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Needle Stick and Sharp Injuries among Nurses at Zagazig University Hospitals, Sharkia Governorate, Egypt

Amani Shawki Ahmed

Community, Environmental and Occupational Medicine Department, Faculty of Medicine- Zagazig University, Egypt

ABSTRACT

Background: Needle stick and sharp injuries are a significant risk to the health of nurses. Every day nurses face the possibility that they may injure themselves. Although many injuries will have no adverse effect, the possibility of developing a disease such as hepatitis C, hepatitis B or HIV can cause untold psychological harm. ***Objectives****:* to determine the prevalence of needle sticks and sharps injuries and its associated factors among nurses at Zagazig university hospitals ***Methods:*** a cross-sectional study was conducted on 236 nurses working at Zagazig university hospitals during 2013. ***Data collection***: the data were collected through a questionnaire includes some demographic and work characteristics and information regarding the incident of needle stick injury. ***Results****:* the prevalence of needle stick and sharp injuries among nurses was (74.57%) during the whole work duration, (72.8%) of nurses exposed to needle stick while (39.4%) exposed to sharp injury and (36.86%) exposed more than once. (55.93%)of studied group exposed during the last year. the most frequent causative tools was hollow –bore needle (78.03%) followed by blade (27.27%) then suture needle (23.48%). the most frequent procedures at which exposure happen were needle recapping, injection and sample drawing (62.87%, 56.06% and 43.18%) respectively. all exposed nurses used antiseptic after exposure while half of them let blood to flow. only (6.81%) took the vaccine while no one took sero-prophylaxis after exposure.
Conclusion& recommendations**:** nurses are at a significant risk of needle stick and sharp injuries and prone to blood borne pathogens**.** Health education and training programs should be held regularly for nurses about occupational health hazards of NSI, protective measures, the importance of reporting of incident and sharp management training, and follow preventive practices.

Key words: Needle stick, sharp injuries, hepatitis C, hepatitis B or HIV

Introduction

Needle stick and sharp injuries (NSI) are wounds that caused by sharps accidentally puncture the skin. Sharps include needles, as well as items such as scalpels, razor blade, lancets, retractors, scissors, pins, clamps, cutters, staples and glass items (OSHA, 2009). Risk factors that causes NSI are numerous as, manipulating needles in patient line related work, recapping activity, passing devices, handling specimens, clean-up or failure to dispose the needle in the puncture proof containers (Wilburn *et al.,* 2004). Percutaneous injuries are a serious concern to all health care personnel and pose a significant risk of transmission of occupational blood borne pathogens (Sumathi *et al*., 2010). Including microorganisms that causing HIV/AIDS, hepatitis C and B, infectious mononucleosis, malaria and syphilis (Wilburn *et al*., 2004).

Nurses who work in health care institutions with less adequate resources or poor organizational climate and nurse leadership had a significant risk of needle stick injuries (Clarke *et al*., 2002a, b). Nurses in hospitals with favorable working environments are about 20–34% less likely to experience NSIs (Clarke, 2007). Nurses working on hospitals with lower staffing rates and high levels of emotional stress and exhaustion related to their jobs had significantly higher likelihoods of needle stick injuries (Clarke *et al*., 2002a, b). The association between staffing levels and NSIs among Chinese nurses has also been reported (Smith *et al*., 2004).

Among all health care personnel, Nurses have the highest rate of needle stick and sharp injury(ICN, 2009).In USA, It was estimated that the reported incidence of NSI among nurses is currently 16.3 %.(Trinkoff *et al*., 2009). In United Kingdom, about (48%) of the nurses have reported an incident at some

Corresponding Author: Amani Shawki Ahmed, Community, Environmental and Occupational Medicine Department, Faculty of Medicine- Zagazig University
E-mail: dr_amanishawki@yahoo.com

point in their careers and (10%) had been stuck by a needle or sharp in the last 12 months(Ball *et al*., 2008).

