

Incidence, Knowledge, Attitude and Practice of Healthcare Workers Regarding Needle Stick Injuries at a Tertiary Care Hospital in Riyadh, Saudi Arabia

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Abstract

Background: A needle stick injury is a serious occupational health hazard in health care settings. Health care workers are at risk of bloodborne diseases and the psychological consequences of these injuries. **Objectives:** we aimed in this study to assess the prevalence of NSI among health care workers in King Saud Medical City and to assess their knowledge, attitude and practices regarding needle stick injuries. **Methods:** A cross-sectional study was conducted from 17th August 2022 until 30th November 2023. A structured questionnaire from Saudi Ministry of Health guidelines was used to collect the data. The content validity was evaluated by four academics from King Khalid University in Abha, and some minor changes were made. **Results:** As regard the prevalence of NSI, out of 220 participants, 132 individuals did not report any needle-stick injuries (NSI). While 92.3% of participants accurately defined NSI and acknowledged blood-borne disease transmission risks, only 39.1% followed preventive measures like recapping needles and proper disposal. There were knowledge gaps observed, with varying awareness levels on Hepatitis B and C prevention. Participants demonstrated awareness of post-exposure guidelines but lacked knowledge on immediate actions to take post-injury. Attitudes towards NSI varied, with a significant percentage 44.1% prioritizing patient care over healthcare worker safety. Interestingly, significant support was shown for immediate reporting of sharp injuries and the belief that NSIs are preventable. In terms of practice, adherence to safe needle practices varied, with the majority 90.9% using assigned disposal containers and being vaccinated against Hepatitis B, but not all receiving recent training on safe devices. **Conclusion:** This study revealed that NSIs remain a prevalent occupational health hazard among healthcare workers. Although a significant number of participants demonstrated adequate knowledge and awareness of NSIs and bloodborne disease transmission risks, there were noticeable gaps in their implementation of preventive measures and immediate post-injury actions. Attitudes towards NSIs varied, with some prioritizing patient care over healthcare worker safety. However, there was strong support for the immediate reporting of sharp injuries and belief in the preventability of NSIs.

Keywords: incidence, needle stick injury, health care workers, attitude, practice, bloodborne diseases, safe injection.

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INTRODUCTION

A needle stick injury (NSI) is a skin wound caused by a needle or sharp instrument in a health-care setting that penetrates or cuts the skin [1]. Because of the nature of their work, health care workers (HCWs) are vulnerable to NSIs and sharp injuries [1].

Infections with blood-borne illnesses including Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and

Human Immunodeficiency Virus (HIV) are common as a result of NSI [2-5].

Around 3 million HCWs suffer NSIs and/or sharps injuries globally each year, making NSI the most common occupational health hazard worldwide [1, 6]. In addition, 800,000, 500,000 and 100,000 sharp injuries are predicted to occur annually in USA, Germany and the United Kingdom respectively [7-9].

The nationwide estimate of NSI in the Kingdom of Saudi Arabia (KSA) was 3.2 per 100 occupied hospital beds according a research done in 2012 including 52 hospitals in various regions in KSA [10]. According to data collected from King Saud Medical City in the Riyadh region in 2009, there were 13.8 NSIs per 100 occupied hospital beds [11]. And in a prospective study conducted over a 4-year period in the King Fahad National Guard Hospital in Riyadh, the overall rate of NSI was 33 per 1000 HCWs [12]. In addition, based on recorded data for reported injuries, different rates have been reported from various health care institutions in other regions of Saudi Arabia [13-17]. However, these figures may underestimate the true situation because many injuries go unreported [18]. According to a review of studies on injury rates in the United Kingdom, the difference between estimated and reported rates can be up to ten fold [19].

LITERATURE REVIEW

Results of the literature review showed a considerably high rate of sharp objects and specially needle stick injuries among healthcare workers, especially nurses and surgeons.

In 2022 Alsabaani A *et al.*, published a cross-sectional study to estimate the exposure to NSIs among people working in the healthcare field for one year and investigate their knowledge, attitude, and practice toward these injuries [17]. The results showed that the incidence of damage because of needle sticks among healthcare workers for one year was (91/786) 11.57%. Half the participants exposed to needle stick injury were Nurses, females, and Saudis (52.7%) [17]. Using sharp devices, reported about half of NSIs (52.7%) [17]. The patient room was the most common place in which injuries happened (42.9%) [17]. Moreover, the exposure to needle stick injury was significantly elevated among subjects working at the secondary healthcare level ($p = 0.003$) and those practicing surgery ($p < 0.001$) [17].

