

OCCUPATIONAL SHARP INJURIES IN HEALTH CARE WORKERS; RESULTS FROM EL-MINIA UNIVERSITY HOSPITALS AND EL-MINIA GENERAL HOSPITAL

By

Refat T.M.* , Mohy-El Din H.M.** , Abu-Baih H.M.*** and
El- Sanadiki M.N.***

*Occupational Medicine**, *Internal Medicine*** and *General surgery****
Departments, Faculty of Medicine, El-Minia University, El-Minia, Egypt.

Abstract:

Objective: One of the potential occupational hazards for health care workers (HCWs) is sharps injuries especially needle stick injuries (NSIs). These hazards are influenced by numerous factors including setting, environmental factors, staffing levels, type of procedures, devices and equipment.

Aim of work: To determine the frequency, characteristics and determinants of occupational sharp injuries in HCWs.

Subjects and Methods: This study is a cross-sectional study; involved 160 HCWs employed in jobs with potential exposure to sharps injuries. Data were collected by questionnaire that included demographics, occupation categories; shift work, knowledge of prevention measures and details of sharp injuries.

Results: The results showed that 40% of HCWs were < 30ys old; (57.5%) females; (70%) married; and (77.5%) academic workers. Occupational categories showed (45%) nurses; (26.3%) physicians (surgeons and others), (17.5%) technicians, (11.2%) cleaners and (51.9%) working a shift work day and night (rotating shifts). The majority (40.6%) have > 10 years in service and (71.3%) not trained about precautions. Surveyed HCWs, admitted sharp injuries in (42.5%) with reporting percent of 11.8 as they don't know (18%) or lack of direction (57%). Injuries caused by hollow bored needles (29.2%), stabs, scalpel (30.8%) and others (40%).

Conclusion: The frequency of sharp injuries among HCWs is high and reporting is low and awareness of protection is very low. The data showed that continued training effort,

need to be directed toward new HCWs ; this research, also points to the need for better safety devices products and work practices to reduce suture related injuries.

Key words: Sharp injuries, Health care workers, Occupational, El-Minia University

Introduction:

Health care workers (HCWs) represent a large and growing work force facing special occupational hazards (1). Occupational blood exposure is influenced by numerous factors including setting, environmental factors, staffing levels and characteristics, type of procedure; devices and equipment (2) . The annual number of sharp injuries among HCWs is unknown; however, estimates from existing surveillance systems indicate that 600.000 and 800.000 such injuries occur annually with about 380.000 occurring among hospital based HCWs (3); however, only about 50 % of these injuries are reported (4).

In the operating room as well as many other hospital places, staff often use and pass sharp instruments without looking or letting the other person know what they are doing (5). There are moreover the need for speed and the added stress of anxiety, fatigue, frustration and occasionally ever anger.

Protective equipment, such as masks and face shields required for the purpose of patient and provides protection can add to

exposure risk as it creates greater difficulties in communications. Limited space and visibility within operative fields, emergent patient care situation; fixation of central catheters for hemodialysis with distractions and ambient noise may increase the risk of sharps injuries (6).

Aim of the work

This study tries to emphasize the patterns of sharp injuries and to determine the occurrence and frequency of such injuries in different hazardous hospital departments, especially operative rooms. Furthermore, this study tries to reach an assumption of prevention control and to reach recommendation for reducing these injuries in the future.

Subjects and Methods:

Over a 36 months period starting at January 2008 to January 2011; 160 HCWs were interrogated and received the study questionnaire to answer. The studied HCWs belonged to El-Minia university hospitals and El-Minia general hospital. The units and departments which were surveyed included general surgical department and all the related subspecialties, operating

theatre personnel in different other departments, and hemodialysis units and clinical pathology department etc. All HCWs working in or related to operating rooms were included under surveillance; the survey was performed for all of the shift workers.

The questionnaire was based on a review of the literature and was pilot tested at the two hospitals. The first part of the questionnaire included questions that elicited personal and demographic characteristics including age, sex, marital status, job, education level, and shift work. The second part of the questionnaire elicited data about the frequency and occurrence of occupational exposure to blood and other body fluids and sharps injuries during the previous years of work. The questionnaire also measured the extent to which HCWs were familiar with the different hazards of working in the operating room. It also tested the awareness of HCWs to the protocol of specific precautions in working in such risky environment. The questionnaire asked the respondent whether they were able and willing to implement the precautions and whether they have sufficient support from their organization the questionnaire measured the incidence of the main hazards related to direct involvement.

