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Original article

Pattern and risk factors of sharp object injuries among health care workers in two tertiary hospitals, Al Taif-Kingdom of Saudi Arabia 2016–2018

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ABSTRACT

Occupational exposure of healthcare workers to blood and body fluids following skin injury constitutes a risk for transmission of blood-borne pathogens. The risk of exposure is greater as well. The present study aimed to determine the burden and risk factors of sharp object injuries in two tertiary hospitals in the Taif City KSA. Retrospective review of needle stick injury records was included from the two hospital's staff clinics. A Total of 131 health professionals (employees) recorded as exposed to sharp object injuries from both hospitals were enrolled during period 2016–2018. The collected data was cleaned, reviewed and analyzed using Statistical Package of Social Sciences SPSS ver. 25. The result of the study revealed that, the mean age for the 131 enrolled participants was 31 ± 6.6, Male to Female Ratio was 1:3. The most affected age group was 20–30 years (55.7%). Females were more affected 98 out of 131 (74.8%) than male (33out of 131 (25.2%). And there is increasing incidence rates of exposure from 2.89 /10.000 patient/day in 2016 to 3.42/ 10.000 patients'/day in 2017, with highest exposed nationalities; Filipino 42 (32.1%), Saudi 31 (23.7%), and Indians 26 (19.8%), the remaining 24.5% were from 10 mixed nationalities. The frequent affected divisions were: ER, surgical ward, operation room, ICU, laboratory, Medical W, Medical waste facilities (19.8%, 15%, 12.2%, 9.2%, 92% respectively). The most affected HCWs categories were nurses 74(56.5%), doctor 23(17.6%) and housekeeping 18 (13.7%). And the needle prick 104(79.4%) and cut wound 15(11.5%) constitute the highest type of injuries and were during operation 23 (17.6%), waste collection 15 (11.5%), cannulation 12 (9.2%) and giving injection 12 (9.2%). The common devices caused injuries were bore hole needle 63(48.1%), suture needle **(13.7%), cannula and insulin syringe 13 (9.9%) each. This study concluded that, as from 2016–2018, there was an increasing rate of reported accidental exposure to sharp needle injuries amongst HCWs from 3.0 to 3.4/10.000 patient/day, and the younger and nurses were mostly impacted. Workplace, distress, work types and load had influences on injuries rates and types. Fortunately, no exposure among employee with HBV, HCV and HIV seroconversion were documented.

1. Introduction

The needle stick or sharp injuries are caused by a variety of forms such as needles, lancets, surgical scalpels, cutting needles, blood vacuum tube needles, broken vial preparation, razors, scissors, etc. The major occupational risk of morbidity and death from blood-borne pathogens among healthcare workers is percutaneous exposure to blood and body fluids all through contaminated needle stick and sharp injuries. The transmission of blood-borne pathogens can be very impressed with the needle and sharp injuries (NSSIs). According to the World Health Organization (WHO) study,

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contamination with Hepatitis B Infection (HBV) or C Infection (HCV) and 2–3% of HIV infections among medical staff contribute 40% to the workplace (Assen et al., 2020). Every year, 3.5 million suffered from NSSI worldwide and ~ 1–600,000 thousand employees in the U.S. In the healthcare worker's case, NSSIs are categorized as any transcutaneous injury, penetration of a sharp object wound, or needle that may result in blood contact or other body fluid. The most common circumstances in many studies are intravenous cannulations, unproper needle disposal, needle recap (Shalaw et al., 2020). After percutaneous exposure, the estimated chance of HIV/HBV/HCV transmission to Health care workers (HCWs) is 0.1% to 0.3%, 10% to 30%, 3 to 10% respectively. The risk of infection following exposure ranges from one needle type, a system visually infected with blood or not, a depth of injury (more depth, more risk), a viral load at source during exposure, to initiating first aid timely provision and post-exposure prophylaxis, etc. In addition to diseases, the long-term consequences for NSI-supporting HCWs include severe psychological morbidities such as ache, depression, post-traumatic stress disorder (PTSD), and adjustment disorder (AD). The implications include unpaid working days that impact health care directly [30]. The 1st chance of having HBV, HCV, and HIV infections from a high degree of exposure, is a 2–40%, 3–10%, and 0.2–0.5%, respectively.

