

REPORTING SHARP INJURIES AMONG SURGEONS IN ZAGAZIG UNIVERSITY HOSPITALS, EGYPT

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ABSTRACT

Background and rationale of the study: Although Sharps injuries are a preventable hazard faced by medical personnel in the operating room yet it continues to be one of the hidden problems among HCP. The potential consequence of such injuries includes transmission of blood-borne pathogens with detrimental effects. Despite the advances in technology and increased awareness of medical staff, annually around 600 thousand to one million workers are affected thus considered as one of the most serious threats facing health care workers specially surgeon.

Methodology: a cross sectional study of Zagazig University Hospitals surgical departments. Using a sample composed of 287 surgeons randomly chosen from different surgical departments. A questionnaire assessed in addition to personal and professional characteristics, the history of sharp injuries, types of instrument causing the injury, their post exposure prophylaxis including reporting.

Results: There were total 287 surgeons participated in this study (47%) of the respondent surgeons had been exposed to at least one episode of sharp injury in the preceding 3 months and most of the exposures (68%) occurred in the operation room. The injury was mainly caused during suturing (83%). The commonest devices, accused in most of the injuries were suturing needle and scalpel (74 and 59%). The majority of the surgeons (62%) didn't report the SI and it was largely explained by the majority of the sampled respondents (89%) were not aware of the reporting system existing in their hospital.

Conclusions: The most common reason of underreporting in our study was the lack of awareness that all injuries must be reported.

Recommendations: The observed high level of under reporting reflects the need for education on prevention. Our results can guide in planning an education program for the surgeons to increase awareness about dangers of sharp injuries and help improve the reporting strategy and other potential prevention interventions for of sharp injuries.

UDC CODE & KEYWORDS

■ UDC: 613.6 ■ Sharp injuries ■ Body fluids ■ Post exposure prophylaxis and reporting

INTRODUCTION

"Sharps injuries" (SIs) and "Needle-stick injuries" (NSIs) are common, serious and preventable hazards faced by medical personnel in the operating room in any healthcare setting. Despite the advances in technology and increased awareness of medical staff, annually around 600 thousand to one million workers are affected by needle stick or sharp objects (Foly M., Leyden A.M., 2003). The potential consequence of such injuries includes transmission of blood-borne pathogens. The World Health Organization (WHO) estimates that about 3 million HCWs face exposure to blood borne viruses each year (2 million to HBV, 900,000 with HCV, and 300,000 to HIV), 90% of the infections that result from these exposures are in low income countries (WHO, 2002 and Pruss-Ustun A, et al, 2005). The risks of acquiring those diseases after accidental SIs were 30% for Hepatitis B, 3% of Hepatitis C, and 0.3% of HIV/AIDS (Mary and Annemarie, 2001). The issue of SIs is worrisome worldwide, the frequency of needle stick injuries in Egypt is high, (35%) despite this few efforts have been undertaken to raise awareness about needle stick injury (NSI) among health care workers (HCWs) and hospital managers in Egypt (Talaat et al., 2003). SIs are accidental piercing body trauma caused by sharp medical equipment that were used to screen, diagnose, treat or follow the patient disease conditions during providing the patient care. Sharp injuries affect the quality of health care services in addition, it has detrimental effects on personal and professional lives the health of care providers. Health care workers experience severe emotional distress, fear, anxiety which leads them to behavioral changes (Lee et al., 2005; Wicker et al., 2007).