According to the World Health Organization (WHO) NSIs cause about (40%) of hepatitis C and B infections and (2.5%) of HIV infections among healthcare providers worldwide (WHO, 2002). In addition, direct costs for laboratory tests, including tests for hepatitis B serology, HIV antibodies, and the test for anti-hepatitis C, also treatment for any condition. There are also the burden associated with post-exposure prophylaxis and their work absences (Lee *et al*., 2005). According to US International Healthcare Worker Safety Center, injections and drawing blood accounted for (23.6%) and (11.5%) of NSIs, respectively (Perry *et al*., 2009). So, safety engineered needle devices are recommended for these tasks (Saia *et al*., 2010).

Hence, the objectives of the present study were to determine the prevalence of needle stick and sharp injuries and its associated factors among nurses at Zagazig university hospitals.

Ethical considerations: an informed consent was obtained from all participants before being interviewed. The nurses were told about the aim of the study, and the information would be used for scientific purposes.

Subjects and methods:

Study design, setting & time:

A cross-sectional study was conducted among nurses working at Zagazig university hospitals from November 2012 up to June 2013.

Target population and sampling:

The target population was nurses working at Zagazig university hospitals. The Sample size was calculated using Epi-info. According to the statistical records of Zagazig University Hospitals, the total number of nurses at the year 2012 was 2483nurses while the networking nurses were 2287, with expected frequency of needle sticks and sharps injuries among nurses was 23.5% (Rampal *et al*, 2010) at confidence interval 95%, with study power was 80%. Accordingly, the total calculated sample size was 277nurses. 253questionnaires were filled by who agreed to participate and we ended up with 236 questionnaires completed after excluding incompletely filled questionnaires with response rate (85.2%) and completion rate (93.3%). Stratified random sampling technique was used to select the nurses as follows; Hospitals departments were classified into 5 main strata had nearly the same working conditions; 1) Internal Medicine, 2) Pediatrics, 3) Surgical, 4) Outpatient Clinics and Blood Bank, and 5) Emergency and Intensive Care Departments.

Inclusion criteria for nurses group: nurses either males or females who were working at the same department or unit for at least one year.

Study tools:

The data were collected through a questionnaire was adapted from (CDC, 2007). It was consisted of:

Part I: includes some demographic and work characteristics such as; age, sex, residence, marital status, educational level, working department, duration of work, experience etc.

Part II: history of needle stick injuries, types of devices causing the injury, severity of penetration of needle stick and sharp injuries, procedures taken after exposure, their reporting of the incident, hepatitis B vaccine and post exposure prophylaxis.

Statistical analysis:

Statistical analysis was done using SPSS (the Statistical package for the Social Sciences for Windows) version 19 using frequency distribution tables, mean and standard deviation for descriptive purposes, chi-square for testing the significance of difference of qualitative variables. Logistic regression analysis was carried out to identify the significant risk factors. The level of significance was considered at < 0.05.

Results

Table (1): Illustrated the socio-demographic and job characteristics among the studied nurses, showed that (37.29%) was over 35 years old and (5.93%) less than 25 years. Majority of nurses was female (81.36%) and had diploma of nursing (86.86%). regarding the experience, (55.51 %) had experience more than 10 years.

Table 1: Socio-demographic and job characteristics of studied nurses working at zagazig university hospitals

Characteristics	n=236	%
Age (years)		
• < 25	14	5.93
• 25-	73	30.93
• 30-	61	25.85
• ≥35	88	37.29
Sex		
• Male	44	18.64
• Female	192	81.36
Level of education		
• Bachelor of nursing	31	13.14
• Diploma of nursing	205	86.86
Experience (years)		
• 1	8	3.39
• 1-5	60	25.42
• 5- 10	37	15.68
• ≥10	131	55.51

Table (2), represented that the prevalence of needle stick and sharp injuries was (74.57%) during the whole work duration, (72.8%) of them exposed to needle stick while (39.4%) exposed to sharp injury and (36.86%) exposed more than once. According to exposure during the last year (55.93%) exposed,while(47.78%) had needle stick and (30.93%) had sharp injury and(22.88%) had more than one exposure.

