



# An Epidemiological Study of Sharp Injuries among Health Care Workers of Tertiary Care Hospital in Saudi Arabia

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## ABSTRACT

**Introduction:** Needle stick injury: A penetrating stab wound from a needle (or other sharp object) that may result in exposure to blood or other body fluids to the health care workers (HCW). The study was conducted to know the pattern of needle stick injuries among health care workers and epidemiological link.

**Methodology:** This was a hospital based retrospective study conducted in a tertiary care hospital.

**Observations:** Total 93 incident of sharp injury were reported, of which majority were among nurses (55%) and maximum occurred in operation theatre (29%). 61% health care workers got injury by needle sticks 57 (61%) followed by during surgical procedures (38%). Most common duration of sharp injuries was morning shift 67 (72%) and difference between morning shift and evening shift was statistically significant ( $X^2 = 47.7, p=0.000$ ). The common site of hand in left hand among health care workers was index finger and thumb respectively 15 (16%) and 21 (23%).

**Conclusion:** Present study shown that majority of injuries occurred in morning shift and moderate in nature common among nursing staffs happened during administration of injection and blood extraction in left hand thumb and index finger.

**Key Words:** Sharp injuries, Epidemiological link, Tertiary care hospital, Health care workers

## INTRODUCTION

Sharp Injuries: A penetrating stab wound from a needle or any other sharp objects) that may lead to exposure of blood or body fluids to the health care workers (HCW). The main focus related to exposure of the blood or other body fluids to another person about may be he/she is carrying some infectious disease. Health care workers are more prone of getting sharp injury which occurs in the skin accidentally. Blood borne infection that could be transmitted by such an injury are human immunodeficiency virus(HIV), hepatitis B (HBV) and hepatitis C (HCV).<sup>1</sup>

The chance of infection after an occupational exposure varies according to types of infectious disease and degree of injury occurred to the health care workers. Healthcare personnel those who vaccinated for the hepatitis B and developed immunity to the hepatitis B are at virtually have no risk for acquiring infection. For a susceptible person, the risk of getting infection from a single needle stick or cut exposure to HBV infected blood ranges from 6-30% and depends on the hepatitis B envelop antigen (HBeAg) status of the infected persons.<sup>2,3</sup> Hepatitis B surface antigen (HBsAg) positive individuals who are also positive for HBsAg have more chance to transmit HBV than those who are negative. While there is a risk for HBV infection

from exposures of mucous membranes or non-intact skin, there is no known risk for HBV infection from exposure to intact skin reported. The average risk for getting infection after a needle stick or cut exposure to HCV positive blood is around 1.8%. The risk after a blood exposure to the eye, nose or mouth is not known clearly, but is believed to be very minimal; however, some cases of HCV infection from blood splash to the eye has been reported. There also has been some cases of HCV transmission resulted from exposure to non-intact skin, but no known risk were reported from exposure to intact skin.<sup>3,4</sup>

The risk of human immune deficiency virus (HIV) infection after a needle stick or cut exposure to HIV infected blood is low 0.3% about 1 in 300. The risk of getting infection after exposure of the eye, nose, or mouth to HIV positive blood is on average, 0.1% (1 in 1,000). The risk after exposure of non-intact skin to HIV infected blood is less than 0.1%. A small amount of blood on intact skin probably poses no risk at all. There have been no documented evidence or cases of HIV transmission due to an exposure involving a small amount of blood to the intact skin.<sup>4</sup>

**OBJECTIVES**

The study was conducted to know the pattern of needle stick injuries among health care workers and epidemiological link.

**METHODOLOGY**

The present study was carried out in tertiary care hospital of Saudi Arabia to find out the pattern of various sharp injuries among health care workers and their epidemiological link.

Retrospective data was collected from all department about sharps injuries for last six years from year 2012 to 2017. No sampling was carried out and no sample size was calculated, health care workers reported with any sharp injury during the period of study were taken as a sample. Data was collected from each injured person about various epidemiological parameters like type of injury, site of injury, timing of injury, type of procedure performing when injury occurred, degree of injury, possible cause of injury etc.

Collected data was entered in excel sheets and analyzed using SPSS 22 version and p value less than an equal to 0.05 considered to be statistically significant. Results were presented in the form of tables and graphs.