Results:

A total number of 160 HCWs were surveyed; (57.5%) were females; and (42.5%) were males; 40% were younger than 30 years and (30.6%) were older than 45 years old. 70% of the studied group were married; and 77.5% were academic while 22.5 % were non-academic. The occupational distribution showed 45 % nurses, 26.3 % physicians (surgeons); 17.5% technicians and 11.2% cleaners and co-workers. As regard to shift work attitude; the study showed that 30.6% were working by day-time and 17.5% were working by night while 51.9% were working in rotating shifts (day and night shifts). As regard to years in service 31.9% served less than 5 years while 40.6% served more than 10 years while 27.5% worked for between 5 years and 10 years. Training about precautions prior to job showed that 71.3% had no such training while only 28.7% had such training as shown in table I.

The frequency of sharp injuries, needle stick injuries (NSIs) was 42.5% but reporting of such injuries was only 11.8% and the majority of respondents (57%) admitted that they do not know about reporting or there was no director or office to receive such report. As regard to the devices that caused sharps injuries

the results showed that (29.2%) were by hollow bored needles and (30.8%) by stabs, scalpels and hitting sharps and only (40%) caused by venocate needles. The number of sharp injuries was once in 30.9 % and twice in 26.5% while it was in 23.5 % three times and in 19.1 % it was more than 4 times.

As regard the causes of sharps injuries recapping and injections was the cause in 32.3% while suturing in 26.5%, cutting in operative theatre in 11.8% and improper disposal in 10.3% as shown in table II.

A further in depth look of the data related to operating room sharps injuries showed that suturing, cutting and administration of injection together accounted for 75% of procedures during which sharp injuries occurred and line and blood procedures

accounted for 25% (Figure I). Eighty five percent of injuries with devices used for cutting procedures involved scalpels, the remaining injuries involved beavies, scissors, trocars and other sharp devices (Figure II), the top two categories of injury based on how the injury occurred included suturing 25%, and collision with a sharp or coworker 25% , several categories indicate a strong potential for primary prevention of injuries in operatives rooms including; handling equipment on a tray or stand, passing equipment during clean up and improper sharp disposal (as shown in Figure III): Physicians sustained the greatest proportion of injuries during suturing; while nurses and technicians sustained after use before disposal injuries as shown in Figure III.

Table (I): Distribution of socio-demographic and occupational characteristics of HCWs at MUH and MGH (2008-2011).

Variable	Description	Frequency		P value
		No	%	
Age in years	<30 years	64	40	0.77
	30-44 years	47	29.4	
	>44 years	49	30.6	
Gender	Male	68	42.5	0.028
	Female	92	57.5	
Marital status	Single	48	30	0.0001
	Married	112	70	
Occupation	Surgeons	42	26.3	0.002
	Nurses	72	45	
	Technicians	28	17.5	
	Cleaners	18	11.2	
Education level	Academic	124	77.5	0.0001
	Non-academic	36	22.5	
Shift work	Day time	49	30.6	0.008
	Night	28	17.5	
	Rotating	83	51.9	
Years in services	< 5 years	51	31.9	0.14
	5-10 years	44	27.5	
	> 10 years	65	40.6	
Trained about precautions prior to job	Yes	46	28.7	0.0001
	No	114	71.3	

HCW = Health Care Workers

MUH = El-Minia University Hospitals

MGH = El-Minia General Hospital

Table (II): Distribution of sharps injuries of HCWs at MUH and MGH (2008-2011).

Variable	Description	Frequency		P-Value
		No	%	
NSIs sharp	Yes	68/160	42.5	0.002
	No	92/160	57.5	
Report NSIs	Yes	8/68	11.8	0.0001
	No	60/68	88.2	
Causes of don't report	Don't know	11/60	18	0.17
	No direction	34/60	57	
	Low risk injury	15/60	25	
Devices causing injury	Venocate and scalp vein	64/160	40	0.011
	Hollow bored needle	47/160	29.2	
	Stabs, scalpels and others	49/160	30.8	
Number of NSIs	Once	21/68	30.9	0.2
	Twice	18/68	26.5	
	Three times	16/68	23.5	
	≥ 4 times	13/68	19.1	
Causes of sharp injuries	Recapping and injection	22/68	32.3	0.03
	Suturing	18/68	26.5	
	Cutting	8/68	11.8	
	Improper disposal of drug preparation	7/68	10.3	
	Collision with sharps	3/68	4.4	
	Scalpel blades	10/68	14.7	

NSIs:Needle Stick Injuries

MUH:Minia University Hospitals.