Table 2: Frequency distribution of needle stick and sharp injuries among studied nurses working at zagazig university hospitals

Characteristics	no= 236	%
Exposure during the whole work duration	176	74.57
• Needle stick	172	72.88
• Sharp	93	39.4
• More than one	87	36.86
Exposure during the last year	132	55.93
• Needle stick	113	47.78
• Sharp	73	30.93
• More than one	54	22.88

Table (3) showed frequency distribution of severity of penetration of needle stick and sharp injuries during the last year among nurses, most of exposure was superficial (74.24%) while (4.54%) was deep and (11.36%) of exposed had visible blood on the causative tool.

Table 3: frequency distribution of severity of penetration of needle stick and sharp injuries during the last year among studied nurses working at Zagazig university hospitals

	no= 132	%
Severity of penetration		
• Superficial	98	74.24
• Moderate	25	18.93
• Deep	6	4.54
• Unknown	3	2.27
• More than one	23	17.42
• Visibility of blood	15	11.36

Table (4) revealed that most frequent causative tools of needle stick and sharp injuries among exposed nurses was hollow –bore needle (78.03%) followed by blade (27.27%) then suture needle (23.48%)

Table 4: frequency distribution of causative tools of needle stick and sharp injuries among exposed nurses during the last year working at Zagazig University hospitals

Tool	n =132	%
Needles		
• Hollow –bore needle	103	78.03
• Suture needle	31	23.48
Blade	36	27.27
Lancet	6	4.54
Scissors	11	8.33
Others	4	3.03

Table (5) represented that that the most frequent procedures at which exposure happen were needle recapping, injection and sample drawing (62.87%, 56.06% and 43.18% respectively).

Table 5: frequency distribution of procedures at which exposure happened among the exposed nurses during the last year working at Zagazig university hospitals

Procedures	n =132	%
Injection	74	56.06
Suturing wound	31	23.48
Sample drawing	57	43.18
Operation	16	12.12
Needle recapping	83	62.87
Sharp disposal	35	26.51
Cleaning and sterilization of instruments	11	8.33
Falling of tools	7	5.3
Others	5	3.78

Table (6) The Frequency distribution of procedure taken after exposure showed that, all exposed nurses used antiseptic after exposure while half of them let blood to flow. Regarding hepatitis B vaccination, only (6.81%) took the vaccine while no one took sero-prophylaxis after exposure or reporting the incident

Table 6: Frequency distribution of procedure taken after exposure happened among the exposed nurses during the last year working at Zagazig university hospitals

Variable	n= 132	%
Let blood to flow	66	50
Wash with water	23	17.42
Use antiseptic	132	100
Lab investigation	4	3.03
Vaccination	9	6.81
Seroprophylaxis	0	00
Reporting	0	00

Table (7) showed Association between some Socio-demographic and work characteristics and the frequency of needle stick and sharp injuries the studied group during the last year. Regarding to the departments, it was found that the frequency of exposure were high among nurses working in emergency, surgery and internal medicine departments (78.04%, 71.05% and 63.26% respectively). Regarding sex, there is no statistically significant difference among males and females. About the experience, the risk of exposure decreases with increasing the duration of experience. And the risk of exposure increased with the nurses had diploma.

Table 7: Association between some Socio-demographic and work characteristics and the frequency of needle stick and sharp injuries among nurses during the last year working at Zagazig university hospitals.

Variables	Total NO	Exposed NO	%	X^2	P
Department				51.971	<0.001
• Surgery	76	54	71.05		
• Emergency	41	32	78.04		
• Pediatric	38	11	28.94		
• Internal medicine	49	31	63.26		
• Outpatient department	32	4	12.5		
Sex					
• Males	44	19	43.18	3.56	>0.05
• Females	192	113	58.85		
Experience				52.19	<0.001
• 1	8	7	87.5		
• 1-5	60	53	88.33		
• 5-10	37	25	67.56		
• ≥10	131	47	35.87		
Level of education				16.1	<0.001
• Bachelor of nursing	31	7	22.58		
• Diploma of nursing	205	125	60.97		

Table (8) showed that working in the emergency and surgery departments, less experience and low education level were the most significant predictors of needle stick and sharp injuries among nurses.