Among HCWs, nurses and physicians appear especially at risk and more than other HCWs, surgeons are at an increased risk of exposure to HBV, HCV, and HIV. an investigation among American surgeons indicates that almost every surgeon experienced at least one such injury during their training (Fry, 2005). Studies have shown that the risk of exposure for general surgeons is about three to four times greater, and for non-immunized surgical specialists about six times greater than that of the general population (Cottone & Molinari, 1989). The operating theatre creates an environment in which the surgeons are vulnerable to sharp injuries and accounted for a significant percentage of injuries (29%), ranking second only to patient rooms (32%) (Perry Parker & Jagger, 2003). Causes of sharps injury include various factors like type and design of needle, recapping activity, handling/transferring specimens, collision between HCWs or sharps, during cleanup, manipulating needles in patient line related work, passing/handling devices or failure to dispose of the needle in puncture proof containers (Doebbeling et al., 2003). The situation is made worse by gross underreporting of such injuries among the HCW. Surveys of health care personnel indicate that 50% or more do not report their occupational percutaneous injuries (Bosan et al., 2010). There is still a serious lack of information about the various factors that cause accidents with needles. Data on sharps injury incident is an essential pre-requisite for planning successful sharp injury prevention program in the hospital. Surveillance programs that provide in-depth analysis of needle-stick accidents are an important tool for obtaining

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information may play an important role in planning preventive measures. More generally, injury reporting allows identification of hazardous devices or procedures and so serves to diminish the risk of future injuries. Post-exposure prophylaxis (PEP) is also an essential element of programs to prevent infection and is important for HCWs' safety. PEP includes procedures that should be done after exposure to patients' BBF to prevent probable microorganism transmission (Owolabi et al, 2012).

Prevention of SI, therefore, plays an important role in reducing the risks of contracting blood-borne infections among surgeons. The magnitude of injuries with needles and sharps can be reduced and prevented by if a device was disposed of improperly together with improving awareness about the risks of NSI, propagation of safety guidelines, execution of protocols and appropriate training of safe techniques among health care workers (Wilburn, 2004). Accepting the fact that NSIs are preventable can have a positive impact on the attitudes of HCWs thereby improving the safety culture in handling the sharps (Rhodes, 1995). In addition to the modification of hazardous work practices, creating a safer work practice and widespread use of safety-engineered devices. Surgical techniques and protective barriers in the surgical suite, were designed with adherence to infection control guidelines (Shimoji et al., 2010). Change takes time and successful change requires cooperation and commitment from every member of the multi-disciplinary team (Mathias, 2001). The aim of the present study is to plan a program for prevention of SIs among surgeons in Zagazig University Hospitals, Egypt.

Operational definition

Sharps injuries is the use of sharp tools that expose the surgeons to blood borne pathogens and thus permit the entry of bacteria and viruses into the body which can occur while using the instrument, after the usage or when discarding the object into the sharp container (safety box). Injuries caused by surgical blades, knives during surgical operations and splashes of the bloods and body fluids are also classified as sharp injuries. This includes cuts, pinches, scratches, nicks, gashes and bites which break the skin (Ladou, 2004).

Objectives

1. To determine the frequency and pattern of sharp injury among surgeon during their work.
2. Evaluate post exposure prophylaxis and reporting behavior associated with the of injuries among the exposed surgeon after being pricked.
3. Identify reasons of underreporting.

Methodology

- Study design and setting:

A cross sectional study took place at Zagazig University Hospitals surgical departments from December 2012 up to May 2013.

- Target population and sampling:

Surgeons in different surgical departments as they are the most likely ones to use invasive procedures with sharp instruments used in the operative field so more exposed to the risk. There are 4 surgical departments (general surgery, orthopedic, urology, and obstetrical and gynecologic) were randomly chosen from the 8 departments. The target population for the study was entire surgeons in the randomly chosen departments (410) 307 questionnaires were completed by who agreed to participate in the study, we ended up with 287 questionnaires filled by consenting clinicians and after excluding incompletely filled questionnaires from the final analysis as shown in the flow chart (fig. 1).

- An instrument used for data collection:

A preliminary questionnaire was pilot tested on a sample of 25 surgeons to determine the clarity of the questionnaire items and to confirm its face validity then the required modifications were made accordingly. The final structured self-administrated questionnaire included different items:

- Personal and Job-related variables:

The 1st part included questions about: gender, age, surgical specialty, recent qualification, years of experience in practice, extra working hours, night shifts, whether they had received training related to infection control and standard precautions, in addition to questions asking about the their immunization state e.g. History of hepatitis B virus (HBV) vaccination & post vaccination serologic testing.

