Determine the Prevalence and Causative Factors for Needle Stick Injuries between Nursing Staff at Karbala City

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ABSTRACT

Background: Needle-stick injuries (NSIs) constitute a serious hazard to healthcare workers in any healthcare setting. The present study aimed to determine the prevalence and causative factors for needle-stick injuries among nursing staff in Karbala City. **Methods:** A descriptive cross-sectional design was conducted; 200 nurses working at Safeer and Zain Alabdeen hospitals in Karbala province joined the research for their NSIs experience. Each respondent completed a questionnaire that was divided into three parts with closed questions. **Results:** Most of the sample were female, aged between 20 and 25 years with diplomas or bachelor's degrees, had less than 5 years of experience in nursing, had attended training courses and were vaccinated against the Hepatitis C virus. The prevalence of needle-stick injuries was 69%. Related to the causative factors of needlestick injuries, the most important causes from nurses' perspective were overcrowding, fatigue, and recapping the contaminated needle by hand. There were statistically significant differences between needle-stick injury and the nurses' years of experience, as well as attendance at training courses on how to avoid needle-stick injury accidents. **Conclusion:** The needle-stick injury prevalence rate was found to be 69%. By promoting a safe and conducive work environment, the findings aim to assist national educational institutions, public health organizations, and hospital administrations in Iraq in making informed decisions regarding the prevention and control of needle-stick injuries in the future.

Keywords: Needle-Stick Injuries; Nurses; Questionnaire-Based Survey

INTRODUCTION

Any skin penetration by contaminated needles that exposes medical personnel to contaminated blood or bodily fluids is referred to as a needle stick injury (Centres for Disease Control and Prevention, 2024). Health care workers (HCWs) who handle needles in the course of their clinical work are more likely to get a needlestick, which can result in a serious or deadly infection with blood-borne pathogens like HIV, hepatitis B virus (HBV), or hepatitis C virus (HCV) (Reddy *et al.*, 2017). Needlestick injuries are defined by the National Institute for Occupational Safety and Health (NIOSH), USA, as injuries brought on by items including injections, blood samples, recapping and discarding needles, and handling medical waste (Abalkhail *et al.*, 2022). As a result, nurses must be sufficiently competent in the operations that call for them to handle sharp objects (Reddy *et al.*, 2017).

In healthcare settings, needlestick injuries (NSIs) are still among the most common injuries, and the high rates of NSIs among nursing workers have been shown in numerous research studies to date. The Centres for Disease Control and Prevention (CDC) stated that over 1 million occurrences of NSIs take place each year and account for 8% of injuries that occur in hospitals (Almoliky *et al.*, 2024).

Significance of the Study

It is estimated that approximately 385,000 needle-stick injuries (NSI) occur annually among hospital-

based healthcare workers in the United States, while in Europe, the reported number of such incidents among hospital personnel reaches nearly 1,000,000 cases per year, according to the Centres for Disease Control and Prevention (CDC) and the European Agency for Safety and Health at Work (Abalkhail *et al*., 2022). Since needlestick injuries are both a global and local problem, it is urgent to conduct research on this topic to establish effective solutions.

METHODOLOGY

This study utilised a descriptive cross-sectional design to determine the prevalence and causative factors of needle-stick injuries among nursing staff in Karbala City. It was conducted at two hospitals in the holy city of Karbala—Safeer and Zain Alabdeen Hospitals—specifically in the Intensive Care Units (ICUs) and medical-surgical units, from November 2022 to February 2023.

A total of 200 nurses were selected using a non-probability purposive sampling method. Eligibility criteria included nurses who provided direct patient care, were likely to be exposed to needle-stick injuries and agreed to participate in the study.

Study Instruments

Data were collected using a structured questionnaire consisting of three parts:

Part I: Socio-demographic data — This section covered the participants' gender, age, socioeconomic status, educational level, and years of professional experience.

