that more than half of injuries occurred for fingers. This finding was consistent with most of previous studies (Frickmann et al. 2016; Rakhshani et al. 2008; Aghabeigi et al. 2015; Abdulbaghi et al. 2014; Miraki et al. 2015; Talas and Kokaoz, 2015; Muralidhar et al. 2010; Ingole et al. 2016). For example, Frickmann et al. (2016) reported a 64% of fingers' needle stick. The reason may be due to this fact that needle stick are the most prevalent injury in all studies and that fingers are at higher risks of this injury due to injection, blood sampling and recapping of used needles. Therefore, using gloves has a significant role in decreasing risks of needle stick. In this regard, Shahrabadi et al. (2012) found that more than half of nurses were not wearing gloves at the time of injury. However, Muralidhar et al. (2010) found a different result as 74% healthcare workers were wearing gloves at the time of needle stick incident. Also, Aung et al. (2016) found that all participants (100%) reported as good compliance for gloving while, contrary to this, practice of eye wearing had poor compliance. Therefore, they found that that almost half of nurses in their study were exposed to blood/body fluid splashing into eye.

Moreover, our findings showed that most injured people aged between 30 to 40 years. This can be related to working experience as the number of reported incidents for 20-to-30 year's age range had a little difference with 30-40 age groups. In this line, Hashemi et al. (2011) showed that most of incidents occurred for 30-to-40 years' age range. They attributed this result to performing more risky activities by this age group. Shahrabadi et al. (2012) found the highest rate of incidents for 30-to-39-years' age range which is consistent with the present study. Also, abdulbaghi et al. (2014) found that frequency of incidents decreases with aging. However, this trend was not observed in this study as the age range of 20-30-years has the lowest incidents. Talas and Kokaoz (2015) found a similar result and reported lack of experience and short training courses as the reasons for this. In addition, the results of Uchennna et al. (2015) was consistent with our study as they found that the highest rate of incidents belonged to among the age group of 40-49 and lowest rate belonged to the age group of 60 and above.

Finally, our results showed that most of incidents occurred in the morning from 10 to 12 am. This is due to high patients' referral and peak working time. Ghasemi et al. (2009) also found that, among all staffs in studied hospitals, most occupational exposure and needle stick occurred in morning work shifts. This indicates the importance of workload in the morning work shifts and the need for reasonable assignment of job duties among staffs to prevent injuries. Waste disposal and collecting safety boxes by service staffs, busy times, and changing catheters along with training programs in the morning work shifts all contribute to noisy and busy work environment and make focusing difficult while doing routine procedures. Also, busy work shift, distraction and sleepiness are among other effective factors on needle stick injuries as they are all make focusing more difficult. Therefore, employing enough nurses for hospitalized patients, reasonable distribution of them and providing a comfortable workplace environment play significant roles in keeping nurses healthy. Wicker et al. (2008) conducted a study in Germany and reported medical discipline as a determinant factor in the incidence of occupational injuries. Frickmann et al. (2016) attribute the high frequency of injuries during the first working hours to shift coincides with the time when blood samples are usually collected, i.e., the time of the highest risk of exposure which and introduce it as a global phenomenon. Camacho-Ortiz et al. (2013, 2015) also found that about 40% of needle sticks occur in the morning work shifts.

Finally, our interpretations showed that FR, IR SR and FSI were the highest in 2015 which is due to the high number of incidents during this year.

Conclusion

Considering the multiplicity and epidemic work-related incidents found in this study, holding training and health programs for both employees and employers are suggested in order to provide correct and necessary information about occupational incidents; to prevent possible financial and life loss and to minimize workplace-related injuries. Such programs are of great importance in maintaining human resources.

Also, considering the high rate of injuries in hospitals and healthcare centers, it is suggested that an accurate recording mechanism should be provided for occupational injuries and the exact data about them should be inspected at least one time yearly by an infection control committee with necessary recommendations about decreasing injuries. Avoiding invasive ways as much as possible, changing workplace conditions, developing safety policies, health improvement programs, providing a safe workplace, increasing the employee/patient ration, continuous job training, providing national needle stick protocols, exact measurement of serum levels of virus markers among personnel and individual health profiles, training workshops are suggested to inform personnel about necessary measures after incidents and ways of prevention. Several studies have recommended providing a comprehensive program to prevent sharp-instrument-related injuries in hospitals and healthcare centers in order to facilitate detection, screening, reporting and following injury cases.

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