



Unveiling The Incidence and Associated Factors of Needle Stick and Sharp Injuries among Health Care Workers

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ABSTRACT

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Background: Accidents with sharp objects and needle sticks are a global issue. Healthcare workers are frequently vulnerable to a range of hospital-acquired infections.

Objectives: The study aimed to determine the incidence rate and associated factors of needle sticks and sharps injuries among healthcare workers.

Methodology: A descriptive retrospective cross-sectional study design study was conducted in five public hospitals in Rania governorate, Iraq. The data was retrieved from the hospital's record of the infection prevention and control department from August 2022 to February 2023 period. The healthcare workers are based on the three categories (Nurses, Physicians, and Laboratory staff). Data was collected using a self-report questionnaire, which was developed based on previous studies with similar objectives and validated by experts in the field.

Results: The study discovered that the frequency of needle stick and sharps injuries was 58.6% among healthcare workers and most of them were injured 2-5 times 58.9%. The highest number of needle stick and sharps injury cases were reported among nurses 66.7%. Syringe needle was the predominant medical tool involved in the injuries, accounting for 82%. A minority of the study participants experienced medical sharp cutting of 15%. The major medical sharp objectives involved in the incident were; ampules 66.7%. There was a significant difference between needle stick and sharp injury with some associated fosters like a unit of work, speciality, and experiences.

Conclusion: The study concluded that the prevalence of needle sticks and sharp injuries among healthcare workers in Rania City was high and most of them were nurses. Regular training about the prevention of needle sticks and sharps injuries is needed to increase workplace safety and protect healthcare workers.

Keywords: Needle Stick, Sharps Injuries, Healthcare Workers, Rania City, Occupational Hazards.

INTRODUCTION

Healthcare workers (HCWs) are frequently vulnerable to a range of hospital-acquired infections. (Bhattacharya et al., 2014). A serious workplace risk frequently linked to HCW procedures is a needle stick and sharps injuries (NSSI) (Mohamud et al., 2023). The term "Needle Stick Injury" (NSI) refers to an unintentional stab wound that penetrates the skin caused by a hollow-bore needle or any other sharp object that contains bodily fluids or blood from another person. While A sharps injury (SI) is a skin-piercing stab wound that occurs in a medical setting due to mishaps involving sharp objects (Pavithran et al., 2015).

Several factors contribute to the spread of infections caused by needle stick injuries, including excessive use of injections, insufficient supplies of disposable syringes, lack of safer needle devices or containers for disposing of sharps, transferring tools from hand to hand while performing tasks, lack of risk awareness, and inadequate training. Many factors contribute to the spread of infections caused by needle stick injuries, including overuse of injections, a lack of disposable syringe supplies, safer needle devices, sharps disposal containers, passing instruments from hand to hand while performing any procedure, and a lack of awareness and adequate training. In addition to increasing the risk of infection for medical personnel, needle stick injuries can have serious, profound psychological consequences (A. Merdaw, 2017).

Accidents with sharp objects and needle sticks are a global issue. According to a 2012 survey conducted in Saudi Arabia, there were 3.2 sharp injuries for every 100 occupied beds annually. Disposable syringes and medical device use were the main sources of injury, wards were the most prevalent location for NSIs, and disposable syringes were the leading source of injury (Alfulayw et al., 2021). Globally, the World Health Organization (WHO) reports that over three million healthcare providers are subjected each year to percutaneous

fluid contaminated with a minimum of 2 million cases of hepatitis B virus infection, nearly 170,000 cases of HIV, and a total of cases of 900,000 cases of hepatitis C (Montella et al., 2014).

Healthcare providers can prevent needle stick injuries (NSIs) by putting in place an effective strategy that targets the institutional, behavioural, and device-related factors that raise the risk of NSIs in the workplace (Ismail et al., 2014), (Zhang et al., 2009). There are few reports on NSIs from Kurdistan and Iraq generally with limited data.

AIMS OF THE STUDY

This study was conducted to assess the presence and identify the associated factors of Needle Stick and Sharp Injuries among healthcare workers at Rania healthcare facilities.

