

INCIDENCE OF NEEDLE STICK AND SHARPS INJURIES AMONG HEALTH CARE WORKERS IN A TERTIARY HOSPITAL, SAUDI ARABIA

By

Elsherbeny EE and Niazy NA

*Department of Public Health and Community Medicine, Faculty of Medicine,
Mansoura University, Mansoura, Egypt.*

Abstract

Introduction: Needle Stick Injuries are common and expected among health-care workers during execution of their patient care services. **Aim of work:** To estimate annual incidence of needle stick and sharps injuries among health care workers and to describe the associated factors and type of injuries in a tertiary hospital in Eastern Province, Saudi Arabia. **Materials and Methods:** The target group was all health care workers who obligatory reported for needle stick, sharp injuries during the period from January 2013 to December 2015. The occupational health specialist of the hospital interviewed them to take full documented history through standard questionnaire, performed examination if needed and requested for necessary investigations for the workers and the source patient if known. **Results:** about 30% of the injuries occurred in Emergency Rooms, followed by Operating Theater (about 20%). The commonest site of injury was fingers (70%). It was more common among female, especially nurses (33.3%). Investigating their Anti HBs antibody titre showed 90.6 % immune. The highest reported incidence occurs during blood sample collection (28.2%). Health care workers explained the cause of injury in form of being rushed (38.46%) or feeling fatigued (28.20%). Majority of them (58.12%) squeezed and cleaned the affected part with disinfectant as immediate actions following exposure. **Conclusion:** Occupational injuries with needles or other sharps are common among health care professionals especially nurses. It is more incident at emergency room due to high level of stress and rush at work. Training of workers and is recommended to increase their knowledge about the danger of injuries and the appropriate immediate action to be done after

injury. Safety boxes, strict policy of reporting and follow up of the injured workers is mandatory for preventing further injuries and decreasing danger of blood borne diseases.

Key words: Needle stick, Sharp Injuries, Health care workers and Tertiary Hospital.

Introduction

The United States National Institute of Occupational Safety and Health has defined needle stick injuries (NSIs) as injuries caused by needles such as hypodermic needles, intravenous (IV) stylets, blood collection needles, and needles used to connect parts of IV delivery systems (Norsayani and Hassim, 2003). During performance of health care workers (HCWs) to their tasks, NSIs are common and expected among healthcare workers during execution of their patient care services. Percutaneous exposure occurs because of a break in the skin caused by a needle stick or sharps contaminated with blood or body fluids. Mucocutaneous exposure happens if blood or body fluids come in contact with open wounds, non-intact skin as in case of eczema, or mucous membranes such as the mouth and eyes (Alonso, 2014). HCWs are also exposed to splashes of blood, saliva, and urine. Percutaneous injury and splashes of fluids have been documented as a source of occurrence of

blood borne infection such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) for HCWs (Sepkowitz, 1996; Rogers and Goodno, 2000).

Center for Disease Control (CDC) reported that every year more than three million HCWs are exposed to blood and body fluids via sharp and mucocutaneous injuries in the United States alone with an annual estimated 6 million NSIs (Lee et al., 2005). Due to NSIs, the risk of infections varies from 0.2–0.5% for HIV to 3–10% for HCV while it is 40% for HBV (Cheng et al., 2012). Although needles and other contaminated sharps should not be bent, recapped, or removed, many studies have revealed that recapping being still common among HCWs (Lee et al., 2005). There are several studies indicating that the prevalence of NSI and the risk factors associated vary among different HCW groups such as doctors and nurses depending on the place of studies like teaching institutes, hospitals, and corporate setups

(CDC, 2000 and Cheng et al., 2012). Occupational exposures are common in the developing world and it is believed that 40–75% of these injuries are not reported. Unreported needle stick and sharp injuries are a serious problem and prevent injured HCWs from receiving post exposure prophylaxis (PEP) against HIV, which is shown to be 80% effective in preventing HIV infection among these subjects (Wilburn, 2004).

Up to our knowledge, there are limited comprehensive data from Saudi Arabia on incidence of NSI among HCW and circumstances surrounding the injury.

Aim of work

The current study aimed to estimate annual incidence of needle stick and sharps injuries among health care workers and describe the associated factors and type of injuries in a tertiary hospital in Eastern Province, Saudi Arabia.