Part II: Health-related data — This section included information about participation in training programmes, experiences with sharp object and needle-stick injuries, and vaccination status.

Part III: Causative factors of needle-stick and sharp object injuries — This section examined potential contributing factors, categorised into work-related factors, personal factors, and factors related to medical waste management.

The researchers developed the tool based on a review of relevant literature, including sources from the Centres for Disease Control and Prevention (2024) and National Institute for Occupational Safety and Health (1999). The questionnaire was translated from English into Arabic by the researchers. Both the content validity and translation accuracy were evaluated by a panel of five experts in the fields of nursing and education.

A pilot study was conducted with 20 nurses to assess the feasibility and clarity of the questionnaire. Participation was voluntary, and oral consent was obtained after ensuring the confidentiality and security of the data. Necessary modifications were made based on the pilot feedback before commencing formal data collection.

The final version of the questionnaire was self-administered. It was distributed individually to each participant to minimise misinterpretation and to ensure clarity. Participants were given approximately 10–15 minutes to complete the questionnaire.

Statistical Analysis

Data were analyzed using SPSS Statistics (version 24, 2021). Descriptive statistics included frequencies and percentages, while inferential analysis was performed using Chi-square test of independence and Fisher's Exact test when applicable.

Ethical Consideration

Ethical clearance for the study was obtained from the Ethical Committee of the College of Nursing, University of Warith Al-Anbiyaa, Iraq under reference number 61, dated 30th October 2022.

RESULTS

Table 1: Distribution of Study Sample According to their Demographic and Health Data

Variable	Classes	Frequency (*N*)	Percentage
Gender	Male	90	45%
	Female	110	55%
Age Groups (years)	20 – 25 y	96	48%
	26 – 30 y	52	26%
	31 - 35 y	12	6%
	36 - 40 y	24	12%
	>40 y	16	8%
Educational Level	Nursing preparatory	40	20%
	Diploma	78	39%
	Bachelors	78	39%
	Master's degree	4	2%
Years of Experience in Nursing	< 5 y	126	63%
	6 – 10 y	28	14%
	11 – 20 y	38	19%
	> 20 y	8	4%
Marital Status	Married	86	43%
	Unmarried	114	57%
Training Courses	Trained	146	73%
	Not trained	54	27%
Hepatitis C Virus Vaccination	Vaccinated	154	77%
	Not vaccinated	46	23%

Table 1 shows that, in relation to gender and age, 55% of the sample were female, and 48% were between 20 and 25 years of age. Regarding educational level, nurses holding diplomas and bachelor's degrees each accounted for 39% of the sample. In terms of years of experience, the largest group (63%) consisted of nurses with less than five years of experience.

Regarding marital status, 57% of the participants were unmarried. Concerning training courses, 73% of the nurses reported having completed such programmes. Regarding Hepatitis C virus vaccination, 77% of the nurses were vaccinated.

Table 2: Prevalence of Needle Stick Injuries among Studied Group

Stick Injuries Groups	Freq.	Percentage	Total
Null	62	31%	62 (31%)
Less than 5 times	120	60%	Prevalence 138 (69%)
6 – 10 times	14	7%	
More than 11 times	4	2%	

Table 2 presents the prevalence of needle-stick injuries among the study participants. The overall prevalence rate was 69%, with 60% experiencing fewer than five incidents, 7% experiencing between six and ten incidents, and 2% experiencing more than eleven incidents. Meanwhile, one-third of the sample (31%) reported no history of needle-stick injuries during their nursing careers.