METHODOLOGY

Study design and participants:

A descriptive retrospective cross-sectional study design was determined to be conducted among healthcare workers in five tertiary healthcare facilities (Three governmental hospitals and two private hospitals) in Rania city. Rania is a city located within the Sulaymaniyah Governorate in the Kurdistan Region of Iraq from August 2022 to February 2023.

The study population consisted of 220 healthcare workers who were in direct contact with patients or would have been exposed to needles pricks and sharp objects while dealing with patients. Those healthcare workers included physicians, nurses, and laboratory personnel. The selection process included individuals presented during the data collection process at hospitals. The staff whose jobs do not directly involve administering healthcare or handling needles were excluded from this study. A convenience non-probability sampling method was employed to select the healthcare workers, based on the three categories of healthcare workers (Nurses, Physicians, and Laboratory staff).

Ethics Approval

Ethical approval was obtained from the scientific committee of the College of Nursing at the University of Raparin, the Rania General Directorate of Health (Ref.No: 410/29/7 on August 7, 2022). Additionally, oral consent was obtained from all study participants from all participants and all healthcare workers who have been selected for the study have the right to participate or refuse to participate in the study. For data confidentiality, participants were assured that the data would remain anonymous and be used solely for research purposes.

Data collection instruments:

Data was collected using a self-report questionnaire was developed based on previous studies with similar objectives and validated by experts in the field. Panels consisting of ten experts from various fields related to the study were utilized to determine the content validity of the early instruments. Their roles were to examine the questionnaire's contents for appropriateness, relevance, and clarity to meet the goals of the current study. The experts were in the field of community health nursing (3), public health (2), medical surgical nursing (2), and three field practitioners in healthcare settings. Although they suggested few changes, the experts concurred that the questionnaire was properly conceived and put together.

The questionnaire was structured into three sections. The first section contained questions regarding the healthcare workers' demographic information and hospital work characteristics and the second section included questions about experiences with needle stick injuries (NSIs), including the incidence rate, time of injury, shift during which the injury occurred, wound characteristics, and tools involved. The third section contained questions about experiences with medical sharp injuries, with inquiries about the rate of injury occurrence, time of injury, shift during which the injury occurred, wound characteristics, and the medical sharp tools involved. The HCWs were questioned to recollect any past

needle sticks and sharp injuries over the previous years.

Data analysis

The data were analyzed using SPSS software version 25 to generate descriptive bio statistical measures (frequency and percentage). And inferential measures to determine differences between categorical variables, Chi-square tests were utilized. For data sets with fewer than 10 cases, the Fisher exact test was used instead of Chi-square, with a critical significance value set at 0.05.

RESULTS

Demographic Parameters of Healthcare Workers (HCWs)

Among 220 participants HCWs in five tertiary hospitals, 140 (63.6%) were between 25-35 years old and 92 (41.8%) were males. In terms of educational qualifications, the majority of healthcare workers 100 (48.8%) had a diploma, 99 (48.3%) had a bachelor's degree. When it comes to specialties, nurses were the largest group who participated in the study with 148 (67.6%), followed by laboratory workers at 49 (22.4%) and physicians at 22 (10%). Of those employed staff, 114 individuals (51.8%) had less than 5 years of work experience. In addition, nearly even, with 111 (50.5%) of HCWs were in permanent contracts and 109 (49.5%) on temporary contracts. Regarding the unit of the hospital, most of the staff were working at wards 72 (32.7%) workers. Most healthcare workers were employed in governmental hospitals 172 (78.2%) (Table 1).

Table 2. Shows more than half HCWs 129 (58.6%) had experienced medical needle stick injuries and most of them were injured 2-5 times 76 (58.9%) and 32 (24.8%) experienced it once while 21 (16.3%) of them experienced it more than six times additionally, more than quarter of the accident recently occurred 34 (26.4%) injuries. About the time of the incidents, they primarily occurred during day shifts 69 (53.5%) cases. Most of the healthcare workers reported that their injuries were superficial 91

(70.5%), moderate 36 (27.9%), moreover, the syringe needle was the predominant medical tool involved in the injuries, accounting for 100 cases (82%). The minority were lancets, with 17 (13.9%) cases, and cannulas, with 5 (4.1%) cases.