- Exposures to sharps injuries:

The 2nd part of the questionnaire specifically asks participants about exposures to sharps injuries during the previous 3 months and the circumstances of the most sharp injury, the nature of the exposure, sources, the process leading to that exposure, and type of the instrument.

- Post exposure prophylaxis:

The 3rd part of the questionnaire evaluated 1st aid post exposure measures the prophylaxis taken immediately after the exposure in addition to delayed measures including reporting and reasons of an:

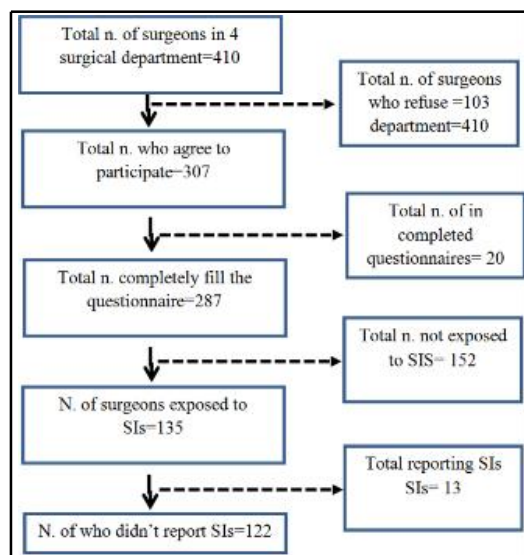
Ethical consideration:

Ethical permission to conduct the study was obtained from the hospital director prior to data collection. Participation in the study was voluntary and informed verbal consent was taken prior to data collection. The questionnaires anonymous and each questionnaire were numerically coded to assure the confidentiality and encourage better reporting.

Statistical analysis:

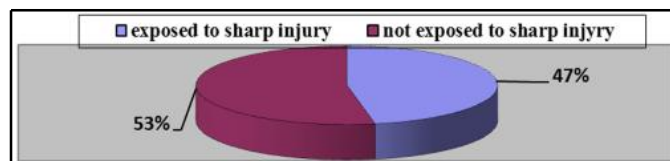
Data were analyzed using SPSS (the Statistical package for the Social Sciences for Windows) version 19.0. Using frequencies for descriptive statics in addition, using Odds Ratio (OR) and 95% CI to measure the strength of association. The data considered statistically significant at p value > 0.05. In addition to the graphical presentation of data, Pareto chart was used for the reasons of underreporting.

Figure 1: Flow chart of the study participants



Source: Author

Figure 2: Classification of the studied surgeons, according to exposure to sharp injury (n = 287)



Source: Author

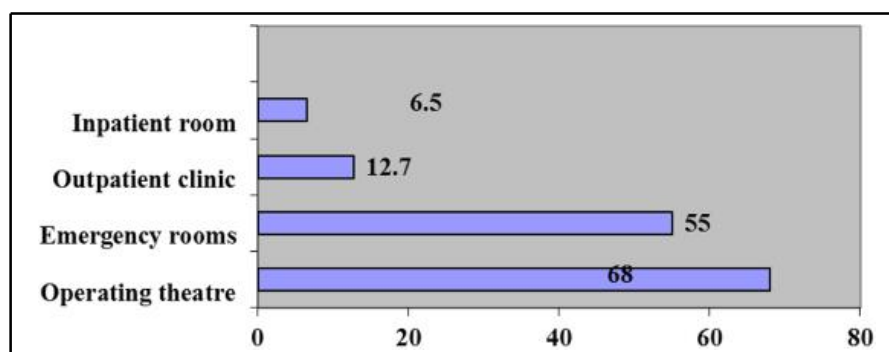
Table 1: Personal and professional characteristics of the respondent surgeons (n = 287)

