

ORIGINAL ARTICLE

Prevalence and Associated Factors of Needle Stick Injury Among Nurses in Najran – Saudi Arabia

Suraya Hider Majrashi¹, Mohammadeh Ali Alarjaa², Noha Hassan Khazaei³, Mona Ahmed Alharis⁴ and Mohsen Ahmed Qahtani⁵

¹Department of Infection Control Infection Control Nurse Najran Armed Forces Hospital Saudi Arabia,

²Department of Obstetrics and Gynecology Najran Armed Forces Hospital Saudi Arabia

Department of Health Education Control Nurse Najran Armed Forces Hospital Saudi Arabia

⁴Department of Family Community Medicine Control Nurse Najran Armed Forces Hospital Saudi Arabia

⁵Department of Laboratory specialist Laboratory section Najran Armed Forces Hospital Saudi Arabia

Corresponding author email: surayaicn2019@gmail.com

ABSTRACT

Healthcare workers including nurses are exposed to many occupational hazards, including needle-stick injuries (NSIs). Blood-borne pathogens can be transmitted to people through NSIs that expose them to blood and body fluids of this study were to estimate the prevalence of NSIs and investigate the associated factors of NSIs among nurses in Najran -Saudi Arabia. A cross-sectional online survey was conducted between March and July 2023. A total of 320 nurses participated in the survey from various healthcare facilities in Najran-Saudi Arabia. The prevalence of NSIs events among the nurses is estimated at 33.8% (95% CI: 19.1, 24.5). Majority of the injury events (84.1%) were not reported to the authority by the injured nurses. The odds of NSIs was higher among the nurses aged 31–40 years compared to other age groups (OR: 2.41; 95% CI: 1.38, 7.01), as well as among the workers who directly dealt with needles or other sharp objects while working compared to those who did not (OR: 5.9; 95% CI: 2.69, 12.97). The high incidence and low rate of reporting of NSIs highlights the need of education and awareness raising programs targeting healthcare providers including nurses with higher risk of injury

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INTRODUCTION

Needle stick injuries (NSIs) are serious and common phenomenon in any healthcare environment¹. Healthcare workers specially nurses are dealing with contaminated needles and other types of sharp instruments that put them in high risk to be exposed to bodily fluids including blood related pathogens that can pose a serious risk conditions [2]. El-Hazmi and Al-Majid reported that a total of seventy three NSIs were reported to the department of infection control, and the nurses were the group of workers most commonly injured, which accounted for 65.8% of all reported incidences[1].

Globally, it had been documented that 32.4–44.5% of healthcare workers report at least one event of accidental needle-stick or sharp injury each year[4]. Regardless the World Health Organization's (WHO) guidelines for reducing NSIs in healthcare settings, they continue to occur in every step of injections or sharp devices usage [5].

It had been reported that several factors influenced the risk of injuries to healthcare workers which including the type of needle and other sharp objects used, beside their safety systems [6,7]. Additionally, the risks of NSIs in the healthcare facilities also depend on the number of patients and the precautions the healthcare workers follow while dealing with patients [8]. In addition, more than 20 unsafe blood-borne pathogens are transmitted by contaminated needles, such as the human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) [1,3]. According to The World Health Organization (WHO) reported that millions of health workers out of 35 occupations worldwide were exposed to infection as a result of needle stick injuries (NSIs) every year, the largest percentage was hepatitis B (37.6%) and C (39%), and the lowest percentage was HIV (4.4%) [5,9,10].

Numerous studies had been conducted in some governmental hospitals in the Kingdom of Saudi Arabia estimated that the annual NSI incidence was 3.2 per 100 occupied beds, and nurses were the most affected category [11, 1,2, 13]. A

recent study conducted in Medina, KSA estimated the annual incidence of NSIs among healthcare personnel around 32% [14].

In Najran area, few studies were conducted regarding NSIs among health care workers especially for nurses. To add to the growing evidence on NSIs and their risk factors, The outcomes of the current study will benefit all registered nurses as well as nursing students. It will have an impact on nursing practices by shedding the light on the common risk factors associated with NSIs and identifying the most important preventive measures. Additionally, it will benefit nursing educators by suggesting strategies and training programs for nurses and nursing students. It would also help in developing specific policies and regulations for NSIs protection and enhancing nursing practices. It is important to make efforts to reduce the percentage, such as employing a greater percentage of healthcare workers and ensuring that institutions contain disposal or storage containers of needles and sharp tools at all times [15].

