

# Prevalence of Needle Stick Injuries Among Nurses in Jeddah, Saudi Arabia

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**Purpose:** Needle-stick injuries (NSIs), sharp tools, and other devices that penetrate the skin are considered occupational hazards for health workers. The most dangerous pathogens in the blood are transmitted through contaminated needles. Thus, this study aimed to investigate the prevalence and associated factors related to NSIs among nurses in Jeddah, Saudi Arabia.

**Patients and Methods:** A quantitative cross-sectional descriptive study design was used. A total of 219 nurses working in a hospital in Jeddah, Saudi Arabia, were recruited for this study. All registered nurses and adult, male, and female nurses working in general and critical care units were included in this study. Data were collected using an online questionnaire. Data were analysed using descriptive statistics using IBM Statistical Package for the Social Sciences (SPSS) version 23. The chi-square test was used to identify variables associated with NSI.

**Results:** The prevalence of NSIs among nurses in Jeddah, Saudi Arabia, was 19.7%.

**Conclusion:** NSIs are the most dangerous pathogens transmitted through the blood between health workers. The prevalence of NSIs was 19.7%. Thus, nurses need to be provided with educational training on how to prevent NSIs.

**Keywords:** prevalence, sharp injury, nursing

## Introduction

Needle stick and sharps injuries refer to medical equipment that can cause skin penetration injuries, such as needles, injectors, intravenous cannulas, ampules, and lancets.<sup>1</sup> It is the most risky and serious occupational health hazard among nurses and other healthcare workers.<sup>2</sup> 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).<sup>1,3</sup> According to Laishram et al. 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%).<sup>4</sup>

NSIs are a serious risk and a common phenomenon in any healthcare environment.<sup>5</sup> Healthcare workers are dealing with contaminated needles and other types of sharps that expose them to blood that may contain pathogens that can pose a serious risk.<sup>6</sup> According to El-Hazmi and Al-Majid (2008), in a 2-year period of 2002–2003, a total of 73 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. In a 5 years duration, a total of 133 NSIs have been reported to the department of infection control (2001–2005). The majority of NSIs reported included nursing staff (45.1%), followed by other healthcare workers.<sup>7</sup> Another study done by Jahangiri et al. In Iran aimed to assess the prevalence and factors related to NSIs among nurses found that the prevalence of NSIs was 76%. Mostly was caused by Hollow-bore needles (85.5%) and occurred in the morning shift (57.8%). In addition, it was found that (41.4%) of the NSIs was caused by recapping the needles and that the percentage of not reporting NSIs was 60.2%. Moreover, their study showed that there is a significant relationship between the prevalence NSIs and working hours and sex.<sup>8</sup>

It is also important to identify the factors associated with NSIs and reduce them due to a large number of injuries.<sup>9</sup> A study conducted in Ethiopia showed that the prevalence of NSIs at the Dessie referral hospitals among nurses was 43%. The findings of that study showed that applying universal precaution and training related to NSIs of sharp objects and needle extraction had a great association with the reduction of needle stick and sharps injuries.<sup>10</sup> Moreover, another study showed that the maximum occurrence of NSIs has been evident in healthcare providers. It also showed that age, educational status, number of shifts monthly, and history of factors associated with training were all relevant to NSIs. Preparation, injecting, and repacking of used needles were also associated with the highest rate of NSIs.<sup>11</sup> In addition, a study at a hospital in China has found that factors such as department, age, sex, and years of professional experience increased the risk of NSIs.<sup>12</sup> Another study in North East Ethiopia also showed that those working in private hospitals were more susceptible to NSIs by 9.62 times compared with that of government hospitals due to their weak commitment to practice compliance and lack of personal protective equipment used.<sup>13</sup> In addition, health workers in developed countries are considered at risk for NSIs and cross-infection due to the high prevalence of the previously mentioned factors.<sup>14</sup>

Therefore, nursing education and institutional support are crucial as they can help reduce the incidences of NSIs by improving and strengthening training on occupational safety, providing sufficient protective equipment to prevent NSIs, and improving the working environment in hospitals.<sup>15</sup> Additional measures to prevent the risk of NSIs from occurring are developing and applying occupational safety and health policies and programs based on those factors, as well as proper oversight of their implementation, are needed.<sup>16</sup> The program must develop a committee, which may need an official that heads the committee and healthcare providers who collect information about injuries to assess their risks and provide the necessary prevention. Those responsible for monitoring exposure must regularly analyse and review the data. After the patient is injured, it is also important to follow up on their condition and prevent this from happening again.<sup>17</sup> 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.<sup>13</sup>

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 Saudi Arabia. Thus, this study investigated the prevalence and associated factors of NSIs in Jeddah, Saudi Arabia. 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.