Table 8: Logistic regression analysis for the most predictor variables of needle stick and sharp injuries among nurses during the last year working at Zagazig university hospital

Variables	B	S.E	WALID	P-Value
Working in Surgery department	2.844	.591	23.12	<0.001
Working in emergency department	3.214	.654	24.13	<0.001
Working in internal medicine department	2.490	.611	16.59	<0.001
Work experience <1 year	2.527	1.084	5.42	<0.05
Work experience <5 years	2.605	.441	34.81	<0.001
Education level: Diploma of nursing	1.678	0.453	13.74	<0.01

Discussion

All workers in health care institutions handling needles and sharp instruments have a significant risk for NSI including nurses (OSHA, 2005). Our study showed that the prevalence of needle stick and sharp injuries among nurses was (74.57%) during the whole work duration, (72.8%) of them exposed to needle stick while (39.4%) exposed to sharp injury and (36.86%) exposed more than once. This was in agreement with (74%) reported by Gurubacharya *et al*. (2003) in their study carried out in Nepal in 2003 and (74%) reported by Maqbool Alam (2002) in a study carried out in 2002 at the 100-bed hospital, Saudi Arabia.

Regarding exposure during the last year (55.93%) exposed. About the type of exposure, (47.78%) had needle stick and (30.93%) had sharp injury while (22.88%) had more than one exposure. Which is slightly lower compared to the case incidence of (63.3%) reported by Ebrahimi and Khosravi, (2007). However this is much higher than (39.4%) reported by Hofranipour *et al*. (2009) in Iran. This high incidence and prevalence of needle stick and sharp injuries can be explained by that nurses are responsible for most of the injections, intravenous fluid administration, venipuncture, and other procedures using needles and sharp instruments. Also the long duration that nurses spent in direct patient contact.

Our study also showed that majority of injuries was superficial (74.24%) while (4.54%) was deep and (11.36%) of exposed had visible blood on the tool. Regarding causative tools, the most frequent causative tools were hollow –bore needle (78.03%) followed by blade (27.27%) then suture needle (23.48%). And most frequent procedures at which exposure happen were needle recapping, injection and sample drawing (62.87%, 56.06% and 43.18% respectively). This was in agreement with Muralidhar *et al*. (2010) who reported that nurses were involved in withdrawal of blood, as it is the most common activity involving

manipulation of needle in patient. In the EPInet study, (38 %) of NSIs occurred during needle use, while (42%) occurred after use of needle and before its disposal (EPINet, 1999).

The present study revealed all exposed nurses used antiseptic after exposure while half of them let blood to flow. Regarding hepatitis B vaccination, only (6.81%) took the vaccine while no one took seroprophylaxis after exposure. Regarding the reporting of the incident, no one in our study report the incidence.

It was noticed that the frequency of exposure were high among nurses working in emergency, surgery and internal medicine departments (78.04%, 71.05% and 63.26% respectively). Regarding sex, our study showed that there was no significant association between gender with needle stick and sharp injury. Similar results have also been reported by Rampal *et al*. (2010) and Hadadi *et al*. (2008). About the experience, the risk of exposure decreases with increasing the duration of experience. And the risk of exposure increased with the nurses with lower education. Our study revealed that working in the emergency and surgery departments, less experience and low education level were the most significant predictors of needle stick and sharp injuries among nurses.

According to a CDC report, using safety engineered devices could reduce needle stick and sharp injuries by (76%) (Lal, 2007). Ensuring adequate training about safe use and disposal of needles and sharps, and following preventive measures like vaccinations for hepatitis B (Clarke, 2007 and Zafar, 2008).

Conclusion and Recommendation

Nurses are at a significant risk of needle stick and sharp injuries and prone to blood borne pathogens**.** There is much chance for improvement in protecting the nurses from needle stick and sharp injuries. Based on the findings of the present study, it is highly recommended that health education and training programs should be held regularly for nurses about occupational health hazards of NSI, protective measures, the importance of reporting of incident and sharp management training. And following preventive practices like vaccinations for hepatitis B and follow up of hepatitis B surface antibody titer and booster dose of hepatitis B vaccine every 5 years. Incident report form should be present at every department.

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