Regarding medical sharp cutting (Table 3). Indicted that a minority of the study participants experienced injury 33 (15%) and among those nearly half 16 (48.5%) experienced more than two incidents, with 11 (33.3%) having one incident, while 6 (18.2%) having two incidents. And more (36%) of accidents recently occurred. Furthermore, most of these incidents occurred during day shifts 16 (48.5%). The depths of the wound were mostly moderate 19 (57.6%) followed by superficial 11 (33.3%). The major medical sharp objects involved in the incident were ranked as follows; ampules 18 (66.7%), glass 3 (11.1%), scissors 2 (7.4%), and blades 4 (14.8%).

Table 4 shows details of the association between NSIs with demographics and associated factors. In terms of age, the highest percentage 77 (59.7%) of needle stick injuries was among those aged 25-35 years, followed by workers aged under 25 years 30 (23.3%). There was a significant difference (P value 0.004) between the age of the health worker and the NSI. While the result shows the staff who experienced NSI more were female, 76 (58.9%) but, the difference between the sex of the health workers and the NSI was not statistically significant (P value: 0.793). About the educational qualifications, the highest percentage of HCWs had a diploma certificate 61 (51.7%) workers, followed by workers with a bachelor's degree 53 (44.9%). The P-value of 0.522 indicates that there is no significant difference between the groups based on educational attainment with the NSI.

For professional specialties, there was a statistically significant difference between the occurrence of NSI among healthcare workers' specialties with a P-value of 0.02. Nurses make up the highest percentage of the NSI with 86 (66.7%) workers followed by laboratory workers with 35

(27.1%) workers while the physicians were the smallest group with 8 (6.2%) individuals. HCWs with 5-15 years of experience had the most reported injuries with NSI 57 (44.2%) compared to those with less than 5 years of experience 55 (42.6%) and those with more than 15 years of experience 17 (13.2%). Further, the study revealed a highly significant difference between health workers' years of experience and the incident of NSIs with a P-value of 0.001. In addition, there was a significant difference between the type of contract of health professionals with hospitals and exposed to NSIs with a P value of 0.015. The workers with permanent contracts had a higher percentage 74 (57.4%) compared to those with temporary contracts 55 (42.6%).

The result analysis also showed a unit of working is related to the occurrence of NSI injury with a P-value of 0.001. The highest percentage of NSIs was in emergency departments at 37 (28.7%), followed by those in laboratories 36 (27.9%), wards 31 (24%), operating theatres 21 (16.3%) and ICU/CCU with 4 (3.1%). Finally, regarding the type of hospital, workers in public hospitals had the highest percentage of NSI exposure 15 (62.5%), compared with 5 (20.8%) for those working in private hospitals. The P-value of 0.388 indicates no significant difference between the type of hospital and the occurrence of NSI.

Finally, Table 5. Shows a significant difference between the age of the health care worker and the occurrence of medical sharp injuries with the P-value 0.028. HCWs who were aged between 25-35 had experienced medical sharp injuries more than other age groups. In terms of sex, female 17 (51.5%) workers were more injured compared with male workers 16 (48.5%) and the P-value was 0.4, indicating no statistically significant difference between the sharp injury based on sex.

Regarding educational qualification, there was no significant difference between medical sharp injuries among workers and educational level at a P-value of 0.808. the highest percentage of medical

sharp cut occurred among diplomas certificate staff 14 (51.9%) closely followed by workers with bachelor's degrees. While the study shows a highly statistically significant difference between the sharp injuries and the professional specialty of the hospital workers, in which the majority of sharp injuries were found among nurses, with 30 (90.9%) individuals and followed by physicians 2 (6.1). The study also observed that among healthcare workers a large number of injuries happened among those workers who have 5-15 years of experiences 17 (51.5%) workers followed by those with less than 5 years of experience, however there were no statistically significant difference between the occurrence of medical sharp injuries with years of healthcare workers' experiences at P-value 0.266.