In 2021 Bahat H *et al.*, performed a single-center cross-sectional study aimed to assess the prevalence and characteristics of needle stick injury and underreporting among healthcare workers from different departments [18]. The study included 844 participants, half of them were previously exposed to needle stick injury (53%); the majority of injury caused was needles (68%) [18]. The high prevalence of needle stick injury was among physicians (75%) and in the emergency and surgical sectors (66% and 55%, respectively) [18]. Underreporting was significantly highly reported ($P < 0.001$) among physicians (59%), workers who did not have training about needle stick injury (59%), workers above 51 years groups (56%, $P = 0.003$), and men (54%, $P = 0.01$). The most common underreporting rate was in injuries that occurred in the operating room (82% $P < 0.001$) [18].

In 2021 Fadil RA *et al.*, conducted a retrospective study to investigate the burden and risk factors of sharp object injuries in two hospitals in Taif City, Saudi Arabia [16]. The authors included 131 healthcare workers recorded as exposed to sharp objects injuries from the two hospitals who were included [16]. The results showed that there has been a rising in the incidence of sharp needle injuries from the period of 2016 to 2017. The younger (20–30 years) people and the nurses were more exposed to injuries (55.7% and 56.5%, respectively). It is revealed that the most prevalent tool that caused infection was the borehole needle (48.1%). The needle prick injury was the most commonly occurring exposure (79.4%) and followed by waste collection (11.5%) [16].

In 2019, Al Shaikh HA *et al.*, carried out a cross-sectional study for three years aimed to investigate the prevalence of sharps injuries in Saudi hospitals, the risk factors associated with sharps damage, and assess patterns or seasonal variations [22]. The results showed that nurses were more prone to injuries among all job categories (48%), and hollow bore needles were recorded as the most common tool involved (69%) [22].

In 2018, Khabour O. F *et al.*, conducted a survey-based study to assess the self-reported recurrence of occupational infection and needle stick injury among clinical laboratory technicians in Al- Madinah, Saudi Arabia [15]. The study included 234 clinical laboratory workers in the private and government medical sectors. Results revealed that about 33% of the participants were exposed to occupational infection and 24% had a previous needle stick injury. The deficiency in biosafety training was significantly associated with Occupational infection, needle stick injury, and recap the needles ($P < 0.05$) [15]. Approximately, 49% of the lab workers reported that they always close needles after use, furthermore, 15% of them recorded doing that most of the time [15].

In 2016, Samargandy SA *et al.*, carried out a retrospective chart review on people reporting exposure to blood and body fluids to explore the epidemiological characteristics, adequacy of post-exposure management, and clinical impact of the population exposed to blood and body fluids. The results showed that the total number of incidences recorded was 326 times, of which 302 (92.6%) exposures were through the skin, and 21 (6.5%) were mucocutaneous [13]. Nursing staff had the major rate of exposure (45.6%), followed by physicians (17.5%). Surgeons were indicated to have a significantly higher risk for sharp tool injuries compared with others (26.3%, $P < 0.005$). Most (72.5%) of percutaneous injuries were by hollow-bore needles. The majority of exposures (42.6%) were carried out after using the needle or sharp tools and before disposal [13].

In 2016, Kasatpibal N *et al.*, performed a cross-sectional study in 247 Thailand hospitals [23]. The

study's objective was to explore the prevalence of and risk factors for NSIs, injuries from sharp tools, and blood and body fluid contact among operating room nurses. The injuries caused by blood and body fluids were the most common type followed by NSIs (40.0% and 23.7%, respectively) [23]. Risk factors for needle stick injury were lack of awareness (OR, 1.36; 95% CI, 1.04-1.77), training without practice (OR, 1.67; 95% CI, 1.29-2.17), inadequate staffing (OR, 1.60; 95% CI, 1.21-2.11), outdated guidelines (OR, 1.69; 95% CI, 1.04-2.74) and haste (OR, 4.81; 95% CI, 3.41-6.79) [23].

In 2015, Memish ZA *et al.*, performed prospective surveillance of needle-stick and sharp tool injuries during the year 2012 by using EPINet™ version 1.5 which provides needle stick and sharp injury reports [10]. The annual skin incidents per 100 occupied beds were 3.2% at the studied Ministry of Health hospitals. Nurses were the most common job category affected by needle sticks (59.4%) [10]. Most incidences happened in patients' rooms in the Ministry of Health hospitals (34.6%). Disposable needles were the most common cause of injuries (47.20%). Most NSIs occurred through the use of syringes (36.4%) [10].

In 2013, Memish ZA *et al.*, conducted a retrospective study to assess the risk factors associated with needle stick damage among health care providers of a tertiary care hospital in Saudi Arabia [11]. The results showed that 477 injuries from needle sticks and sharp objects with high incidence (13.84%) [11]. The most common place of incidence of needle stick sharp tool injuries was the patient room (150/477), followed by the emergency room (82/477), and then intensive care units (70/477) [11]. Nurses were the most prevalent affected job type (64.6%). The Syringe with disposable needles were the most common causes of injuries (64.1%) and hands were the most common body part exposed to injuries (95.5%) [11].