MGH:Minia General Hospital.

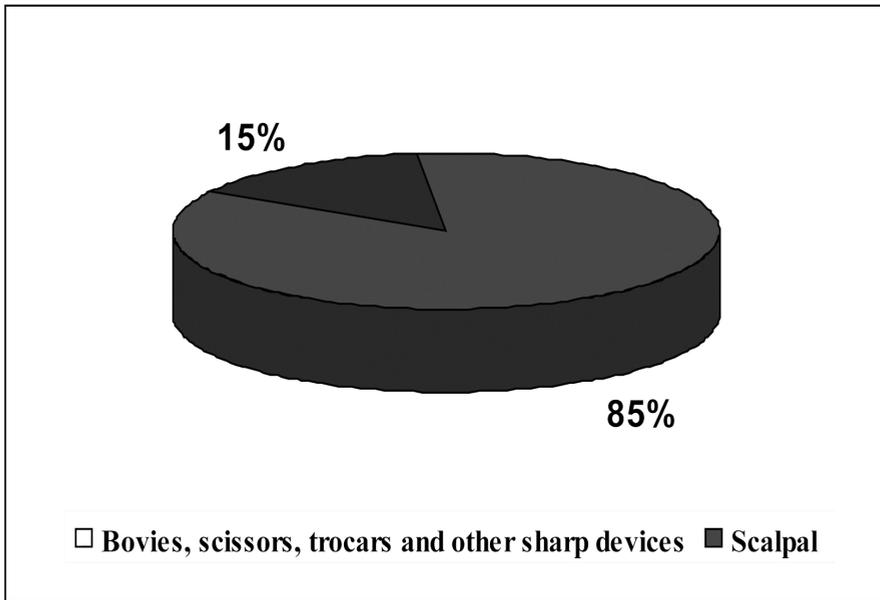


Figure (I): Operating room sharp injuries by procedures or purpose for which sharps were used.

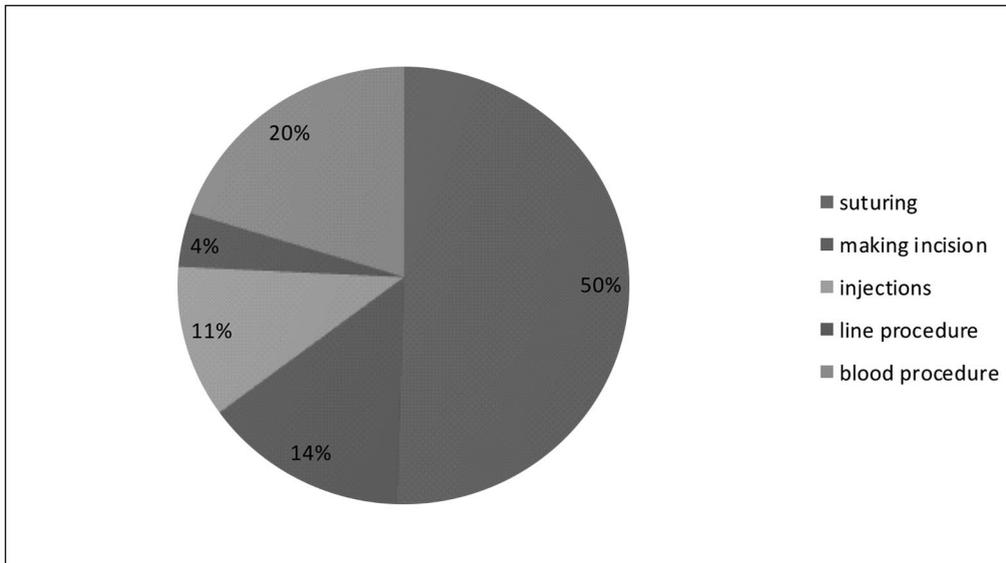


Figure (II): Distribution for injuries of cutting procedures.