Regarding the type of contract of employment, a higher percentage of injuries come among workers with permanent contracts 19 (57.6%) compared with temporary contracts 14 (42.4%). The P-value of 0.375 indicated no significant difference between the sharp injury and with type of employment contract with the hospital. While there was a significant difference between incidents of sharp injuries with the healthcare workers units of working at the P-value of 0.017. The highest percentage of accidents took place among the emergency unit workers 15 (45.5%) workers followed by those in wards 12 (36.4%), laboratory workers 2 (6.1%), operation room 2 (6.1%), and ICU/CCU 2 (6.1%). Lastly, for the type of hospital, the highest percentage of sharp injuries was among workers who worked at governmental hospitals, with 16 (48.5%), and the P-value of 0.508 indicates no significant difference between the sharp injuries among workers and type of hospital.

DISCUSSION:

The current study discovered that healthcare personnel frequently suffered injuries from needle pricks and sharp devices. These injuries affected a large proportion of healthcare professionals (58.6%), with needle sticks and (15.0%) with sharp equipment,

especially nurses Laboratory staff, and physicians. In a global systematic review and meta-analysis that focuses on the prevalence of NSIs among HCWs worldwide. A total of 87 studies including 50,916 participants from 31 different countries found that 44.5% of HCWs worldwide had NSIs (Bouya et al., 2020). The category of HCWs shows that nurses are at higher risk than physicians, and laboratory staff (66.6%), (27,13%) (6.2%) with needle injury and (90.9%), (6.0%) (3.0%) with sharp injury respectively in this study. While a study by (Alfulayw et al., 2021), observed the risk was 1.11% higher for doctors than for nurses with needle stick injuries. The injuries among nurses were more commonly caused by multiple tasks especially recapping the needles. However, physicians were most commonly injured during the use of sharp objects. According to another study, recapping the needle was the cause of the majority of needle injuries (42.1%) among HCWs (Ali et al., 2020). Thus, it is necessary to retrain the safe injection instructions. However, the key to raising healthcare personnel's knowledge and enhancing their performance and behaviour was educational training.

Furthermore, this study also observed that public hospital staff are more at risk than private hospitals for needle sticks (81.8%) and sharp injuries (81.3%). This result is expected because public hospitals have many employees and units, public hospitals receive more patients and patients stay in the hospital for long periods, in addition at public hospitals many staff members are newly graduated and employed (51.8%) of the study samples were have less than 5 years' experience in hospital this results also supported by the findings of (Ali et al., 2020), who found that healthcare personnel with fewer than five years of experience at the Rizgary Teaching Hospital are more likely to get needle stick injuries.

While most of the HCWs were who injured with NSIs were at wards (32.7%), laboratory (23.6%), and emergency unit (28.4). However, emergency unit

employees were more susceptible to needle pricks and sharp injuries (28.6%), and (11.62%) respectively, but laboratory unit employees were more exposed to needle sticks (27.9%), and there were fewer injuries by sharp tools among them (1.5%). The unit employees among whom needle prick was more common than sharp injuries (24%) and (9.3%). Thus, the morning shift staff were more injured with needle sticks and sharp equipment and the most common causes for injury were syringe needles, lancet and cannula needles (82.0%), (13.9%), and (4.1%) respectively, while the broken ampule for preparing medication was the most causes for injury among HCWs (66.7%). Likewise, a cohort study with a 4-year follow-up conducted in an Indonesian tertiary care hospital revealed that the most common injury caused by needles was syringe needles (Yuniastuti et al., 2020). Also according to the results of the study done by Mohamud et al., 2023, found that hypodermic needles were primarily responsible for the majority of NSSIs among HCWs. Most patient treatments in hospitals need the daily use of syringes or needles, which calls for their regulated gathering, recapping, and discarding. This could account for the increased rate of NSSIs connected to needles and syringes.