Table 3: Causative Factors of Needle Stick Injures: Factors Related to Work, Personal Factors and Medical Waste Management

Factors Related to Work	Freq.	Percentage (%)
Stress at work	132	(66%)
Overcrowding	170	85%
Excessive work pressure	160	80%
Lack of assistance in work	130	65%
Uncooperative patient	144	72%
Too many procedures that need to inject the patient	128	64%
Personal Factors	**Freq.**	**(%)**
Fatigue	146	73%
Lack of sleep	120	60%
Lack of attention and focus	132	66%
Urgency in providing care	136	68%
Factors Related to Medical Waste Management	**Freq.**	**(%)**
Poor management of medical waste	130	65%
Re-covering the contaminated needle with hands	156	78%
Try to bend the needle after use	90	45%
Handling the contaminated needle by another person	124	62%
Lack of experience in handling sharp objects	90	45%
Not knowing how to use a sharps disposal container	66	33%
The lack of a container for the disposal of sharp objects (safety box)	80	40%
Putting contaminated needles in places other than the container	110	55%
Overfilling the sharps disposal container	138	69%

Regarding factors related to work, the majority of the studied nurses identified overcrowding and excessive work pressure as leading causes of accidental needle-stick injuries, with percentages of 85% and 80%, respectively. For personal factors, 73% of the nurses considered fatigue a significant cause of accidental needle-stick injuries. Concerning factors related to medical waste management, the most commonly agreed-upon cause was recapping contaminated needles by hand, reported by 78% of the nurses (Table 3).

Table 4: Relationship Between Needle Stick Cases and Demographic along with Health Characteristics of Nurses

Sharp and Needle Stick Cases						
Variables	**Null**		**Injured**		**P value**	**df**
	Freq.	**%**	**Freq.**	**%**		
Age						
20 - 25 y	32	33.3	64	66.7		4
26 - 30 y	20	38.5	32	61.5		
31 - 35 y	2	16.7	10	83.3	0.069	
36 - 40 y	6	25	18	75		
> 40 y	2	12.5	14	87.5		
Gender						
Males	24	26.7	66	73.3	0.233	1
Females	38	34.5	72	65.5		
Educational Level						
Nursing prep.	12	30	28	70		3
Diploma	24	30.8	54	69.2	0.960	
Bachelors	26	33.3	52	66.7		
Master	0	0	4	100		
Years of Experience						
< 5 y	50	39.7	76	60.3		3
6 - 10 y	2	7.1	26	92.9	0.009*	
11 - 20 y	8	21.1	30	78.9		
> 20 y	2	25	6	75		
Training Courses						
Trained	36	24.7	110	75.3	0.001*	1
Not trained	26	48.1	28	51.9		
HCV Vaccination						
Vaccinated	44	28.6	110	71.4	0.176	1
Not vaccinated	18	39.1	28	60.9		

*Statistically significant

Table 4 demonstrates that, although there was no significant correlation between needle-stick injury cases and nurses' age, gender, educational attainment, or vaccination status, statistically significant differences were found regarding the nurses' years of experience ($p = 0.009*$) and their receipt of training on how to prevent needle-stick injuries ($p = 0.001*$).

DISCUSSION

Needle-stick injuries (NSIs) are serious incidents caused by used sharp objects, primarily affecting nurses. Ensuring workplace safety for nurses and other healthcare professionals requires the implementation of effective, evidence-based preventive measures. Furthermore, exposure to contaminated needle sticks places medical personnel at daily risk of potentially fatal blood-borne infections.

According to the demographic and health data of the study sample, the majority of the nurses were female and aged between 20 and 25 years, which is consistent with the findings reported by Anwar *et al*. (2025). Most participants held diplomas or bachelor's degrees, in line with the results of Kebede and Gerensea (2018) and Mekonnen *et al*. (2018). The largest subgroup comprised nurses with less than five years of experience, a finding supported by Kiddeer *et al*., 2024. More than half of the sample were unmarried, echoing the results of a study conducted in Jordan (Higazee, Rayan & Khalil, 2016). Furthermore, most of the nurses had completed training courses, as similarly noted by Abebe, Kassaw and Shewangashaw (2018) and Singh *et al*.(2019). Additionally, the majority of participants had received vaccinations, consistent with the findings of Mekonne *et al*. (2018).