If the source patient has been positive. Furthermore, HBV can survive under ideal conditions for up to one week and have been detected from the dropped needles. The wellbeing and productivity of health workers are impaired by high cost, health effects, mental distress, and the loss of working days by morbidity and mortality associating with occupational risks (Yazie et al., 2019). In addition to health care providers, workplace NSSIs impact the quality of health care services. Health care staffs suffer extreme emotional distress, and anxiety that leads them to changes in their work and actions. Three million of the thirty-five million health care staff suffer NSSIs worldwide every year with health facilities in many countries showing the highest occurrence of these injuries (Assen et al., 2020).

Various studies have suggested that while bloodborne pathogen prevalence are rare in many developed countries, there is still a high level of NSSI exposure in those countries (Mannocci et al., 2016; Spiegel et al., 2007). The number of occupational accidents in the general population as well as in manufacturing, construction, mining, health, and social services has risen compared with day work; night, and shift work. The shift from day to day could increase the risk of injury at work. Based on the earlier meta-analysis study by Fischer et al (Fischer et al., 2017), night and evening shifts have resulted in a growing risk of job injury (Härmä et al., 2020). If health professionals implement a comprehensive program to address institutional, behavioral, and device-related factors that contribute to needle stick injury in health workers, NSIs can be regarded as preventable (Dilie et al., 2017). Global wide studies have been conducted and no studies from the city of Taif, Saudi Arabia, are currently available. The current study was therefore designed to evaluate incidence and risk factors for needle stick injuries in two tertiary hospitals. To evaluate pattern and risk factors associated with sharp object injuries among HCWs and care providers arising in two tertiary hospitals.

2. Materials and methods

The study was a retrospective study, that carried out during 2016–2017 in two tertiary hospitals in Taif city kingdom of Saudi Arabia. The study included all health care workers who were working in this tow hospitals and exposed to sharp injuries including doctors nurse, technicians, housekeeper, etc during study periorec. The sample included all cases of needle stick injuries in the period of the study The procedure in the two hospitals was: if any health care worker exposed to accidental sharp injury he or she should notify occupational health clinic where will be registered and notification and post exposure management of all occupational injuries and will be given if. In this study review of epinet and hesn electronic program on data collection and other registry records from staff clinic was used to collect data. Data validation was done The data include socio demographic information, job categories, departments and circumstances of injuries and result of complete follow-up of cases. The data was collected in Excel sheet then transported to SPSS version 20 for analysis (Khan et al., 2019). The ethical approval was obtained for this study from Research Ethics Committee in General Directorate of Health Affairs, Taif, KSA.

3. Results

In this study, 131 individuals were recruited among them 25.2% were male and 74.8% were female. In this study, between 20 and 50 years of age, both male and female individuals were involved. The most affected age group was between 20 and 30 years of age at 55.7%, followed by 31–40 years of age at 28.2% and then 41–50 years of age at 4.6%, and finally only 2.3% above 50 years of age. The basic details were tabulated in Table 1. A total of 13 nationalities of individuals have been involved in this study. The maximum number of subjects affected was Filipino with 32.1%, followed by Saudia Arabia with 23.7% and Indians with 19.8%. The remaining 24.4% of affected individuals were from 10 mixed nationalities.

Table 2 sets out the socio-demographic profiles of impacted health care staff with sharp objects. The ER department is the largest (19.8%) hospital department followed by the surgical department (15.3%), OR (12.2%), ICU/lab (9.9%), medical department (9.2%), medical waste (5.3%), and unspecified personnel reported as others with 18.5%. Total individuals are affected by syringes (48.1%) with the device attributable to accidents followed by a suture needle (13.7%), a cannula/insulin syringe (9.9%), and a surgical device (6%). Unidentified instruments are recorded as others at 13.8%. There have been minimal incidences in the circumstances of the injury, 17.6% during operation, 11.5% during waste processing, 9.2% during cannulation and each injection, 8.4% during blood extraction, 6.1% during needle recapping and blood surgery monitoring each, 5.3% during needle retrieval and incorrect position of needle removal, 4.6% during injecting of insulin. The 16.9% of subjects were recorded as non-identified errors.

Table 3 specifies out health care workers' occupation exposed to sharp objects and injury. The highest number of people affected are 56.5% nurses, followed by physicians (17,6%), housekeepers

Table 1
Demographic features of health care workers exposed to sharp object injury.