Therefore, the prevalence of NSIs is an important measure to ensure safety among nurses and other healthcare providers. The literature showed that limited studies had been conducted about the prevalence of NSIs in Najran. The findings of this study will benefit all registered nurses and nursing students. It will have an impact on nursing practice by identifying the common factors associated with NSIs and identifying the most important prevention methods. In addition, it will benefit nursing education by suggesting strategies and training programs for nurses and nursing students. It would also help develop specific policies and regulations to protect from NSIs and enhance nursing practice. Therefore, this study aimed to determine the prevalence and associated factors related to NSIs among nurses in Najran, Saudi Arabia.

MATERIAL AND METHODS

STUDY DESIGN AND SAMPLING

It was a facility-based and cross-sectional study that conducted in Najran – KSA. A Convenient Sampling Technique (CST) was adopted for recruiting a total of 210 nurses. For collecting data, an electronic self-administered questionnaire was designed and distributed through different social networks, such as emails, WhatsApp, facebook and other social media. The study objectives and title were clearly written on the front page of the online survey form, and the participants were requested to fill consent section before starting answering the questions..

STATISTICAL ANALYSIS

After cleaning and coding, data analysis was performed by using SPSS version 22(IBM Corp. Armonk, NY. USA). Categorical variables such as age groups, gender, and educational level were summarized and reported as frequency distribution. The Chi-square test was used to examine the association between different categorical variables. Whereas, t-test or ANOVA were used for continuous variables. Multivariate logistic regression (LR) analysis that tested with OR (95% confidence intervals (CI) and *P*-value was performed to identify factors associated with NSIs. A *P*-value of <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Out of 400 invited individuals, 352 ones completed the questionnaire. The response rate was 88%. After excluding 32 participants who didn't complete the questionnaire correctly, a total of 320 were included as represented in Figure 1.

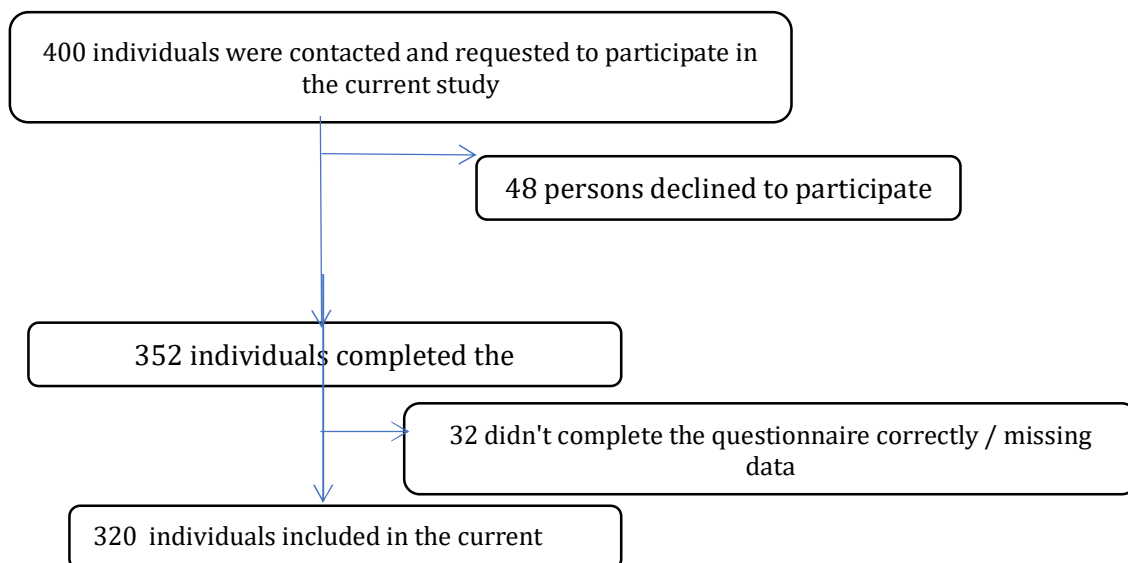


Figure 1. Participants' recruitment flow -chart.

CHARACTERISTICS OF THE STUDY PARTICIPANTS

320 subjects were included in the current study. Table 1 shows that the participants' mean age was 26.4 ±9.67 (ranging between 24-44 years). In terms of gender, females were dominated in the sample (76.56%). In terms of nationality, the majority were non-Saudi participants (58.4%). Regarding educational level, the majority of participants 186 (58.1%) correspond to diploma in nursing 72.5% (n=232) of the participants received enough training courses on how to deal with sharp objects. Almost 40% of them have work experience 6-10 years (Table1).