The current study found that the prevalence rate of needle-stick injuries (NSIs) among the studied group was 69%. Similarly, studies by Alaru *et al*. (2023) and Guimarães, Corrêa & Uehara (2022) reported higher prevalence rates of 87.2% and 89.9%, respectively, indicating a widespread occurrence of NSIs among nurses. However, this finding contrasts with the results of Bassiouny *et al*. (2025); Gao *et al*. (2024) and Kiddeer *et al*. (2024), who reported significantly lower NSI prevalence rates of 23.2%, 29.1% and 35.25%, respectively.

The current study identified several causative factors of needlestick injuries. Among the work-related factors, the majority of the nurses reported that overcrowding and excessive work pressure were key contributors to accidental NSIs. These findings are consistent with those of Li, He and Zhao (2024), who found that long working hours significantly increased the incidence of NSIs. Similarly, Akbari *et al*. (2018) reported that elevated stress levels, especially when working with sharp instruments, increase the risk of such injuries.

According to the study findings, fatigue was identified as the most significant personal factor contributing to needle-stick injuries. This result is consistent with the findings of Adams (2012). Other notable factors include urgency in providing care and a lack of attention and focus, which align with the findings of Afridi, Kumar and Sayani (2013).

The most commonly reported factors related to medical waste management that nurse agreed contributed to needle-stick injuries were recovering contaminated needles by hand, overfilling sharps disposal containers, and poor medical waste management. These findings are consistent with those of several studies, including Arora *et al*. (2024) and Musana *et al*. (2025), which highlighted a lack of compliance, inadequate supplies, and insufficient safe injection practices. Conversely, the findings of Anwar *et al*. (2019) reported that the majority of nurses followed safe injection practices, which contradicts the results of the present study.

This study revealed statistically significant differences in the occurrence of needle-stick injuries among the nurses in relation to their years of experience. This finding aligns with the results reported by Bassiouny *et al*. (2025) Similarly, a significant association was found between needle-stick injury incidence and receiving training on prevention measures, which is consistent with the findings of Alharazi *et al*. (2022) and Zarei *et al*. (2025). However, no significant relationships were observed between needle-stick injuries and variables such as age, gender, educational level, or vaccination status. These results contradict the findings of Alaru *et al*. (2023), who reported significant associations with these demographic factors.

Limitation

Nurses might not report all incidents due to fear, shame, or administrative pressure. Additionally, they may forget previous injuries, particularly minor ones or those that occurred a long time ago. Another limitation is the need for a more representative sample.

CONCLUSION

The prevalence rate of needle-stick injuries (NSIs) among the nursing staff in Karbala City was found to be 69%, a figure that reflects challenges such as staffing shortages, heavy workloads, and limited resources. According to the participants, the most significant contributing factors were overcrowding (work-related), fatigue (personal), and recovering contaminated needles by hand (medical waste management-related). Statistically significant associations were identified between the occurrence of NSIs and both the nurses' years of experience and participation in training courses on preventive measures.

Future studies should explore compliance with standard precautions and examine how nurses' attitudes toward safety protocols influence their practices. Additionally, there is a need to develop and implement targeted educational and training programmes aimed at improving safety behaviours and reducing the incidence of NSIs in healthcare settings.

Recommendation

It is recommended to improve workplace conditions by allocating adequate nursing staff and resources, as well as minimising excessive workloads to reduce occupational stress and the risk of injury. Regular training programmes should be implemented for healthcare workers, focusing on the safe handling of sharp instruments and adherence to best practices for injury prevention. Additionally, routine staff meetings are encouraged to discuss workplace challenges, address job-related stress, and enhance team collaboration. Promoting and ensuring the vaccination of nursing staff, particularly against blood-borne pathogens such as Hepatitis B and C, is also essential. Furthermore, future research should explore the most effective and safe methods for the disposal of contaminated needles and other sharp medical waste.

Conflict of Interest

There is no conflict of interest, according to the authors.

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