Sociodemographic characteristics	Number of Incidents n (%)
Sex	N (%)
Male	33(25.2%)
Female	98(74.8%)
Age group	
20–30yrs	73(55.7%)
31–40 yrs	37(28.2%
41–50yrs	6(4.6)
More than 50 yrs	3(2.3%)
Nationality	
Filipino	42(32.1%)
Saudi	31(23.7%)
Indian	26(19.8%)
Others (10 nationalities)	30(24.45)

Table 2
Sociodemographic features of health care workers exposed to sharp object injury.

Associated factors	Number of incidents n (%)
Hospital departments	
ER	26 (19.8%)
Surgical ward	20 (15.3%)
OR	16 (12.2%)
ICU	13 (9.9%)
Lab	13 (9.9%)
Medical ward	12 (9.2%)
Medical waste	7 (5.3%)
Others	24 (18.5%)
Device cause injury	
Syringe	63 (48.1)
Suture needle	18 (13.7)
Canula	13 (9.9)
Insulin syringe	13 (9.9)
SURGICAL instrument	6 (4.6)
Others	18 (13.8)
Circumstances of injury	
During operation	23 (17.6)
During waste collection	15 (11.5)
Cannulation	12 (9.2)
During given injection	12 (9.2)
During blood extraction	11 (8.4)
During blood sugar monitoring	8 (6.1)
During needle recapping	8 (6.1)
During needle discard	7 (5.3)
Wrong place needle	7 (5.3)
During insulin injection	6 (4.6)
Others	22 (16.9)

Table 3
Occupation of Health care workers exposed to sharp object injury.

Staff job	Number of incidents N (%)
Nurse	74 (56.5)
Doctor	23 (17.6)
House keeper	18 (13.7)
TECHNICIAN	8 (6.1)
Yellow man	4 (3.1)
Paramedic	2 (1.5)
Trainer in lab	1 (0.8)
Yellow man	1 (0.8)
Total	131(100)

(13,7%), technicians (6,1%), yellow men (3,9%), paramedics (1,5%), and laboratory trainees (0.8%). Fig. 1 demonstrates the incidence occurrence of sharp object injuries in Taif city. During 2016–2017, a total of 131 employees were exposed to injuries. The incidence rose from 2,89/10,000 patients' days, in 2016, to 3,422/10,000 pts days in 2017. The number of people in 2017 increased from 2016, in 2016 48.1% of patients were affected and in 2017 51.9% of patients were affected respectively.

4. Discussion

The current study aimed to investigate the risk factors of sharp needle injuries among the health care workers in the Taif city of Saudi Arabia. This is the initial study implemented in Taif city and the study results confirmed the rate of acute injuries increased from 2.89/1000 patient days in 2016 to 3.422/1000 patient days in 2017. Several more publications from all over the Gulf and around the globe on this particular topic are applicable, but the information is still lacking on regional variations and related factors. In the event and reporting of these injuries, multiple aspects play a role. The first requirement for the capture of incident wounds is

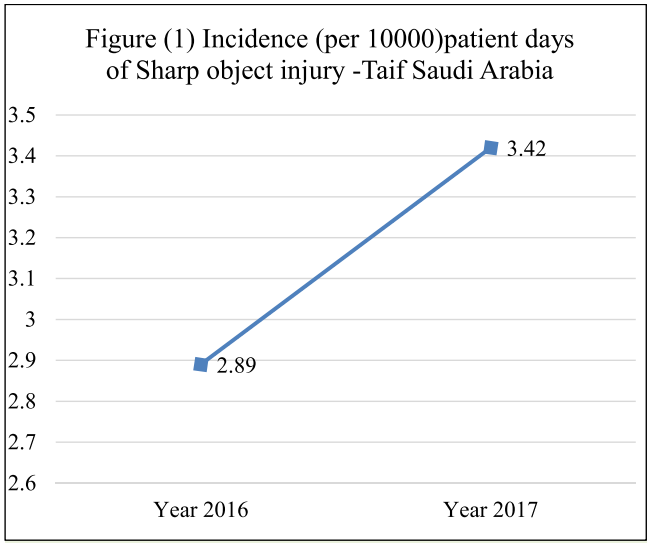

Fig. 1. Incidence of sharp object injury per 1000 patients in Taif city.