Variables	Category	Not Exposed to SIs (n = 152) No (%)	Exposed to SIs (n = 135) No (%)	P value	OR (95%CI)
Gender	Male (n = 178)	97 (63.8)	81 (60.0)	0.04*	1.59 (0.98-2.58)
	Female (n = 109)	55 (36.2)	73 (45.3)		
Age groups (y)	< 35 (n = 60)	40 (26.3)	20 (14.8)	0.01*	2.05 (1.09-3.92)
	≥ 35 (n = 227)	112 (73.7)	115 (85.2)		
Surgical Specialty	Orthopedic (n = 36)	9 (5.9)	27 (20.0)	0.51	1 0.77 (0.30-1.9) 0.1 (0.04-0.72) 0/09 (0.03-0.27)
	General surgery (n = 109)	33 (21.7)	76 (56.3)		
	Gynecology obstetrics (n = 90)	69 (45.4)	21 (15.6)		
	Urology (n = 52)	41 (27.0)	11 (8.1)		
Job title	Resident (n = 32)	17 (11.2)	15 (11.1)	24	1 1.68 (0.6-4.4) 1.7 (0.7-4.08) 0.29 (0.11-0.82) 0.50 (0.2-1.69)
	A. Lecturer (n = 57)	23 (15.1)	34 (25.2)		
	Lecturer (n = 108)	43 (28.3)	65 (48.2)		
	A. Professor (n = 63)	50 (32.9)	13 (9.6)		
Night shifts	No (n = 101)	72 (47.4)	29 (21.5)	0.00*	3.29 (1.9-5.7)
	Yes (n = 186)	80 (52.6)	106 (78.5)		
Extra hour	No (n = 83)	61 (40.1)	22 (16.3)	0.00*	3.4 (1.9-6.3)
	Yes (n = 204)	91 (59.9)	113 (83.7)		
Infection control training	No (n = 121)	34 (22.4)	87 (64.4)	0.000*	0.16 (0.095-0.267)
	Yes (n = 166)	118 (77.6)	48 (35.6)		
Hepatitis B vaccination	No (n = 0)	0	0	---	----
	Yes (n = 287)	152	135		
Anti-HBs after vaccination	Checked (n = 98)	36 (23.7)	62 (45.9)	0.00*	0.37 (0.21-0.62)
	Not checked (189)	116 (76.3)	73 (54.1)		

A = Assistant, SI= sharp injury, *Significance difference (p≤ 0.05)

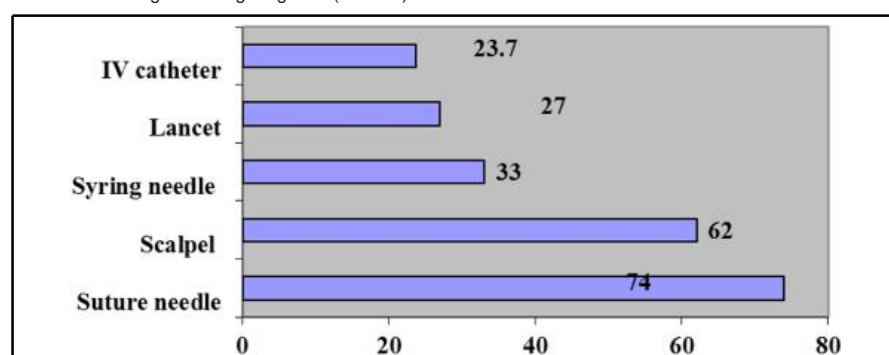
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Figure 3: Place of exposure to SI among surgeons (n = 135)



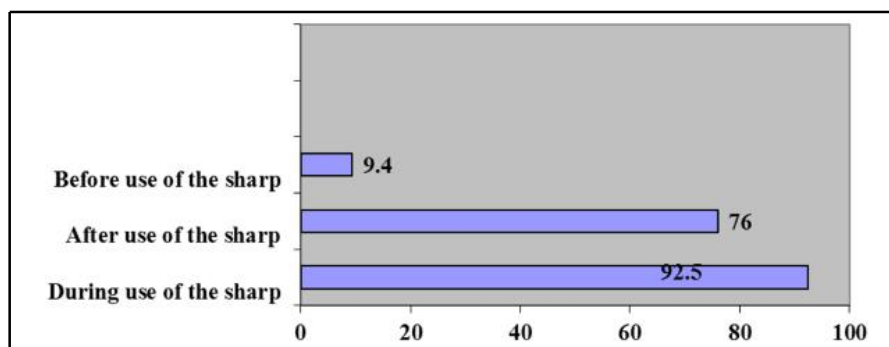
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Figure 4: The instrument causing SI among surgeons (n = 135)