The degree of the injury divided in three category; 1) Superficial : if little or no bleeding

- 2) Moderate : if skin punctured some bleeding
- 3) Severe: if deep stick, profuse bleeding

**RESULTS**

In the present study total 93 incident of sharp injury were reported during study periods. The Majority of incidents reported among nurses 51 (55%) and maximum number occurred in operation theatre 27 (29%). Majority of health care workers got injury by needle sticks 57(61%) followed by during surgical procedures 35(38%), the difference also statistically significant ( $X^2 = 10.4, p=0.001$ ). According to severity of injuries most common was moderate wound 85 (91.39%) and common reason of injury were needles stick during injection and blood extraction. Most common duration of sharp injuries was morning shift 67 (72%), followed by evening (21.50%) and least incidence happened during night (6.50%). The difference between morning sift and evening sift was statistically significant ( $X^2 = 47.7, p=0.000$ ). The common site of hand in left hand among health care workers was index finger and thumb respectably 15 (16%) and 21 (23%). The sharp injury in other sites like palm, thigh and feet were common in right side of the body. 71 (76%) of health care workers using single pair of gloves and 9(10%) were using double pair of gloves when sharp injury incident happened, it means glove is also not very effective in protecting needle stick injury. 13(14%) workers got injury while working without gloves.

**Table 1: Yearly distribution of needle sticks injuries among health care workers**

Years	Doctors (n= 19) (%)	Nurses (n= 51) (%)	Others (n= 23) (%)	Total (n= 93) (%)
2012	05 (26)	11 (21.5)	04 (17.5)	20 (21.50)
2013	04 (21)	12 (23.5)	04 (17.5)	20 (21.50)
2014	02 (10.5)	10 (19.5)	06 (26)	18 (19)
2015	02 (10.5)	09 (17.5)	03 (13)	14 (15)
2016	03 (16)	04 (7.5)	02 (8.5)	09 (10)
2017	03 (16)	05 (10)	04 (17.5)	12 (13)

(Others- Technicians, Trainee, and housekeeping)  
chi-square = 23.5; degrees of freedom = 1; probability = 0.000

**Table-2: Yearly Distribution of sharp injury cases according to shift of working**

Years of incidence	Shift			Total (n=93) (%)
	Morning (n=67) (%)	Evening (n=20) (%)	Night (n=06) (%)	
2012	15 (22.38)	03 (15)	02 (33.3)	20 (21.5)
2013	13 (9.40)	07 (35)	0 (00)	20 (21.5)
2014	17 (25.37)	01 (05)	02 (33.3)	20 (21.5)
2015	09 (13.43)	03 (15)	01 (16.7)	13 (14.0)
2016	05 (7.46)	03 (15)	01 (16.7)	09 (9.7)
2017	08 (11.94)	03 (15)	0 (00)	11 (11.8)

Chi-square = 47.7; Degrees of freedom = 1; Probability = 0.000

**Table: 3 Distribution of Sharp injury cases according to occurrence of department**

Department	2012 (n=20)	2013 (n=18)	2014 (n=20)	2015 (n=15)	2016 (n=9)	2017 (n=11)	Total (n=93)
ER	1 (5)	4 (22)	2 (10)	1 (6.6)	1 (11)	0 (0)	9 (9.6)
OR	6 (30)	8 (44)	5 (25)	3 (20)	2 (22)	3 (27)	27 (29)
DR/LR	1 (5)	1 (5.5)	1 (5)	0 (0)	1 (11)	0 (0)	4 (4.3)
OBW	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.07)
Pediatric	1 (5)	1 (5.5)	1 (5)	0 (0)	1 (11)	2 (18)	6 (6.5)
OPD	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	0 (0)	1 (1.07)
Lab and Blood bank	1 (5)	0 (0)	2 (10)	1 (6.6)	2 (22)	1 (9)	7 (7.5)
CSSD	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	1 (9)	2 (2.15)
Dental	0 (0)	1 (5.5)	1 (5)	1 (6.6)	0 (0)	0 (0)	3 (3.22)
ICU	1 (5)	1 (5.5)	1 (5)	0 (0)	0 (0)	0 (0)	3 (3.22)
Dialysis	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.07)
Surgery	1 (5)	0 (0)	2 (10)	6 (40)	0 (0)	0 (0)	9 (9.6)
Ortho	1 (0)	0 (0)	0 (0)	0 (0)	1 (11)	3 (27)	5 (5.3)
Medical	3 (15)	2 (11)	5 (25)	3 (20)	0 (0)	0 (0)	13 (14)
Others	1 (5)	0 (0)	2 (10)	0 (0)	0 (0)	1 (9)	4 (4.3)

Figure in parenthesis indicate percentage.