a strong surveillance system (, xxxx). Needle stick injuries (NSIs) or needle stick sharp injuries (NSSIs), known as sharp injuries, percutaneous wounds, and sharp exposures represent accidents of the skin that are in contact with the blood of a source patient or the body fluids, including needles, scalpel or other sharp objects (Jahan, 2005). According to recent estimates by the World Health Organization, about two million NSIs cases are reported each year but this number may be understated because many NSSI cases, especially in developing countries are not reported. However, NSIs are of concern to the public health sector because they are a major worldwide source of morbidity and death. Annual NSIs cases of HCV, HBV and HIV infections are estimated at 16,000, 66,000 and 1,000. This could lead to around 1,100 deaths or major handicaps (Saadeh et al., 2020).

Limited studies have been carried out within the kingdom and other parts of the Globe (Al Shaikh; Jahan, 2005; Saadeh et al., 2020; Walle et al., 2013; Khraisat et al., 2014; Garus-Pakowska et al., 2018). The meta-analysis studies confirmed the positive and negative associations among the needle stick injuries among the health care workers (Yazie et al., 2019; Gheshlagh et al., 2018; Tarigan et al., 2015; Auta et al., 2018). The prevalence of Iranian healthcare professionals has been confirmed around 74% (Akbari et al., 2018). Similar studies have reported a 37% prevalence of NSI in England (Control CfD, 2004), and 1.43 cases per year among nurses were reported as a hepatitis C and HIV transmission rate (Elder and Paterson, 2006). Furthermore, Australia's NSI prevalence rate was also found to be equivalent to 47,000 NSIs annually, with one in five people (Grimmond et al., 2003). In the study by Talas, et al. (Talas, 2009), which reported a rate of 49%, the NSI Prevalence rate was also reported in Turkey. However, 79.7% of NSI prevalence in South Korea was reported, the most frequent instrument leading to, a needle cap of 52%. Compared to other studies, a high rate of NSIs can be found between Iranian nurses by comparing the results obtained in this study (Akbari et al., 2018).

In the hospital department, 19.8% of sharp injuries were in the emergency department, the same rate as in the previous KSA study, which is high at 21.5% followed by 15.3% of surgical wards. The most injury-causing device is the Hall Bore device. The use of blunt needles reduces the risk of perforating gloves to a relative risk of 0.46 compared to studies conducted in Iran showing no documented seroconversion exposure to HCV, HBV and HIV, the results of this study were greater in women than in men (3:1). The HBV

vaccine coverage of 69.5% of respondents was 72.5% (Alimohamadi et al., 2020).

NSI is one of the world's largest health system safety issues among HCWs with a global prevalence of 44.5%. Though its actual cause is unclear for the different prevalence rates in regions. The lowest prevalence of needle stick injury measurements in the various WHOs in developed regions such as Europe and the United States compared with other regions in the world can be attributed to the following reasons: the difference in methodology and the number of studies included in the current research from each country, different laws, different methods and the degree of supervision. Global and regional variations in needlestick prevention policies and fewer details of accurate prevention programs and national annual supervision structures in less developed regions. The fact that there are large NSI prevention programs, the provision of training courses and specific management information for NSIs in the developed countries, incentives to register NSI cases in hospitals, the priority categories of NSIs may be responsible for reducing NSI's prevalence among HCWs developed countries. The preventive perspective of NSIs among HCW's should be established (Bouya et al., 2020).

There are some limitations to the current study. This is a data-limited retrospective study. The strength of this study is the data obtained from several hospitals in Taif city.

5. Conclusion

There has been a spike in the occurrence of sharp needle injuries from 2016 to 2017. The younger people and the nurses were more affected. The emergency department was the area most affected. The most injurious tool was the borehole needle. The sharp operational injury was the most commonly occurring exposure followed by waste collection. It is important to provide the safety engineering system and training staff with standard precautions and post-exposure prevention to minimize the risk of acute injuries. To reduce the incidence of severe injury in healthcare workers, future research to measure knowledge, belief, and magnitude in acute injuries and post-exposure prophylaxis is crucial. However, nurses are more prone to injuries and measures must be put in place to help protect them.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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