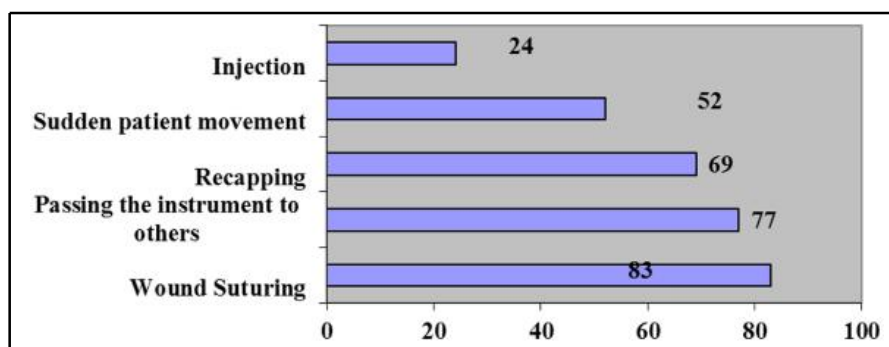
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Figure 5: Timing of SI among surgeons (n = 135)



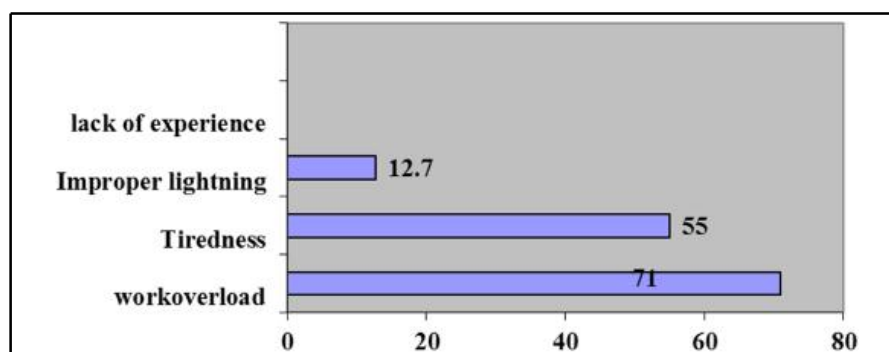
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Figure 6: Procedures causing SI among surgeons (n = 135)



Source: Author

Figure 7: Reasons of SI among surgeons (n = 135)



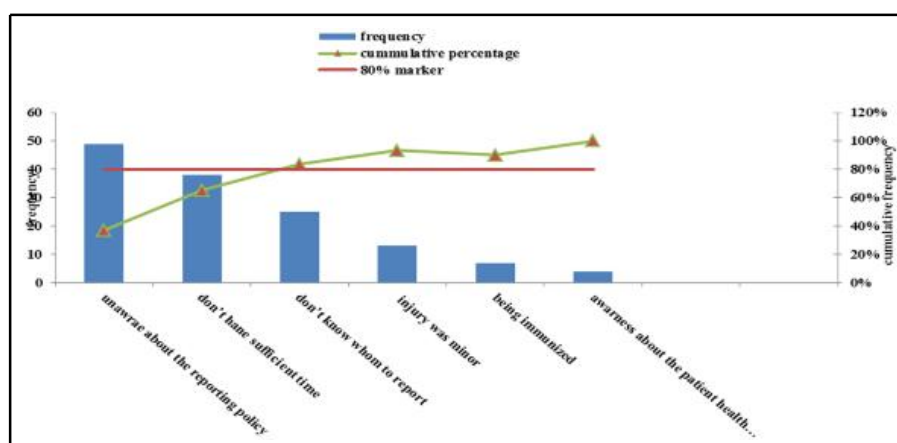
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Table 2: Post sharp action after being pricked (n = 135)