Table 1: Socio-demographic characteristics of the respondents (n=391)

Variable	Characteristics	Frequency	Percent (%)
Sex	Male	75	23.44
	Female	245	76.56
Nationality	Saudi	133	41.6
	Non-Saudi	187	58.4
Age in years	20-30	166	51.9
	31-40	120	37.5
	≥41	34	10.6
Level of education	University graduated (BSc and/higher)	113	35.3
	Diploma	207	64.7
Received enough training courses on how to deal with sharp objects	Yes	232	72.5
	No	88	27.5
Years of experience	1-5	94	29.4
	6-10	126	39.4
	≥11	100	31.2

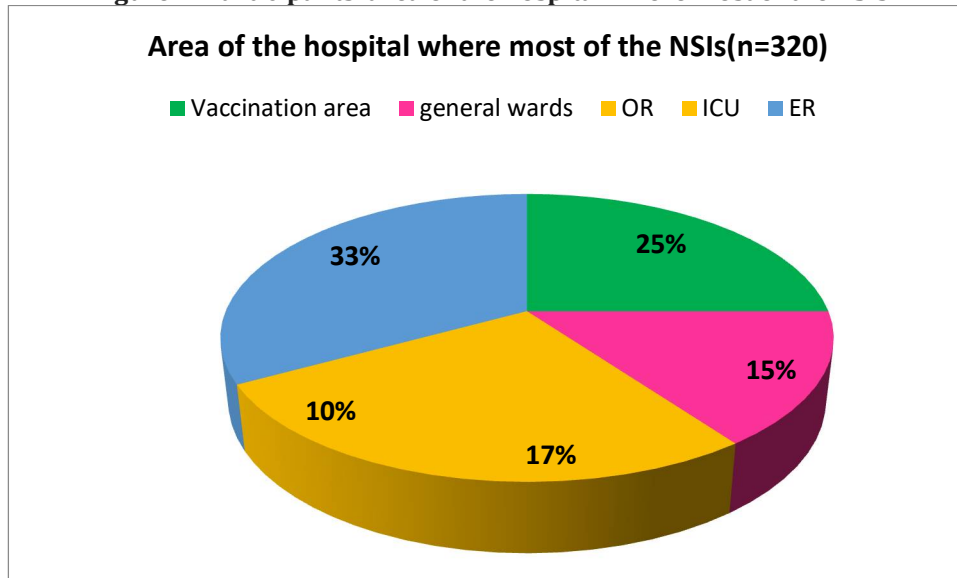
Table 3. Predictors of needle-stick or sharp injuries among nurses in Najran (n=320)

Predictors	Unadjusted Model		Adjusted Model	
	OR (95% CI)	P-Value	OR (95% CI)	P-Value
Sex				
Males	1		1	
Females	1.71 (0.94, 2.81)	0.082	1.18 (0.71, 2.19)	0.61
Nationality				
Non-Saudi	1		1	
Saudi	0.70 (0.41, 1.33)	0.151	1.12 (0.38, 2.61)	0.87
Age in years				
20-30	1		1	
31-40	3.90 (1.41, 5.99)	0.065	2.41 (1.38, 7.01)	0.051
≥41	2.14 (1.71, 5.02)	0.101	1.29 (0.39, 3.70)	0.601
Level of education				
Diploma	1		1	
University graduated (BSc and/higher)	6.69 (3.40, 13.17)	0.000	5.90 (2.69, 12.97)	<0.001
Received enough training courses on how to deal with sharp objects				
No	1		1	
Yes	2.29 (1.39, 3.79)	0.011	1.41 (0.87, 2.51)	0.249
Years of experience				
1-5	1		1	
6-10	3.86 (0.31, 77.07)	0.298	1.40 (0.06, 29.72)	0.769
≥11	4.13 (0.61, 42.19)	0.191	5.87 (0.61, 58.44)	0.115
Frequencies of experiencing NSIs during the last year				
1-3	1		1	
4-6	2.99 (0.29, 57.06)	0.566	1.36 (0.14, 28.92)	0.649
≥7	5.01 (0.71, 40.15)	0.184	5.67 (0.71, 55.56)	0.815

Table (3) shows the unadjusted and adjusted odds ratios and their 95% confidence intervals (CIs) for the predictors of NSIs among the nurses. We observed that the odds of NSIs were 2.41 (95% CI: 1.38, 7.01) times higher in 31–40 years age group compared to the 20–30 years age group after adjusting for the effect of other socio-demographic and profession related variables. However, no significant differences in the odds of NSIs were observed between 20–30 years and other older age groups.