Thus, this study aimed to investigate the prevalence and associated factors related to NSIs among nurses in Jeddah, Saudi Arabia.

## Materials and Methods

### Design

This study used a quantitative cross-sectional descriptive design. This study was conducted from 16th January to 15th May 2021.

### Settings

This study was conducted at a government hospital in Jeddah, Saudi Arabia. This hospital was chosen as the research setting because it is a major teaching hospital in Jeddah that accommodates a large number of beds (1067 beds) with a total of 1123 nurses, in addition to its convenience in the field of research.

### Participants and Sampling

The sampling technique and recruitment process was a convenience sample of registered nurses' staff according to the inclusion criteria. All registered nurses and adult, male, and female nurses working in general and critical care units were included in this study. A total of approximately 1123 nurses working in the governmental hospital in Jeddah. Therefore, the sample size of this study included 219 nurses. The sample size was calculated using Raosoft, calculated

as  $n = (z)^2 p (1 - p) / d^2$ , with a 5% margin of error and a confidence level of 95%. Inclusion criteria were: nurses working in general and critical care units (specifically; pediatric unit, male medical ward, male surgical ward, female surgical ward, medical intensive care unit [MICU], coronary care unit [CCU]), paediatric intensive care unit [PICU], surgical intensive care unit [SICU], obstetrician-gynecologist (OB-GYNE) and emergency department nurses), both sexes, and all nationalities were included in this study.

## Operational Definitions

### Needle Stick Injuries (NSIs)

It is defined as any cut, prick, or skin penetration injuries to the nurses caused by a medical equipment such as needles, injectors, intravenous cannulas, ampules, and lancets.<sup>1</sup>

## Data Collection

An online questionnaire (closed-ended questions) was used to collect data. Online questionnaires are useful during the coronavirus disease 2019 (COVID-19) pandemic and can assist in reaching the maximum number of nurses using e-mail or the web for conducting surveys, as it is cost-effective, faster, easy to use for participants, and saves time. A survey planet online tool was used to collect the data.

The study used a pre-tested questionnaire which was obtained from a previous study by Sabaa et al. Regarding needle stick and sharps injuries: awareness, prevalence, and associated factors of a global problem in healthcare workers at the Tanta University Hospitals, Egypt.<sup>18</sup> The tool was confirmed based on the three experts' opinions in the nursing field at the Faculty of Nursing in (KAU), Jeddah, to ensure the appropriateness and clarity of the questions. Therefore, the questions that have been modified were required in light of their suggestions. In addition, pilot test was performed before conducting the main study. Based on the pretest results, the questionnaire was additionally adjusted and then administered to the whole sample. Some amendments were made to the questions by the researchers, and other questions were added to the questionnaire.

The questionnaire used to collect data consists of 2 parts:

### Part 1: Sociodemographic Characteristics of Participants and Job Experience

Demographic data consisted of age, sex, working experience, nationality, and educational level of the participants.

### Part 2: Included 22 Questions Assessing the Prevalence and Associated Factors of Needle Stick Injury

The questionnaire contains behavioural and environmental variables.

## Data Analysis

Data was analyzed using IBM SPSS Version 23.0 (Chicago, IL USA). Data were checked for missing values. Descriptive statistics were performed for demographics and study variables, which included means, percentages, frequencies, standard deviation as appropriate. The Chi-square test of independence was used in this study to determine whether there is a statistically significant relationship between discrete variables (ie, dichotomous, ordinal, or categorical). A p-value of  $\leq 0.05$  will be considered statistically significant.

## Ethical Consideration

Ethical approval was obtained from the Faculty of Nursing Research Ethical Committee at King Abdulaziz University (KAU) and the Unit of Biomedical Ethics Research Committee at King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia. Permission was obtained from nursing administrators at the hospital after explaining the purpose of the study.