Materials and Methods

Study design: A follow up study.

Place and duration of the study: The study was conducted in a private tertiary health care hospital, Eastern province,

Saudi Arabia. The hospital has both in-patient and outpatients departments. It provides clinical and preventive services to Saudi citizens and non-Saudi residents. Its total bed capacity was 350 beds. The study was performed through 3 years from January 2013 to December 2015.

Study sample: The target group was all health care workers of the hospital who obligatory reported for needle stick, sharp injuries such as broken vials or splashes on mucous membrane or cuts by potentially infectious materials as blood and body fluids during the period of the study. It was mandatory for all health care workers to attend orientation program including infection control lectures prior starting the work. They were 117 health care workers through the whole period of the study.

Study method: The Patient Safety and Risk Management Unit of the hospital has an active post-exposure prophylaxis policy. The workers who experience needle stick, sharp injury or exposure to potentially infectious blood or body fluids, are requested to write occurrence variance report (OVR) signed by the witness and their

supervisors .The latter sends the report to employee health clinic (EHC) as well as the risk management unit to take necessary actions.

The occupational specialist in EHC interviewed the affected worker to get personal information as age, gender, job title, duration of work, as well as full documented history through standard questionnaire based on CDC recommendations for the contents of the occupational exposure report (US Public Health Service, 2001) as a part of the hospital policy, performs examination if needed and requests for necessary investigations for the worker and the source patient if known.

The questionnaire was in English as it is the main language used in the hospital. It includes information about the type of injury, the source of injury (known/unknown), self-induced or by someone else, use of personal protective equipment at the time of injury or splashes, what type of work the HCWs does, emergency/routine health care, hepatitis B vaccination status, immediate post-exposure measures taken like washing of hands and lastly the suggested cause of the incident from the point of view of HCW.

The incidence was operationally calculated from the equation: - Incidence equals number of new events of needle stick injury among the HCW during the period of the study divided by number of health care workers on duty during the same period.

Consent

Informed written consent was obtained from all study participants before administering the questionnaire. No personal identifiers were included in the form. They were informed that all collected data will be confidential and used for scientific purposes only.

Ethical approval

Formal written consent was obtained from Hospital Management with request of confidentiality of the hospital name in the published paper. The study was approved by Infection Control and Ethics Committee of the hospital.

Data Management

Data were analyzed using SPSS software (version 17.0 for Windows; SPSS Inc., Chicago, IL, USA). For univariate analysis, all the variables are qualitative .They were described as frequencies and percentages.

Results

Table 1: Needle prick injury reported by healthcare workers (No = 117)

Needle prick injury/blood splash	Number	Percentage (%)
Total episodes incidence		
• During the year of 2013	45/502	8.96
• During the year of 2014	41/495	8.28
• During the year of 2015	31/481	6.44
Total episodes		
• Needle prick	80	68.37
• Blood splash	15	12.82
• Cuts from sharp	22	18.80
Place of occurrence		
• Emergency	35	29.91
• Operating theater	23	19.65
• Labour room	17	14.52
• ICUs	15	12.82
• Others*	14	11.96
• Treatment room	13	11.11
Site of exposure		
• Fingers	82	70.08
• Face/eyes	19	16.23
• Hand other than fingers	9	7.69
• Others**	7	5.98

*other departments as laboratory and primary health care.

**other sites of exposure as forearm (4 cases), elbow (1 case), arm (2 cases) (accidental by someone else).

Table (1) showed that the annual incidence of episodes were declining through the years of the study from 8.96% to 6.44%. The commonest type of injury was needle prick about (68%). Most of the injuries occurred in Emergency Rooms (30%), followed by Operating Room (20%). The commonest site of affection was fingers (70%).

Table (2): Socio demographic data of the workers suffering sharps injuries and glove use reported by.

The character	Number	Percentage (%)
Age (years)		
• <25	75	64.11
• >25	42	35.89
Gender		
• Male	46	39.32
• Female	71	60.68
Job title		
• Nurses	39	33.33
• Hospital waste disposal staff	37	31.62
• Physicians	31	26.49
• Laboratory staff	10	8.54
Work experience (years)		
• < 5	23	19.65
• > 5	94	80.34
Anti HBs antibody titer		
• <10 IU/ml	11	9.40
• >10 IU/ml	106	90.60

Table (2) showed that the injuries were common among those with work experience more than 5 years. It was also more common among female, especially nurses (33.3%). Investigating their Anti HBs antibody titre showed 90.6 % immune.