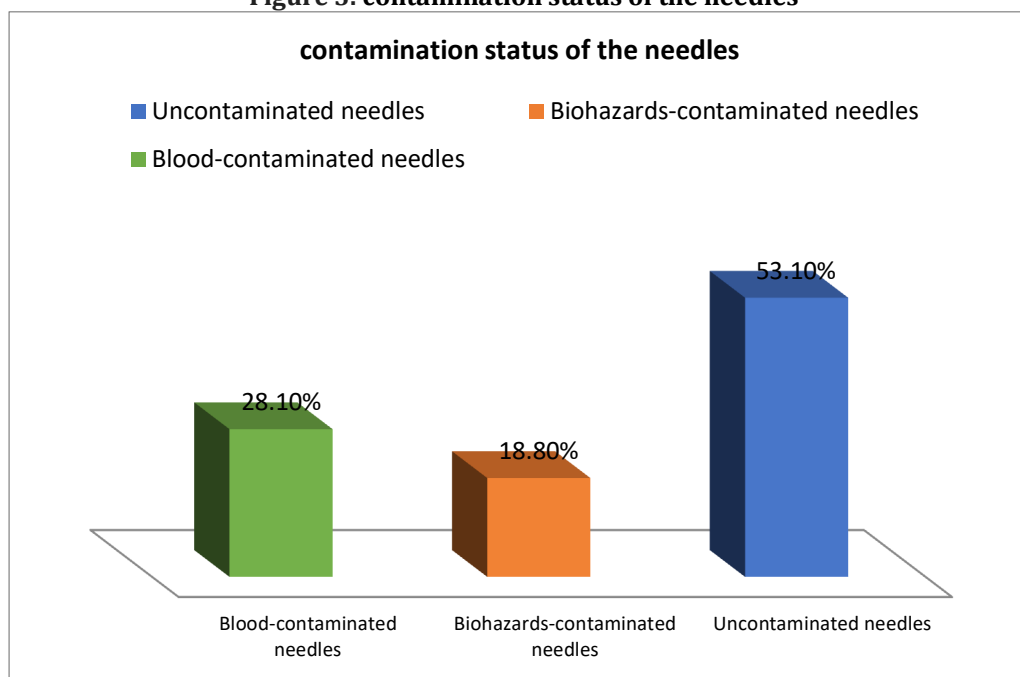
The multivariable logistic regression analysis also suggested that dealing with sharp objects at work is significantly associated with NSIs experience. No significant differences in the odds of NSIs were observed between gender and nationality groups in both the unadjusted and adjusted models.

Figure 2. Participants’ area of the hospital where most of the NSIs



As displayed in figure (2), the area of the hospital where most of the NSIs took place were the emergency unit (33%), followed by the vaccination area (25%), operation room (OR) about (17%), general wards (15%), and the ICU (10%). In regard to contamination status of the needles, about 90 (28.1%) of the injured nurses were injured with blood-contaminated needles, while 60 (18.8%) were injured with needles that contaminated with other biohazards, while 170 (53.1%) were injured with uncontaminated needles respectively (figure 3).

Figure 3. contamination status of the needles



Most injuries occurred during using needles (47.5%), followed by recapping used needles (26.2%), and 13.8% NSIs occurred while disposing of a used needles. About 12.5% of the healthcare workers received injuries while doing other activities.

It had been noticed that the majority of the injured nurses 71.3% (n=228) reported mild injuries (skin puncture), while 28.8% (n=92) reported moderate injuries (cut/ puncture with some bleeding), and no one reported severe (deep puncture/cut or abundant bleeding) injuries respectively. Also, it had been stated that only small proportion of the injured nurses 15.9% (n=51) reported their injury events to the authority.

Table 4 Association Between Prevalence of Needle Stick Injuries and Nationality (n=320)

		Nationality		Chi-square	P-value
		Saudi	Non-Saudi		
Have you ever been exposed to a needle stick injury (NSI)?	No	99	113	4.843	0.041
	Yes	34	74		

Table (4) shows a significant relationship between exposure to NSIs and nationality, where the P-value of the chi-square test was 0.041.