**Table: 4 Distribution of sharp injury cases according to type of sharps**

Years	Needle (n=57) (%)	Surgical (n=35) (%)	Glass (n=1)(%)	Total (n=93) (%)
2012	12 (21)	7 (20)	0 (0)	19 (20)
2013	9 (16)	10 (28.5)	1 (100)	20 (22)
2014	13 (23)	6 (17)	0 (0)	19 (20)
2015	10 (17)	4 (11)	0 (0)	14 (15)
2016	6 (10)	3 (8.5)	0 (0)	9 (10)
2017	7 (13)	5 (14)	0 (0)	12 (13)

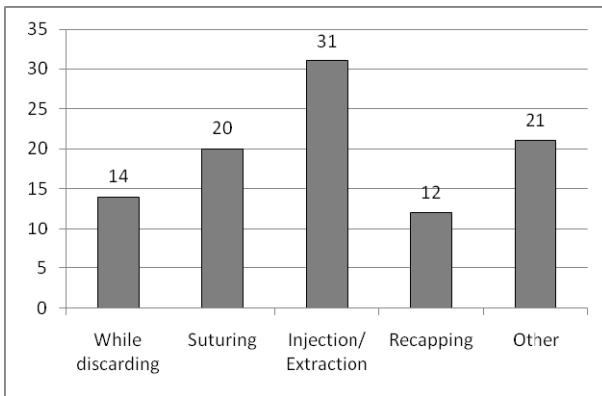
(Surgical means - Suture needle, Scalpel, bone cutter, Clip. Wire, blade, clamp etc.)

Chi-square = 10.4; Degrees of freedom = 1; Probability = 0.001

## DISCUSSION

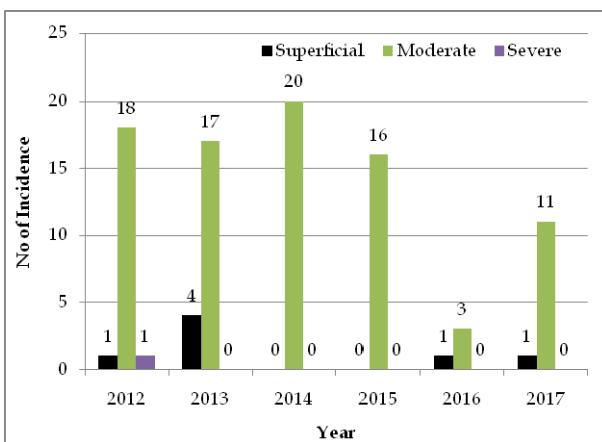
The present study conducted to know the epidemiology of sharp injuries in the tertiary care hospital of KSA. The study conducted by Rice JJ and others in the orthopedics department they observed 11% of surgeons reported injuries before the operation, glove penetration also reported in 22% of surgeons, in the present study also same kind of finding reported of sharp injuries in operation theatre little difference may be due to they did only in orthopedics department and we was conducted hospital wise study 27 (29%).<sup>2</sup> Another study conducted by Janine Jagger about rates of needle stick injury caused by various devices they found 35% injuries occurred due to disposable syringe, intravenous tubing and needle assemblies for 26 percent and prefilled cartridge syringes for 12 percent, in the present study needle was responsible for 57 (61%) of needle stick injuries followed by surgical procedures (Surgical means Suture needle, Scalpel, bone cutter, Clip. Wire, blade, clamp etc.) 35 (38%) the difference may be due to study settings and study variables.<sup>3</sup> The study conducted by Renée Ridzon regarding simultaneous transmission of human immunodeficiency virus and hepatitis C vi-