PEP	Categories	No	%
Immediate			
Stop what he is doing	- Yes	96	71.1
	- No	39	28.9
Encourage bleeding of the wound by applying gentle pressure	- Yes	80	59.3
	- No	55	40.7
Wash well under running water for 30 seconds	- Yes	125	92.6
	- No	10	7.4
Wash with antiseptic	- Yes	48	35.6
	- No	87	64.4
Subsequent			
Report the incident to the manager	- Yes	13	9.6
	- No	122	90.4
TOTAL		135	100
PEP = Post Exposure Prophylaxis			

Source: Author

Figure 8: Pareto chart reflecting reasons of under-reporting in surgeon exposed to SIs (n = 135)



Source: Author

Results

After excluding incompletely filled questionnaires from the final analysis, 287 were only included in final analysis, giving (70.0%) response rate (287/410).

Regarding the prevalence of SIs among the sampled respondents, the findings of our study revealed that (47%) the sampled surgeons in Zagazig University Hospitals got exposed to sharp injuries during their the previous 3 months it was illustrated in fig (2).

For assessing the factors associated with sharp injury, we used bivariate analysis. These factors included personal, work-related characteristics and immunization state we found that all the personal factors, SIs was significantly associated with gender ($P = 0.04$) and increased age of surgeons ($P = 0.01$) where the males are exposed about 2 times more

significantly exposed to SIs than the females (OR = 1.59, 95% CI 0.98-2.58). Those older than 35 years old were more exposed to SIs than younger age groups as displayed in (Table 1).

Whereas among the professional and work related characteristic, the subspecialty and the academic rank didn't significantly differ between exposed and not exposed to SIs ($p = 0.51, 0.24$) where the majority of those exposed to SIs were general surgeons (56.3%), and lecturers (48.2%). On the other hand, SIs was about 3 times more among surgeons having night shifts (OR = 3.29, 95% CI 1.9-5.7). Similarly, it is about 3 times more among those having extra working loads (OR = 3.4, 95% CI 1.9-6.3) (Table 1).

The findings in our study revealed that although all the respondent sample were immunized against HB, yet the majority of them hadn't checked their serological levels and there was a significant difference ($p = 0.00$) where the majority of the non-exposed didn't check for their serological levels.

Pattern and circumstances of SIs:

Regarding the place of exposure to sharp injury, the study results revealed that the majority of the SIs occurred in operating theatre and the emergency rooms (68 & 55%) (fig. 3). Regarding the instruments accused of causing the injury, the needle stick was the major cause for the injury (74%), followed by scalpel and syringe needles (62 & 33%) respectively (fig. 4).

Figure 5 portrayed the timing of exposure to SIs, the majority of injuries occurred during performing the procedures (92.5%) followed by immediately after finalizing the operative procedures (76%). Regarding the procedures most commonly expose the sampled surgeons to injury were: wound suturing, passing the instrument to others, recapping the needle (83, 77 and 69%) respectively as shown in figure (6). The majority of cases of SIs were due work overload, tiredness, improper lightening (81, 73, 66%) respectively as revealed by figure (7).

Post exposure prophylaxis, Reporting rate and causes of underreporting:

Table 2 showed that the most common actions taken immediately after exposure were: washing the wound, and encouraged bleeding (92.8 and 59.3%) respectively, whereas for the delayed post-exposure actions taken included 9.6% report the SIs. Pareto showed that the majority of them didn't report as they were not aware about the reporting policy in the hospital or whom to report (fig. 8).