Table 5 Association between prevalence of NSIs and age (n=320)

		Participants' age in years			Chi-Square	P-value
		20-30	31-40	≥41		
Have you ever been exposed to a needle stick injury (NSI)?	No	87	26	21	11.566	0.067
	Yes	79	94	13		

Table (5) shows no significant relationship between exposure to NSIs and participants' age, where the P-value of the chi-square test was 0.067.

Nurses who had not attended any training on the prevention and management of NSIs in their workplace were at a significantly greater risk of sustaining such injuries than those who had attended the training. This study showed that 72.5% of nurses had training courses about how to avoid NSIs.

Needle-stick or sharp injuries (NSIs) are a prominent occupational hazard for healthcare workers especially for nurses [16]. It is essential to identify the rate of NSIs and their associated factors among nurses in Najran- KSA. Our results showed that 33.8% (n=108) of the participants experienced NSIs events during the last year. This finding is almost similar to that had been reported in Jeddah (29.8%), Medina (32%), and Dessie town-Ethiopia (35.5%) [17,14,18]. Although, it is slightly higher than that reported in Turkey (20.7%), Germany (28.7%), and China (27.5%)^{19,20,21}. Another study conducted in Dammam reported a very low rate (8.4%) when compared to our study's findings [22]. It is possible that in Dammam a greater compliance with infection control procedures, workplace safety awareness, and available resources are associated with lower risk of NSIs in the KSA. Conversely, much higher incidence was reported in United Arab Emirates (42%), Iran (42.5%), Ethiopia (60.2%), Jordan (66.5%), and Egypt (70.4%) [23,24,6,25,26]. Nevertheless, the annual incidence (33.6%) reported by our study is alarming. These differences could be also due to variations in number of participants in, years of occupational experiences and level of education, and continuous training programs on infection control.

Our findings also revealed that participants belonged to the 31–40 years age group were associated with higher odds of NSIs compared to other age groups, although, the differences were not significant. Moreover, no significant association was found between, nationality, gender, years of experience and attending training on NSIs prevention and NSIs events among nurses. This result is in contrast to previous studies conducted in Iran, and Philippine [24,27].

In the current study, the area of the hospital where most of the NSIs took place was the emergency unit (ER); this finding was congruent with studies conducted previously in KSA and Malaysia [28,29].

Higher incidence NSIs in these areas can be explained by the nature of the work and the medical activities that carried out in these areas. We noticed that different devices led to NSIs in Najran's hospitals. The most common devices were needles followed by blades, glassware, plastic ware, and scissors. The findings of our study especially related to the fact that needles caused majority of the injury were consistent with the results of other studies conducted in Vietnam [30], and India [31].

Our study suggested that the most common activity leading to NSIs was while using the device and recapping used needles. This was consistent with previous investigations from Nigeria [32], Southern Ethiopia [33], and United States of America [34].

Nevertheless, this study provided important insight into this critical occupational health issue. Future studies should employ a cohort design targeting other variables.

CONCLUSION AND RECOMMENDATION

The survey findings showed that the prevalence of NSIs among nurses in this study was not so high compared to other previous studies. It had been identified that the associated factors and their relationship with age, gender, nationality, educational level, and working experience; however, the prevalence can be vital in terms of body fluids and blood-borne pathogens.

The factors that related to NSIs which were identified in the present study can be utilized for planning effective prevention strategies and also can be considered when evaluating nurses' skills, attitudes, and work practices in

relation to NSIs risks. Recognizing these knowledge gaps may help authorities in developing preventive strategies for nurses.

Therefore, all nurses should have been trained about how to control infections in a best manner. Programs should emphasize specific causes of NSIs. NSIs while recapping was common. Knowing the way for disposing sharp devices as well as used needle is also important. The concept of precautions in all approaches to health workers and how they must comply with the usages of personal protective devices. They should also be informed of the importance of reporting the injury events when occurred. In addition, it is important to ensure that all nurse are vaccinated against some infectious diseases specially hepatitis.

Based on this study, minimizing emotional fatigue and working loads at work could be beneficial in this regard. Therefore, healthcare workers including nurses should receive periodic instructions and health education programs on the necessary and healthy work practices to prevent such injuries.

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Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the work done in the manuscript. Each author listed in the manuscript had seen and approved the submission of this version of the manuscript and takes full responsibility for it.

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