Needle stick and sharps injuries (NSSI) are serious workplace risks frequently linked to the inappropriate practices of healthcare workers (HCWs) (Bouya S et al., 2020). Sharps injuries continued to happen at every stage of using, disassembling, or discarding sharps devices, despite the application of preventive measures such as improved equipment design and personnel training. The United States Occupational Health and Safety Administration (OSHA) reports that NSSIs put 5.6 million healthcare workers (HCWs) at risk of occupational exposure to several blood-borne pathogens (Alfulayw et al., 2021). This study was conducted to unveil the prevalence and associated factors related to needle sticks and sharp injuries among Rania healthcare facilities.

Finally, the study result shows that the prevalence of needle stick injury was associated with age, professional, place of work/unit, and those who have years of services for more than 5 years. Workplace setting plays a significant part in the occurrence of NSSIs. Emergency departments, Intensive care units, and operating rooms are examples of acute healthcare settings where nurses might be more likely to experience injuries (Gita & Rao, 2017). Additionally, research indicates that nurses working in certain environments may be more vulnerable to injuries due to higher workloads, personnel shortages, various invasive tasks, critical patient states, stressors, and numerous invasive procedures (Assen et al., 2020). In addition, a study by Fereidouni's study (Fereidouni et al., 2019) Stated that among other staff members, nurses reported the highest prevalence of the experience (24.4%). Furthermore, a Chinese study demonstrates a strong correlation between NSIs and employment status, age, and gender (Wang et al., 2019), while in this study gender was not related to the incidence of NSIs.

CONCLUSIONS:

Exposure to needle stick injuries among healthcare workers remains a common problem. Most healthcare workers were injured either by needle sticks or by sharp equipment. The majority of those infected are nurses who work in critical departments such as the emergency department, operation room, and blood testing laboratories unit.

RECOMMENDATIONS:

Raising awareness along with providing periodic training on the safe handling of sharp objects is strongly advised for HCWs, particularly nurses. Enhancing the current NSI reporting mechanisms to ensure the prompt administration of post-exposure prophylaxis is also recommended.

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Declaration of Competing interest

The authors report no conflict of interest.

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TABLES:

Table (1): The distribution of healthcare workers' demographic and hospital working characteristics

Variables		Frequency	Percentage
Age groups	< 25	55	25
	25-35	140	63.6
	> 35	25	11.4
Sex	Male	92	41.8
	Female	128	58.2
Educational qualification	High school	2	1
	Diploma	100	48.8
	Bachelor's	99	48.3
	Post-graduate	4	2
Specialty	Physician	22	10
	Nurse	148	67.6
	Laboratory worker	49	22.4
Experiences (years)	< 5	114	51.8
	5-15	87	39.5
	>15	19	8.6
Type of contract	Permanent	111	50.5
	Temporary	109	49.5
Hospital unit	Ward	72	32.7
	Laboratory	52	23.6
	Emergency	62	28.2
	Operation room	25	11.4
	ICU/ CCU	9	4.1
	Governmental	172	78.2
Hospital type	Private	11	5
	Both	37	16.8

Table (2): The prevalence of medical needle stick injury incidents and injuries are characteristics

Questions		Frequency	Percentage
Did you experience medical needle prick injuries?	Yes	129	58.6
	No	91	41.4
If yes, how many times?	1	32	24.8
	2-5	76	58.9
	> 6	21	16.3
Were you recently injured?	Yes	34	26.4
	No	95	73.6
In what shift it was (mostly)?	Day shift	69	53.5
	Night shift	38	29.5
	Both	22	17.1
Type of the wound?	Superficial	91	70.5
	Moderate (skin punctured)	36	27.9
	Severe (deep stick)	2	1.6
What was a tool used when you were injured?	Syringe needle	100	82.0
	Lancet	17	13.9
	Cannula	5	4.1

Table (3): The prevalence of medical sharp injury incidents and injuries are characteristics