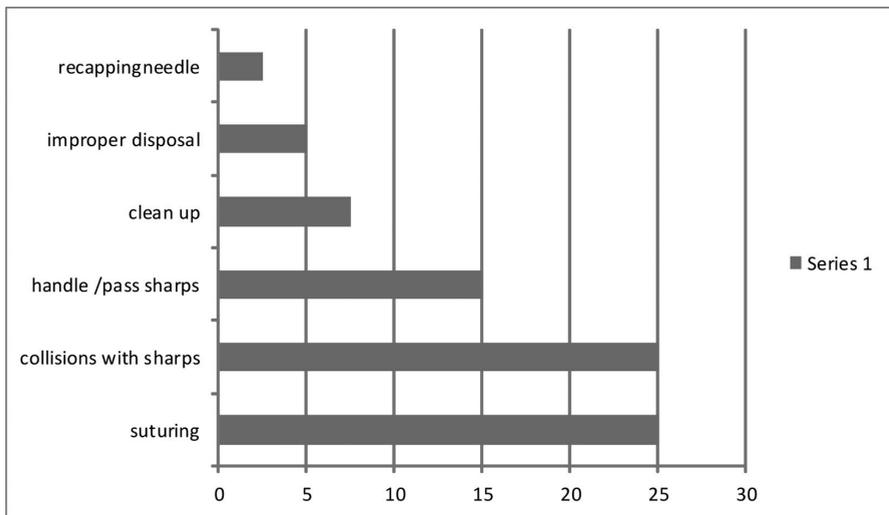


Figure (III): Operating room sharp injuries by how the injuries occurred.

Discussion:

Health care workers in general and doctors in particular are at risk of exposure to blood and body fluids through sharps injuries (7,8,9). In our study the frequency of sharp injuries was 42.5% however reporting of such injuries was only 11.8%. In different previous studies, the rate of needle stick injuries and blood exposure accidents were 45.2 %, 21.6 % and 64% (10,11). The study results found that 50% were caused by hollow bored needles and 33.8% by stabs, scalpels and by hitting sharps. The study results also showed that recapping and injections caused 32.3% while suturing caused 26.5% and cutting caused 11.8%. In previous reports, suturing was the most common accident situation

(45%), blood drawing was the second rank 24% and the recapping was the most commonly frequent cause of the sharps injuries (12). Of the injured HCWs 28% were not using any personal protective equipment and 67% did not seek any medical advice for injury. This is similar to our results that showed 71.3% of HCWs with no training about any precaution measures prior to job.

In our study incidence of sharp injuries by occupation showed the practicing nurses to be the most frequent injured category (45%) followed by physicians (26.3%) and technicians 17.5%. This goes in accordance with many previous studies (13,14) that showed nurses to be the major occupational group at risk for blood exposures. Operating

rooms represent special challenges for injuries and blood borne pathogen exposures. 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 (15,16).

The results of this study showed that stabs, scalpel and other sharps constituted 33.8 % of injuries and suturing 32.3% and cutting 11.8%, also protective equipment, such as masks and face shields required for purpose of patient and provides protection, can add to exposure risk as it creates greater difficulties in communication (17). Also, limited space and visibility within the operative fields, under staffing, emergent patient care situations, distractions and ambient noise may increase the risk of sharps injuries and blood borne pathogen exposures (18). A previous study covering six hospitals revealed the highest proportion of injuries within the operative field and 3 types of devices caused 75.9% of injuries, suture needles (51%), hollow-bore needles (13.2%), and scalpel blades (11.7%), (19). In this study, the reporting rate was very low (11.8%); several studies have demonstrated that there is significant

under reporting of sharps injuries among HCWs (20,21). One study reported that as many as 70% of surgeons never or rarely report percent annual exposures. Factors contributing to low reporting rates include: health care workers perception of risk, occupation, length of service, lack of time and poor following of precaution measures (22,23).

A number of studies indicate the potential to reduce the number of injuries in operating rooms, based on introduction of changes within the work environment and substitution of safety devices for predefined surgical procedures. Use of blunt suture needles in fascia and muscle closure and designated neutral zones (24), are two strategies that have demonstrated their effectiveness in randomized clinical trials.

Quality improvement effort, should promote buy-in and active participation of all members of the team including senior leadership, nursing staff, surgeons, anesthesiologists, physicians assistants, technicians and housekeeping. An inclusive, systematic approach is integral to the processes of device selection and evaluation and initiation of work practice controls (25).

Modifying work practices can eliminate injuries due to improper disposal or handling of sharps and recapping. If absolutely necessary due to intermittent medication dosing, only a single-handed technique should be used when recapping a needle (25).