rus from a needle stick injury they observed the estimated risk of acquiring HIV infection after percutaneous exposure to blood from an HIV infected patient was 0.3 percent and estimates risk of the transmission after percutaneous exposure to blood positive for anti-HCV antibody (anti-HCV) range from 0 to 10 percent of cases, in the present study we were not observed incidence of particular disease related to sharp injuries.<sup>4</sup> Another study conducted by Mohamad Yaakob Norsayani among medical students about incidence of needle stick injury and actors associated with this problem among medical students they found the incidence of needle stick injury among medical students was 14.1%, the highest incidence of episodes of needle stick injury occurred in Obstetrics and Gynecology department postings, followed by Medicine and Surgery, present study we analyzed retrospective data about needle stick injuries and we observed common in nursing staff and those who working in morning shift may be due to high work load and work pressure, majority of incident occurred in operation resuscitation (OR), this difference may be due to difference in setting and study subjects.<sup>5</sup> The research conducted by McCormick R.D and other about epidemiology of needle-stick injuries in hospital personnel they found among housekeeping personnel 12.7% of employee annually and laboratory personnel 10.47% followed by register nurses 92.6/1000, in the present study sharp injuries most common among nursing staffs 55% followed by housekeeping staffs and others 25% the present study have higher sharp injuries may be due to high workload among nursing staffs.<sup>6</sup> Another observation done by WJC Thomas et al. regarding incidence and reporting rate among doctors they observed 44% anonymously admitted to having a needle-stick injury. Only 9% who sustained an needle stick injury said that they followed the agreed local policy. 21% of surgeons

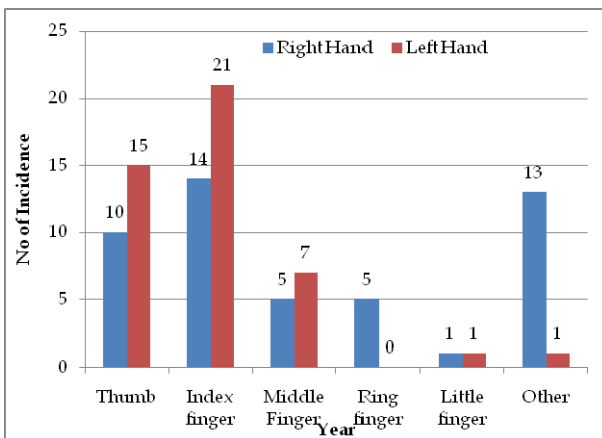


(Others means - During Ampule breaking etc.)

**Graph: 1** Distribution of sharp injury cases according to severity of wound (injury) (2012-2017)



**Graph: 2** Distribution of sharp injury cases according to performing works or reason of injury



(Others- Palm , thigh, feet etc.)

**Figure: 3** Distribution of sharp injury cases according to site of the hands/body

ignored the incident and continued, in the present study we also observed low incidents of reporting from obstetrics and gynaecology department.<sup>7</sup>The study conducted by B Elmiyeh et al about needle stick injury they found 38% had experienced at least one sharp injury in the past years, 80% aware

about incidents to be reported to employee health clinic and only 51% reported the incident actually, in the present study around 21.5% had experienced sharp injury in last one year the difference may be due to study settings.<sup>8</sup> Study conducted by Abha Sharma and others colleague on prevalence of needle stick injury among health care workers in a tertiary care hospital they observed needle stick injuries highest among interns 47% followed by junior residents 27.8% and staff nurse 10.1%, in the present study maximum injuries were reported among nursing staffs 55%, this difference may be due to difference in setting, study conducted in India was in medical college hospital their many interns and residents take training present study conducted in the general hospital.<sup>9</sup>

Another study conducted among students of various discipline (Medical, Dental and Midwifery) they found needle stick injury reported around 71% of students and most commonly occurred in patient rooms 43.6% in the present study we reported highest sharp injuries among nursing staffs 55% because study done in the General Hospital.<sup>10</sup> Study conducted by Askarian M about needle stick injury among nurses in the far province of Iran they observed higher prevalence among nurses similar kind of findings also reported in the present study.<sup>11</sup>

The study conducted by Clarke SP about hospital work environments, nurse characteristics, and sharps injuries he was observed nurses less than five years' experience and routinely performing venipuncture for blood draws more likely to have needle stick injury, in the present study we were observed epidemiological factors for the sharp injuries and we also found more among nurses in the morning shift.<sup>12</sup>

**CONCLUSION**

Present study shown that majority of injuries occurred in morning shift and moderate in nature common among nursing staffs happened during administration of injection and blood extraction in left hand thumb and index finger.

**RECOMMENDATION**

According to observation most of the incidents were occurred in morning shift this indicate workload have play major role, so adequate staff according to load is very important to avoid injuries. Emphasis also to be given proper hands on training to the nursing staffs on safe injection practice and blood extraction, it would definitely help in decreasing sharp injuries among health care workers.

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