Questions		Frequency	Percentage
Did you experience medical sharp injuries?	Yes	33	15
	No	187	85
If yes, how many times?	1	11	33.3
	2	6	18.2
	> 2	16	48.5
Were you recently injured?	Yes	12	36.4
	No	21	63.6
In what shift it was (mostly)?	Day shift	16	48.5
	Night shift	11	33.3
	Both	6	18.2
Types of the wound?	Superficial	11	33.3
	Moderate (some bleeding)	19	57.6
	Severe (profuse bleeding)	3	9.1
What tool was involved in the injury?	Ampule	18	66.7
	Glass	3	11.1
	Scissors	2	7.4
	Blade	4	14.8

Table (4): The distribution of needle stick injuries among demographic and hospital working characteristics factors

Variables		Needle stick incidence		P-value
		Yes	No	
		N (%)	N (%)	
Age groups	< 25	30 (23.3)	25 (27.5)	0.004
	25-35	77 (59.7)	63 (69.2)	
	> 35	22 (17.1)	3 (3.3)	
Sex	Male	53 (41.1)	39 (42.9)	0.793
	Female	76 (58.9)	52 (57.1)	
Educational qualification	Preparatory	2 (1.7)	0 (0)	0.522
	Diploma	61 (51.7)	39 (44.8)	
	Bachelor's	53 (44.9)	46 (52.9)	
	Post-graduate	2 (1.7)	2 (2.3)	
Specialty	Physician	8 (6.2)	14 (15.6)	0.02
	Nurse	86 (66.7)	62 (68.9)	
	Laboratory worker	35 (27.1)	14 (15.6)	
Experiences (years)	< 5	55 (42.6)	59 (64.8)	0.001
	5-15	57 (44.2)	30 (33)	
	>15	17 (13.2)	2 (2.2)	
Type of contract	Permanent	74 (57.4)	37 (40.7)	0.015
	Temporary	55 (42.6)	54 (59.3)	
Hospital unit	Ward	31 (24.0)	41(45.1)	0.001
	Laboratory	36 (27.9)	16 (17.6)	
	Emergency	37 (28.7)	25 (27.5)	
	Operation room	21 (16.3)	4 (4.4)	
	ICU/ CCU	4 (3.1)	5 (5.5)	
Hospital type	Governmental	15 (62.5)	54 (51.4)	0.388
	Private	5 (20.8)	33 (31.4)	
	Both	4 (16.7)	18 (17.1)	

Table (5): The distribution of Medical sharp objective injuries among demographic and hospital working characteristics factors

Variables		Medical sharp objective injuries		P-value
		Yes	No	
		N (%)	N (%)	
Age groups	< 25	9 (27.3)	46 (24.6)	0.028
	25-35	16 (48.5)	124 (66.3)	
	> 35	8 (24.2)	17 (9.1)	
Sex	Male	16 (48.5)	76 (40.6)	0.400
	Female	17 (51.1)	111 (59.4)	
Certificate	Preparatory	0 (0.0)	2 (1.1)	0.808
	Diploma	14 (51.9)	86 (48.3)	
	Bachelor's	13 (48.1)	86 (48.3)	
	Post-graduate	0 (0.0)	4 (2.2)	
Specialty	Physician	2 (6.1)	20 (10.8)	0.002
	Nurse	30 (90.9)	118 (63.4)	
	Laboratory worker	1 (3.0)	48 (25.8)	
Experiences (years)	< 5	13 (39.4)	101 (54.0)	0.266
	5-15	17 (51.5)	70 (37.4)	
	>15	3 (9.1)	16 (8.6)	
Type of contract	Permanent	19 (57.6)	92 (49.2)	0.375
	Temporary	14 (42.4)	95 (50.8)	
Hospital unit	Ward	12 (36.4)	60 (32.1)	0.017
	Laboratory	2 (6.1)	50 (26.7)	
	Emergency	15 (45.5)	47 (25.1)	
	Operation room	2 (6.1)	23 (12.3)	
	ICU/ CCU	2 (6.1)	7 (3.7)	
Hospital type	Governmental	16 (48.5)	53 (55.2)	0.508
	Private	11 (33.3)	27 (28.1)	
	Both	6 (18.2)	16 (16.7)	