References:

1. Dement JM, Epling T, Ostbye LA, Pompeii DL and Hunt DL. (2004): Blood and body fluid exposure risks among health care workers: results from the Duke Health and safety Surveillance system. *Am.J.Ind.Med.*46:637-648.
2. Clarke SP, Sloane DM and Iken IH. (2002): Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *Am.J.Public Health* 92:1115-1119.
3. Ferguson KJ, Waitzkin KH, Beekmann SE and Doebbeling BN. (2004): Critical incidence of nonadherence with standard precautions guidelines among community hospital-based health care workers.*J.Gen.Intern.Med.*19:726-731.
4. Berguer R and Heller PJ (2004): Preventing sharps injures in the operating room.*J Am coll sug* 199;3:462-467
5. Mingoli A,Sapienza P and Sgarinzi G. (1996): Influence of blunt needles on surgical glove perforation and safety for the surgeon *Am J Sug*;172:512-516.
6. Stringer B, Infante-Rivard C and Hanley JA (2002): Effectivness of the hands-free technique in reducing operating theatre injuries . *Occup Environ Med*; 59:703-707.
7. Seyed HR and kaveh AS (2009): Accidental blood and body fluid exposure among doctors. *J.Occup.Med* 59(2):101-106.
8. Ghofranipour F ,Asadpour M, Ardebili HE, Niknami S and Hajizadeh E.(2009): Needle stick sharps injuries and determinants in nursing care workers.*Eurp. J.Occup.Med.* (11);562-568.
9. O'Connor M.B.(2009): Needle stick injury advice in the UK and Ireland. *J. Hosp. Inf.* 71(2):185-186.
10. Musharrafieh UM, Nassar NT, Rahi AC, Shoukair AM, Doudakian RM and Hanadeh GN (2008): Healthcare workers exposure to blood borne pathogens in Lebanon. *Occup. Med.* ,58(2):94-8.
11. Makary MA, Al Attar A and Holzmueller CG (2007): Needle stick injuries among surgeons in training . *N Engl. J Med* ;356;2693-99 .
12. Wicker S, Jung J, Allwinn R, Gottschalk R and Rabenau HF (2008): Prevalence and prevention of needle stick injuries among health care workers in a German University Hospital.*Int. Arch. Occup. Environ. Health.*,81:347-354.
13. Berguer R and Heller PJ (2005): Strategies for preventing sharps injuries in the operating room.*Surg. Clinic. North. Am.*,85:1299-1305.
14. Stone PW, Clarke SP, Cimiotti J and Correadearaujo R. 2004: Nurses working conditions :Implications for infectious disease. *Emerg.Infect.Dis.*10:1984-1989.
15. Bennett NT and Howard RJ (1994): Quantity of blood inoculated in a needle stick injury from suture needles. *J Am Coll Sug*;178:107-110.
16. Shiao J, Guo L and McLaws ML (2002): Estimation of the risk of blood borne pathogens to health care workers after a needle stick injury in Taiwan. *Am J Infect Contol*;30:15-20.
17. Doebbeling BN, Vaughn TE, McCoy KD, Beekmann SE, Woolson F, Ferguson K.J and Torner JC (2003): Percutaneous injury,blood exposure and adherence to standard precautions: are hospital based health care providers still at risk? *Clin.Infect.Dis.*37:1006-1013.

18. Revara FP and Thompson DC (2000): Systematic reviews of injury-prevention strategies for occupational injuries, an overview. *Am J Prev Med* ; 18:1-4.
19. Tanberg D, Stewart K and Doezema D. (1991): Under-reporting of contaminated needle stick injuries in emergency health care workers. *Annals of Emergency Medicine*; 66-70
20. Nagoa M, Yoshitsusu I and Junko T (2009): Accidental exposure to blood and body fluid in the operation room and the issue of underreporting: *A.J.IC*;(4):101:105.
21. Lymer UB, Richt B and Isakson B (2004): Blood exposure: Factors promoting healthcare workers compliance with guidelines in connection with risk. *J Clin.Nurs*;13:547-554.
22. DeJoy DM, Searcy CA and Murphy LR (2000): Behavioural-diagnostic analysis of compliance with universal precautions among nurses. *J Occup Health Psychol*;5:127-141.
23. Vaughn TE, McCoy KD and Beekmann SE (2004): Factors promoting consistent adherence to safe needle precautions among hospital workers. *Infect Control Hosp Epidemiol*;25:548-555.
24. Hartley JE, Ahmed S and Milkins R (1996): Randomized trial of blunt-tipped versus cutting needles to reduce glove puncture during mass closure of the abdomen. *Br J Surg*;83:1156-1157.
25. Beekmann SE and Henderson DK. (2004): Protection of healthcare workers from blood-borne pathogens. *Curr.Opin Infect.Dis*.18:331-336.