Discussion

Sharps injury is one of the major occupational hazards, surgeons are specially being at high risk as they perform invasive surgical procedures. The degree of risk is directly related to a number of factors, including the inherent nature of peri-operative work, routine and concentrated use of various types of sharp instruments and exposure to large amounts of blood, body fluids and tissue (Clarke et al., 2003). We designed the current study based on the fact that data on sharps injury becomes an essential pre-requisite for initiating successful injury prevention program and can be the best strategy to tackle this problem and can guide in planning an education program for the surgeons to increase awareness about dangers of size and help improve the reporting strategy and other potential interventions for prevention of sharp injuries. Operating rooms present special challenges in reducing the risk and number of SIs and blood borne pathogen exposures (Stringer et al., 2002).

The prevalence of SIs is variable among previous different studies. The frequency of sharp injury in the current study during their the previous 3 months was (47%). This 3 month time period was used to minimize recall bias. The finding is similar to a study conducted in UK & Ethiopia (38 & 51.6%), on the other hand it was lower compared to other studies conducted in Egypt and India, where the prevalence of SIs reported were (67.9% and 80.1%) respectively 13-17. This difference in the prevalence can be attributed by the differences in the definition operationalized to be used in different studies in addition it could be the study design used. Also, it could be due to the difference in the study health facility setups, and even the year of the study.

Our findings revealed that all the personal factors, the males are exposed about 2 times more significantly exposed to SIs than the females, this can be simply explained by the fact that the females have a lower risk taking behavior better safety precautions than the males. Surprisingly Those older than 35 years old were more exposed to SIs than younger age groups this might be due to starting their private work at that age which represents an extra burden over them. Workload pressure and time constraints are likely to cause needle stick injuries (Clarke and Aiken, 2002). Consistent with these findings, we found that among the professional and SIs was about 3 times more among surgeons having night shifts and among those having extra working loads.

Vaccination

Recently, the incidence of HBV infection has largely declined due to the widespread immunization with hepatitis B vaccine even though, the sero-conversion level after vaccination was not assessed (Poole, Miller and Fillingham, 1994). We had a similar finding in our survey was only 6 workers (10%) had been tested for anti-HBs. The findings in our study revealed that although all the respondent sample were immunized against HB, yet the majority of them hadn't checked their serological levels and the majority of the non-exposed didn't check for their serological levels.

Circumstances of sharp injury

Determining the circumstances of SIs is of paramount importance which depends partly on the type and design of the device and certain work practices. The majority of the SI occurred in operating theatre and the emergency rooms (68, 55%), which can be due to more intense activity, especially in hot working days and been exposed to more pressure and rush injuries that requires frequent suturing placing additional burden on the surgeon. This is just the contrary, to surveillance data from Nash and Epinet where the majority of NSI occur in inpatient units. This may be because road traffic injury patients from the major case load to the hospital which requires frequent suturing of the wound (EPINET, 1999).

For the instrument incremented in the injury, different types of sharp medical equipment include suture needle, hypodermic needle, disposable needle, blood sugar lances, surgical scalpel, trocar puncture needle, vacuum tube blood collection needle, broken vial preparation (vials or ampules), razors, scissors can be accused (Zhang, 2009). Most of the injuries occur due to three basic devices i.e. IV equipment, suture needles and hollow bore needles. But for surgical personals, suture needles are most common equipment that causes injuries (Edwin, 2000). Which is consistent with our findings, which revealed that the needle stick was the major cause for the injury (74%), followed by scalpel and syringe needles (62 & 33%) respectively.

Although the most important causes of SI are two-handed recapping, the unsafe collection and disposal of sharps waste (Berguer, 2004). Our results showed that procedures most commonly expose the sampled surgeons to injury were: wound suturing, passing the instrument to others, recapping the needle. In contrast to previous done in Egypt, where (74.7%) reported that they were recapping the needles immediately after use. Unfortunately, although recapping has been banned by the United States Occupational Safety and Health Administration, it continues to be an identified cause of SIs in most hospitals. Several studies have shown recapping to be an important cause of SI (Ebrahimi, 2007; Kermode, 2005).

In the operating theatre, 39% of the injuries were self-inflicted while 61% were inflicted by the surgeon or assistant and the majority of the injuries occurred during direct transfer of sharps between personnel (Kermode, 2005).