All data were kept confidential and anonymous, with no names identified, a code was allocated to all collected data, and information was treated confidentially and kept safe and locked. Privacy was guaranteed to all

**Table 1** Count and Percentage Distribution of Socio-Demographic Characteristics of Participants and Job Experience

		Count	%
<b>Do you work at King Abdul-Aziz University Hospital?</b>	No	0	0.0%
	Yes	223	100.0%
<b>Sex</b>	Female	192	86.1%
	Male	31	13.9%
<b>Nationality</b>	Saudi	11	4.9%
	Non-Saudi	212	95.1%
<b>Years of work experience</b>	Less than 1 year	20	9.0%
	1–5 years	57	25.6%
	6–10 years	61	27.4%
	11–15 years	46	20.6%
	More than 15 years	39	17.5%
<b>Educational Level</b>	Bachelor's degree in Nursing	100	44.8%
	Diploma in Nursing	119	53.4%
	Master's degree	4	1.8%
<b>Ward/Unit</b>	Pm I	17	7.6%
	PM2	17	7.6%
	Pediatric 2	13	5.8%
	MMW	31	13.9%
	MSW	35	15.7%
	FMW	2	0.9%
	MICU	20	9.0%
	CCU	1	0.4%
	PICU	50	22.4%
	SICU	4	1.8%
	OB, Gyne	32	14.3%
	Er	1	0.4%

participants, written informed consent was obtained from participants after providing an explanation of the study, and participation was voluntary.

## Pilot Study

A pilot study was conducted on 10% of the total study sample (22 participants) to assess the clarity, applicability, and feasibility of the study tools. Accordingly, no adjustments were made to this tool. Therefore, a pilot study sample was included in this study.

## Results

The results of this study consisted of three parts: the sociodemographic characteristics of participants and job experience, the prevalence and associated factors of NSIs, and the relationship between sociodemographic characteristics and job experience of participants and the prevalence of NSIs.

The nurses' demographic and work-related characteristics are presented in Table 1. It was revealed that 86.1% of the sample studies were females. Approximately 5% were from Saudi Arabia, and 25% had work experience of 1 to 5 years. More than half of the participants had a nursing diploma. The PICU was the ward/unit with 22.4% of the sample study.

Table 2 describes the prevalence and associated factors of NSIs. A total of 219 female and male nurses working in general and critical units from the government hospital in Jeddah were recruited for this study. The results showed that 19.7% of the participants were exposed to NSIs. Of these, 72.3% had one NSI, 38.3% reported that the syringe needle was the type of item that caused injury, and 79.2% reported injuries to the concerned body. Among the participants, 37.5% did not report their injury because they thought it was not important, and 83% received medical care after the injury. Approximately 36.2% experienced NSI at night, and 55.3% reported that bright light was the working environment condition when they had an injury. A total of 23.9% single-handedly recapped the needle at the time of injury, 93% used personal protective equipment. Approximately 84.1% used single glove, and 51% administered 5–10 injections per day. Of these, 86.2% had training in NSIs, 99.1% were aware of disease transmission by NSIs, 98.6% were aware of hospital policies related to NSIs, 95.9% were familiar with the NSIs reporting system, and 99.5% used personal protective equipment. In addition, 19.7% single-handedly recapped needles after injection, and 99.5% reported that sharp containers were available at the injection site. A total of 98.6% of the needles were immediately disposed into the sharps box. A total of 97.7% of participants followed universal precautions, and 85.3% reported that there was sufficient protective equipment in the workplace, as indicated in Table 2.

Tables 3–8 illustrate the association between sociodemographic characteristics and job experience of participants and the prevalence of NSIs. The results in Table 3 showed that there was a significant relationship between exposure to NSIs and age, where the *P*-value of the chi-square test was 0.016, less than 5%. The results in Table 5 show a significant relationship between exposure to NSIs and nationality, where the *P*-value of the chi-square test was 0.028, less than 5%. Other sociodemographic characteristics such as sex, years of work experience, educational level, and unit/word were not significantly associated with exposure to NSIs, as shown in Tables 4,6–8.

## Discussion

NSIs are considered one of the most serious risks for all health workers, as they may be exposed to serious diseases through the transmission of viruses through the bloodstream, such as HIV hepatitis B and C.

According to our study, the prevalence of NSIs in Jeddah, Saudi Arabia, was 19.7% of the participants exposed to NSIs. It is lower than the findings of the study done in the Dessie referral hospital, which was 43%.<sup>10</sup> The prevalence of NSIs among nurses working in public hospitals of Dessie town for the last year and during their career was 34.5% and 48.8%, respectively.<sup>19</sup>

In the United States, more than 80% of NSIs have been reported.<sup>20</sup> Therefore, it has become an increasing challenge and a high professional threat to all health workers, not just nurses; thus, it is important that every hospital contains health and safety standards.