Table (3): Circumstances of injury.

Cause of injury	Number	Percentage (%)
Procedure during which injury occurred		
• Blood sample collection	33	28.20
• IV cannulation	26	22.22
• Recapping of needle	22	18.80
• Surgery	20	17.09
• Lumbar puncture	9	7.69
• Detaching needle after use	7	5.98
Causative person		
• Self-induced	103	88.03
• Someone else	14	11.96
Using protective equipments during the incident (gloves)		
• Yes	102	87.17
• No	15	12.82
Wearing double gloves (No=102)*		
• Yes	55	53.92
• No	47	46.07

*That is the number of participants who used personal protective equipment (gloves).

Table 3 showed that the highest reported incidence occur during blood sample collection (28.2%) followed by IV cannulation (22.2%). The workers mostly injured themselves (88.03%). Majority of them were using protective equipments as gloves (87.17%). From the latter group about half were wearing double gloves.

Table (4): Causes of injury as reported by the health care workers.

Causes of injury	Number	Percentage (%)
Feeling rushed	45	38.46
Feeling fatigued	33	28.20
Lack of skill set	23	19.65
Lack of assistance	16	13.67

Table 4 showed that the causes of injury as reported by the health care worker side in the form of being rushed (38.46%), feeling fatigued (28.20%), lack of skill set or even lack of assistance.

Table (5): Immediate actions undertaken by healthcare workers following exposure.

Actions taken	Number	Percentage (%)
Only squeezed the affected part	4	3.42
Only washed with soap and water	9	7.69
Only cleaned with disinfectant like alcohol	15	12.83
Did nothing	3	2.56
Squeezed the affected part and washed with soap and water	18	15.38
Squeezed the affected part and cleaned with disinfectant	68	58.12

Table 5 described the actions taken by the workers after injury as they reported. The majority of them (58.12%) squeezed the affected part and cleaned with disinfectant, while (15.38%) squeezed the affected part and washed with soap and water. On the other hand (12.83%) only cleaned with disinfectant like alcohol.

Discussion

Occupational injuries with a needle or other sharps are common among health-care professionals. These injuries increase the risk of developing many blood-borne infectious diseases. The present study was conducted at a tertiary care hospital in Saudi Arabia to detect the incidence of obligatory reported needle stick, sharp injuries and exposure to blood and body fluids. A total of 117 cases of exposure to blood and body fluids were reported in the study during the period of 3 years.

There is clear decline in the annual incidence of NSI among HCW through the period of the study (Table 1). This reduction in percutaneous injuries may be explained by a steep market shift from conventional to safety-engineered devices and an increase in the number of OSHA citations for violation of the revised standard for handling blood borne pathogens (Phillips et al., 2012).

The current study showed that the highest reported incidence was among nurses (33.3%) followed by waste disposal staff (31.62%) then physicians (26.4%) (Table 2). These data correspond to a study from India (Ashat

et al., 2011) that reported NSI being less frequent (19.2–28.5%) among physicians than nurses. While in other study from North India, physicians constituted the largest percentage (73.7%) versus nurses (19.9%) (Goel et al., 2017). In the current study, high incidence amongst nurses was probably due the high work pressure and decrease of the number of nursing staff especially during vacations in emergency, outpatient department (OPD) and ICUs in the studied hospital. In case of hospital waste management staff, low educational level might play a role in their high incidence of injury (Lakbala et al., 2012).

The current study described the causes of injury in the form of being rushed (38.46%), feeling fatigued (28.20%), lack of skill set or even lack of assistance (Table 4). These results agree with results performed in Mexico (Padrón et al., 2014) among trainee physicians revealed that night shift rounds, the feeling of being rushed by someone else, and the presence of fatigue were risk factors for the first puncture.