Post exposure prophylaxis

According to Gupta et al. (2008) knowledge about PEP protocols is hypothesized to reduce the risk by 79%, is recommended within 2 hours of exposure as there is time constrained for administration of HBIG to those with inadequate HBV antibody coverage and is crucial as a prophylaxis against the risk of acquiring BBPs. The most common actions taken immediately after exposure were: washing the wound, and encouraged bleeding, whereas for the delayed post-exposure actions taken included 9.6% report the SIs.

The CDC recommendation is to test for antibody after completion of three injections of HBV vaccine, and if negative, give a second three-dose vaccine and test again for anti-HBsAg antibodies. If there is no antibody response, no further vaccination is recommended. Antiretroviral therapy administered within 24 to 36 hours after exposure has been associated with an 81% reduction in HIV infection. Although no post exposure prophylaxis is available for HCV, testing can identify HCV infection at an early stage, during which treatment is highly effective in preventing chronic infection. Although, reporting of NSIs may be required to establish the causal relationship of the exposure and subsequent complications (e.g. Chronic infection or inability to practice medicine) (CDC, 2001).

Our finding are consistent with Guo et al. (1999) who found that underreporting is a critical problem accounting for 81% of the studied sample, similarly about 90% of the sampled surgeons didn't report their injuries. This was explained that the majority of them were not aware about the formal reporting system exists in the hospital. SI have historically been underreported. Reporting bias may have resulted in health care workers preferentially reported exposure that they believed was more likely to result in HBV, HBC and HIV. This is just the opposite to another study reported that as many as 70% of surgeons never or rarely report percutaneous exposures. Factors contributing to low reporting rates include: healthcare workers' perception of risk, occupation, length of service, lack of time, and poor follow-up care¹⁵. Pareto showed that the majority of them didn't report as they were not aware about the reporting policy in the hospital or whom to report.

CONCLUSION

Our study provides the foundation and evidence of how such injuries occur, including under what circumstances, with what devices and during what types of procedures (47%) of the respondent surgeons had been exposed to at least one episode of sharp injury in the preceding 3 months and most of the exposures (68%) occurred in the operation room. The injury was mainly caused during suturing (83%). The commonest devices, accused in most of the injuries were suturing needle and scalpel (74 and 59%). The majority of the surgeons (62%) didn't report the SI and it was largely explained by the majority of the sampled respondents (89%) were not aware of the reporting system existing in their hospital. The most common reason of underreporting in our study was the lack of awareness that all injuries must be reported. The picture that emerges reflects a number of different risk opportunities involving interactions among patients, workers, devices and the environment. Greater collaborative efforts are needed to prevent NSIs and their consequences. Such efforts are best accomplished through a comprehensive program that addresses institutional, behavioral and device-related factors that contribute to the occurrence of NSIs. Thus, based on the findings of our study, we recommend:

- Reporting of SIs to the officials of the infection control committee should be mandatory.
- Barriers to reporting should be properly determined and eliminated in order to ensure appropriate treatment after sharp exposure.
- The hospital should regularly investigate and assess sharps-related injuries and establish a post-exposure prophylaxis program for the protection of HCWs who experience sharp injuries. In addition, the surgeon should be encouraged to report each and every incident immediately as this is the only true way to ensure that correct management of.
- Establishment of surveillance that could be used to identify potential risk factors associated with NSIs, such as high-risk occupations, settings or procedures, and detects the emergence of new problems. Surveillance systems could be used also to track whether interventions put into place significantly help reduce injuries.
- We strongly recommend that surgeons should receive periodic training for sharp management and should be motivated to avoid using needles whenever safe and effective alternatives are available. Avoid recapping or bending needles that might be contaminated.

- Plan for the safe handling and disposal of needles before use.
- It should be mandatory for all surgeons to be immunized against Hepatitis B before starting their career.
- Organized shift schedules and having sufficient staff numbers.
- Compliance with universal precautions in the operating theatre.
- Further research about SIs and how it can be decreased.

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Conflicts of interest: The authors declare that they have no conflict of interests

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