The result of this study showed that 72.3% of the participants had NSIs at one time, which was higher compared with the study conducted in Jordan (67.6%).<sup>20</sup> Naturally, the prevalence rate between regions varies depending on nurses' awareness and their use of personal protective equipment, whether they have them, and if they had training before.

The syringe needle is the most common device causing injuries because most NSIs occur from intradermal, intramuscular, subcutaneous, and intravenous needles. Of these, 38.3% reported that the syringe needle was the type of item that caused the injury, followed by the second-highest type, an intravenous cannula. A different study showed that 93% of the NSIs happened by the open bore needles.<sup>4</sup> Another study in China revealed that glass and syringe needles are responsible for 22% and 59% of all NSIs, respectively.<sup>12</sup>

This study showed that 79.2% of participants reported injury to the concerned body. Among the participants, 37.5% did not report their injury because they thought it was not important. However, 95.9% of the nurses were familiar with

**Table 2** Count and Percentage Distribution of Prevalence and Associated Factors of Needle Stick Injuries

		Count	%
<b>Have you ever been exposed to a needle stick injury (NSI)?</b>	No	175	80.3%
	Yes	43	19.7%
<b>How many times you had NSI?</b>	Once	34	72.3%
	Twice	11	23.4%
	≥ Three times	2	4.3%
<b>What was the types of items causing the injury?</b>	Syringe needle	18	38.3%
	The IV cannula (catheter)	14	29.8%
	Suture needle	1	2.1%
	Glass item	2	4.3%
	Butterfly needle	8	17.0%
	Insulin needle	4	8.5%
<b>Did you report your injury to the concerned body? If your answer is yes, move to question</b>	No	10	20.8%
	Yes	38	79.2%
<b>If you did not report, why did you not report the condition?</b>	Thinking not important	6	37.5%
	Lack of awareness about reporting	4	25.0%
	Fear of stigma	2	12.5%
	Other	4	25.0%
<b>Did you get medical care after you injured?</b>	No	8	17.0%
	Yes	39	83.0%
<b>At what time of your work did you face the NSI?</b>	Morning	16	34.0%
	Afternoon	14	29.8%
	Night	17	36.2%
<b>What was the condition of the working environment when you had the injury?</b>	Bright light	26	55.3%
	Dim light	6	12.8%
	Noisy	15	31.9%
<b>Did you recap the needle at the time of injury?</b>	Yes, double handed	6	13.0%
	Yes, single handed	11	23.9%
	No	29	63.0%
<b>Did you use PPE?</b>	No	3	6.4%
	Yes	44	93.6%
<b>What was the type of PPE used?</b>	Single glove	37	84.1%
	Double glove	7	15.9%

(Continued)

**Table 2** (Continued).

		Count	%
<b>How many injections do you give per day?</b>	< 5	37	17.0%
	5–10	111	50.9%
	10–15	53	24.3%
	15–20	11	5.0%
	>20	6	2.8%
<b>Have you ever had training on NSI?</b>	No	30	13.8%
	Yes	188	86.2%
<b>Are you aware of diseases transmission via NSI?</b>	No	2	0.9%
	Yes	216	99.1%
<b>Are you aware of the hospital policy related to NSI?</b>	No	3	1.4%
	Yes	215	98.6%
<b>Are you familiar with NSIs reporting system?</b>	No	9	4.1%
	Yes	209	95.9%
<b>Do you use personal protective equipment?</b>	No	1	0.5%
	Yes	217	99.5%
<b>Do you recap needles after injection?</b>	Yes, double handed	13	6.0%
	Yes, single handed	43	19.7%
	No	162	74.3%
<b>Is a sharp container available at injection place?</b>	No	1	0.5%
	Yes	217	99.5%
<b>Do you Immediately dispose used needle/syringe into the sharps box?</b>	No	3	1.4%
	Yes	215	98.6%
<b>Do you follow universal precaution?</b>	No	5	2.3%
	Yes	213	97.7%
<b>Is there sufficient protective equipment at workplace?</b>	No	32	14.7%
	Yes	186	85.3%
<b>Did you report your injury to the concerned body? If your answer is yes, move to question</b>	<b>No</b>	<b>10</b>	<b>20.8%</b>
	Yes	38	79.2%
<b>If you did not report, why did you not report the condition?</b>	<b>Thinking not important</b>	<b>6</b>	<b>37.5%</b>
	Lack of awareness about reporting	4	25.0%
	Fear of stigma	2	12.5%
	Other	4	25.0%
<b>Did you get medical care after you injured?</b>	No	8	17.0%
	Yes	39	z83.0%