We hypothesized that the more experienced HCW would be less likely to sustain needle stick injuries. Surprisingly, the percentage of injured workers who had work experience more than 5 years (80.34%) is more than those with less years of experience (Table 2). These results are in accordance to the results of a Canadian study done in a teaching hospital among medical trainee (Ouyang et al., 2017) that showed the risk of incurring an injury increased by 30% per year of training. Our explanation of this increased rate of injuries could be related to increased contentment and carelessness of HCW over time.

In the present study, NSI were more frequently reported among females (60.68%) than males (39.32%) (Table 2). In concordance to our findings, some studies have reported female HCWs being the most common group to be affected by NSI, probably nurses (Clarke et al., 2002 and Mbaisi et al., 2013).

In the current study, injuries were most commonly reported from emergency ward (29.91%) followed by operating theater (19.65%) (Table

1). In emergency wards, most of the time HCWs carry out the procedures on an urgent basis, and the pressure of immediate patient care increases the chances of NSI (Table 4). However, Cervini and Bell (2005) reported that operation theaters are the most common site of NSI to occur up to 53.84%. This difference could be due to the good patient–physician ratio in operation theaters of the studied hospital.

Recapping and post-use disposal of needles have been reported as the most common action during which HCW sustain NSI (34.0–65 %) (Muralidhar et al., 2010 and Goel et al., 2017). In our study, most of the injuries occurred (67.5%) during procedures rather than recapping (18.8%) and sharp disposal (5.98%) (Table 3). Contradictory results have been reported in a study conducted at Vellore (recapping 8.5%, disposal 18.6%) (Jayanth et al., 2009). This denotes increased hazard awareness among HCWs and use of safer needle disposal methods at the Saudi institute.

In the present study, venipuncture for blood collection was the most common procedure (28.2%) during which NSI occurred. Surgical procedures like

suturing contributed 17.09 % of the NSI (Table 3). These results are similar to the study done in India 2017 reporting that blood sample collection was the most common procedure during which NSI occurred (Goel et al., 2017). This is in contrast to many other studies where stitching was the most common procedure (29–46%), followed by blood sample collection (19%) responsible for NSI (Cervini and Bell, 2005 and Mbaisi et al., 2013). Our explanation of this difference is the availability of better facilities.

In the current study, most of the injuries were self-induced (Table 3). This results was in agreement with Canadian study that found the incidence self -injury constituted 69% of the total injuries among medical trainee (Ouyang et al., 2017).

Of the blood-borne diseases, hepatitis B is not only the most transmissible infection but also the only one that is preventable by vaccination (Singhal et al., 2009). In our study, 90.6 % of HCWs were found to be immune against hepatitis B (Table 2). This emphasizes the significant impact of pre-employment investigation and necessary vaccination given for HCW.

Regarding use of protective equipment during the time of injury, the current study showed that using protective equipment during the incident (especially gloves) was true in 87.17% of the injured HCW, but nearly half of them only were wearing double gloves. This is in disagreement with other studies that revealed (58.4%) of the HCWs were using personal protective equipment such as gloves, masks, and gowns at the time of exposure (Goel et al., 2017). This difference is mostly related to availability of the equipment in Saudi Arabia versus India.

Squeezing the affected part and cleaning with disinfectant were the most frequently used first-aid measures following exposure in over than 58 % of injured HCWs (Table 5). In other studies, over than 62.4% of injured HCWs used cleaning the injury site with soap and water (Goel et al., 2017).

Conclusion and Recommendations

Occupational injuries with a needle or other sharps are common among health-care professionals especially nurses and doctors, health waste disposal workers. The risk increases at emergency room and operating

theater due to high level of stress and rush at work. To decrease incidence of such injuries, training of workers is recommended to increase their knowledge about the danger of injuries and the appropriate immediate action to be taken after the injury. A good policy of reporting the incident of injuries can help the risk management team to avoid or at least decrease the incidence in the future. It is very crucial for HCW to do pre-employment investigation to detect anti-HB antibody titer to complete the full course of vaccination for those who had low titer to prevent the developing of disease.

Study Limitations: the study was carried out on a small sample, which does not represent all health care workers in the company. Multicenter study is recommended. It depends on subjective reporting not active survey. Although the questionnaire is based on CDC guidelines, it is not validated as it is routine work within the hospital policy.

Conflict of interest

The authors declare that no conflicts of interest existed.

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