**Table 3** Association Between Prevalence of Needle Stick Injuries and Age

		Age				Chi-square	Sig.
		20–29	30–39	40–49	≥ 50		
Have you ever been exposed to a needle stick injury (NSI)?	No	34	102	26	13	10.361	0.016*
	Yes	8	16	15	4		

**Table 4** Association Between Prevalence of Needle Stick Injuries and Sex

		Sex		Chi-square	Sig.
		Female	Male		
Have you ever been exposed to a needle stick injury (NSI)? If your answer is No, move to question	No	152	23	0.020	0.888
	Yes	37	6		

**Table 5** Association Between Prevalence of Needle Stick Injuries and Nationality

		Nationality		Chi-Square	Sig.
		Saudi	Non-Saudi		
Have you ever been exposed to a needle stick injury (NSI)? If your answer is No, move to question	No	6	169	4.843	0.028*
	Yes	5	38		

**Table 6** Association Between Prevalence of Needle Stick Injuries and Work Experience

		Years of Work Experience					Chi-square	Sig.
		Less than 1 year	1–5 years	6–10 years	11–15 years	More than 15 years		
Have you ever been exposed to a needle stick injury (NSI)? If your answer is No, move to question	No	18	45	46	36	30	1.337	0.855
	Yes	2	12	12	9	8		

**Table 7** Association Between Prevalence of Needle Stick Injuries and Educational Level

		Educational Level			Chi-Square	Sig.
		Bachelor's Degree in Nursing	Diploma in Nursing	Master's Degree		
Have you ever been exposed to a needle stick injury (NSI)? If your answer is No, move to question	No	80	92	3	0.094	0.954
	Yes	19	23	1		

**Table 8** Association Between Prevalence of Needle Stick Injuries and Ward/Unit

		Ward/Unit											Chi-square	Sig.	
		Pm I	PM2	Pediatric 2	MMW	MSW	FMW	MICU	CCU	PICU	SICU	OB,Gyne			Er
<b>Have you ever been exposed to a needle stick injury (NSI)? If your answer is No, move to question</b>	No	15	11	10	26	25	2	17	1	41	4	22	1	10.917	0.450
	Yes	2	5	3	2	9	0	3	0	9	0	10	0		

**Abbreviations:** NSIs, needle stick injuries; HIV, human immunodeficiency virus; HBV, hepatitis B virus; HCV, hepatitis C virus; WHO, World Health Organization; COVID19, Coronavirus Disease 2019; PICU, Pediatric Intensive Care Unit.

the NSIs reporting system. According to the Center for Disease Control and Prevention, an estimated 600,000 to 1 million NSIs worldwide occur annually, and around half are unreported.<sup>21</sup>

Nurses in this study who did not use personal protective equipment during the procedure were more than four times at a greater risk of sustaining NSI than their counterparts. This is in line with a previous study conducted by Kebede and Gerensea (2018) in Hawassa, south Ethiopia, and others, in which 86.4% of healthcare workers use personal protective equipment constantly, and those who do not use it were associated with NSIs incidences.<sup>19</sup> In our study, 93% used personal protective equipment, and 84.1% used single glove. Most of the 208 (28.5%) nurses working in Dessie City Public Hospitals, reported that during any procedure, they used personal protection equipment, and 123 nurses (59.4%) reported that during the procedure, they used only one glove. In addition, 240 nurses (59.2%) reported that after the completion of any procedure, they would dispose the needles or sharps in containers.<sup>19</sup>

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 86.2% of nurses had training in NSIs. In the study conducted by Abebe (2018) in Arba Minch General Hospital, Ethiopia, the participants who received training related to sharp objects and NSIs were four times less likely to experienced needle pricking and injury to sharp objects compared to those who were not trained in this study. Training and education are effective strategies to affect changes in behaviour around safety precautions and infection prevention.<sup>10</sup>

In our study, there was no significant relationship between exposure to NSIs and working experience, while in another study in Ethiopia, participants with a working experience >10 years were 2.23 times more likely to develop NSIs than those with < 5 years of experience.<sup>10</sup> Thus, working experience is not enough; therefore, training on the safe use of needles and sharps as well as universal precautions, are needed.

A study conducted in two tertiary care hospitals in Lahore also showed that 68.4% of nurses working in a public hospital and 82.9% in a private hospital were aware of the risk of transmission of infectious diseases due to NSIs, especially hepatitis C and HIV. The percentage in this study was higher than that of a previous study in the Saudi Arabian Kingdom in 2002,<sup>8</sup> while in our study, 99.1% of nurses were aware of disease transmission by NSIs.

Of the nurses, 99.5% reported that there was a sharp container available at the injection site, and 98.6% immediately disposed of the needle or syringe in the sharp box. A total of 85.3% of the participants reported that there was sufficient protective equipment at their workplace. We discovered that the most significant flaw in a safe injection environment was a lack of understanding of the sharp disposal policy, particularly in handling sharp containers (59.2%). In a study by Talaat et al 64% of healthcare workers disposed needles in non-puncture-proof containers.<sup>22</sup> Another Egyptian research by Ismail et al. Reported the absence of safe syringe disposal.<sup>22</sup> Concerns about safe injection and waste sorting policy training were found to be far higher in Egypt (84.8–94.8%) and Romania (91%).<sup>23</sup>

According to a study conducted in Saudi Arabia, more than 80% were female than male nurses were employed in the country in 2018. However, the percentage of male nurses among the minority of Saudi nationals is much higher, at approximately 40%, compared to less than 10% among foreign nurses.<sup>24</sup>

Naturally, the prevalence rate between regions varies depending on nurses' awareness and use of personal protective equipment, whether they have them, and if they have previous training. As a result, the researchers sought to investigate how common needle prick and acute injuries were among nurses in Jeddah, Saudi Arabia.

## Strength and Limitations

This study had several strengths, such as a high response rate: 100% of the participants responded to the survey questionnaire. However, some limitations must be considered when interpreting the findings of this study. The study sample was collected from only one hospital in Saudi Arabia. Therefore, the results of this study cannot be generalised to all nurses in Saudi Arabia. However, the main purpose of this study was to investigate the prevalence and associated factors related to NSIs among nurses in Saudi Arabia. Moreover, the focus of this study was on nurses because they are at risk of NSIs; however, all health professionals are at risk. Thus, further research is needed, and systematic analysis is required to make generalisations. In addition, the sample size of the study and type of variables (categorical) limit the use of more advanced types of statistical analyses. Future studies need to replicate this study using a larger sample size and

perform regression analysis to identify the predictor variables that are associated with the increased prevalence of needle stick injuries among nurses.

## Conclusion

Findings showed that the prevalence of NSIs among nurses in this study was not high compared to that of the previous studies. The researchers identified the contributing factors and investigated their relationship with age, sex, nationality, educational level, and working experience; however, the prevalence can be vital in terms of body fluids and blood-borne contamination; otherwise, the reporting stigmatisation occurred clearly in our study.

## Recommendations

Underlying factors related to NSIs were identified in the present study. These can be used to plan effective prevention strategies and can be considered when evaluating nurses' skills, attitudes, and work practices in relation to NSIs risks and their connection to blood-borne diseases. As NSIs are a preventative health problem, recognising these gaps would assist the government in developing prevention strategies for Saudi Arabian and non-Saudi Arabian nurses.

NSI prevention training for all new and experienced nursing professionals is needed. All health workers must be trained to control infections in the best manner. Knowing the correct way to recap and dispose of the needle is also important. They should also promote the concept of precautions in all approaches to health workers and how they must comply with the use of barriers for personal protection. They should also be informed of the importance of reporting the injury. In addition, it is important to ensure that all health workers are vaccinated against hepatitis.

Future studies should examine the disparities in NSIs between nurses and other health professionals. Based on this study, minimising emotional fatigue at work and having safety-engineered instruments and equipment could be beneficial in this regard. Therefore, healthcare workers should receive periodic instructions on the necessary and healthy work practices to prevent injuries.

## Institutional Review Board Statement

This study was approved by the Faculty of Nursing Research Ethical Committee at King Abdulaziz University (KAU) and from the Unit of Biomedical Ethics Research Committee at King Abdulaziz University Hospital (KAUH) In Jeddah, Saudi Arabia.

## Informed Consent Statement

Informed consent was obtained from all participants in this study.

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## Disclosure

The authors declare that they have no competing interests in this work.

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