In 2008, Zafar A *et al.*, carried out a cross-sectional study to investigate the knowledge, attitude, and practices of Health Care Providers regarding NSIs at the Aga Khan University Hospital in Pakistan [24]. The study included 80 participants, 29 were doctors and 51 were nurses [24]. The results showed that approximately 45% of the participants had a previous needle stick injury. Doctors showed a significantly higher rate of injury ($p < 0.001$) [24].

Objectives:

- To estimate the incident needle stick injury among health care workers in King Saud Medical City

- To assess the knowledge, attitude and practices of health care workers regarding needle stick injuries at King Saud Medical City.
- Assessing risk factors and correlates of needle stick injury among health care workers in King Saud Medical City (KSMC), Riyadh, Saudi Arabia

METHODS

- This cross-sectional study was conducted from 17th August 2022 until 30th November 2023 and included a sample size of 360 healthcare workers in KSMC, Riyadh, Saudi Arabia.
- All health care workers in the KSMC were included in the study. Any health care worker on Scholarships, office job or retired, were excluded from the study.
- A structured questionnaire from Saudi Ministry of Health guidelines was used to collect the data [20, 21]. The content validity was evaluated by four academics from King Khalid University in Abha, and some minor changes were made [17].
- The data was collected in on Excel sheet then transported to SPSS version 26 for analysis. Qualitative data was expressed as number and percentage and quantitative data was expressed as mean and standard deviation (SD). Suitable statistical test was used accordingly. A p-value < 0.05 was considered significant.

RESULTS

Table (1) displays various demographic parameters of a group of people with a total number of (220). The distribution of participants across different age groups highlights a relatively balanced representation, with the majority falling in the 30-39 age bracket (46.8%), followed by those in the 20-29 range (31.4%). The gender distribution shows a significant majority of females (79.1%) compared to males (20.9%). The nationality breakdown indicates a nearly equal split between Saudi (47.7%) and non-Saudi (52.3%) participants. In terms of profession, nurses make up the largest group (71.8%), followed by doctors (20.9%), demonstrating a strong healthcare representation within the sample. The varied distribution across positions and years of work practice suggests a diverse mix of experience levels within the participant pool. The areas of practice show a spread across multiple specialties, with the Emergency Department, Medicine/Medical Department, and Intensive Care Unit being among the most cited. Overall, this comprehensive data set provides a detailed snapshot of the sociodemographic composition of the study participants, enabling deeper analysis and interpretation of the findings.

Table 1: Sociodemographic characteristics of participants (n=220)

<i>Parameter</i>		<i>No.</i>	<i>Percent (%)</i>
<i>Age</i>	20–29	69	31.4
	30–39	103	46.8
	40–49	30	13.6
	≥50	18	8.2
<i>Gender</i>	Female	174	79.1
	Male	46	20.9
<i>Nationality</i>	Saudi	105	47.7
	Non-Saudi	115	52.3
<i>Profession</i>	Dentist	3	1.4
	Doctors	46	20.9
	laboratory	2	.9
	Nurses	158	71.8
	Pharmacist	5	2.3
	Therapist	1	.5
	Other	5	2.3
<i>Position</i>	Resident/general	45	20.5
	Specialists	54	24.5
	Consultant	6	2.7
	Other	115	52.3
<i>Years of work practice</i>	≤2	52	23.6
	3–5	27	12.3
	6–10	53	24.1
	11–15	53	24.1
	≥16	35	15.9
<i>Areas of practice</i>	Emergency department	37	16.8
	General practice	8	3.6
	Intensive Care Unit	31	14.1
	Laboratory	6	2.7
	Medicine/Medical department	36	16.4
	Obs-Gynae	12	5.5
	OPD	26	11.8
	Pediatrics	31	14.1
	Surgery/Surgical department	18	8.2
Other	15	6.8	

As shown in Figure 1, The data illustrates that most respondents, constituting a substantial 132 individuals, reported not experiencing any instances of NSI (Needlestick Injuries). This sizable proportion of respondents who stated they had not encountered NSI highlights an aspect of either effective preventive measures being in place or a relatively lower incidence of needlestick incidents within the surveyed population. Conversely, the responses indicating varying frequencies of NSI occurrences present an interesting contrast. Among these, the most frequently cited response was "Once," with 46 individuals reporting a single incident, followed by "Two to four times" with 21 responses. Notably, a markedly lower number of individuals,

specifically 3, reported experiencing NSI five times or more, suggesting a rare but more recurrent pattern for a small subset of respondents. The sizeable count of 18 individuals who couldn't recall the exact number of NSIs they had encountered adds a layer of uncertainty to the data, potentially indicating a need for improved record-keeping or heightened awareness regarding such incidents. Overall, the presented figures provide valuable insights into the prevalence and recollection of needlestick injuries among the surveyed population, emphasizing the importance of maintaining vigilance and implementing adequate precautions in healthcare settings to prevent such occupational hazards.

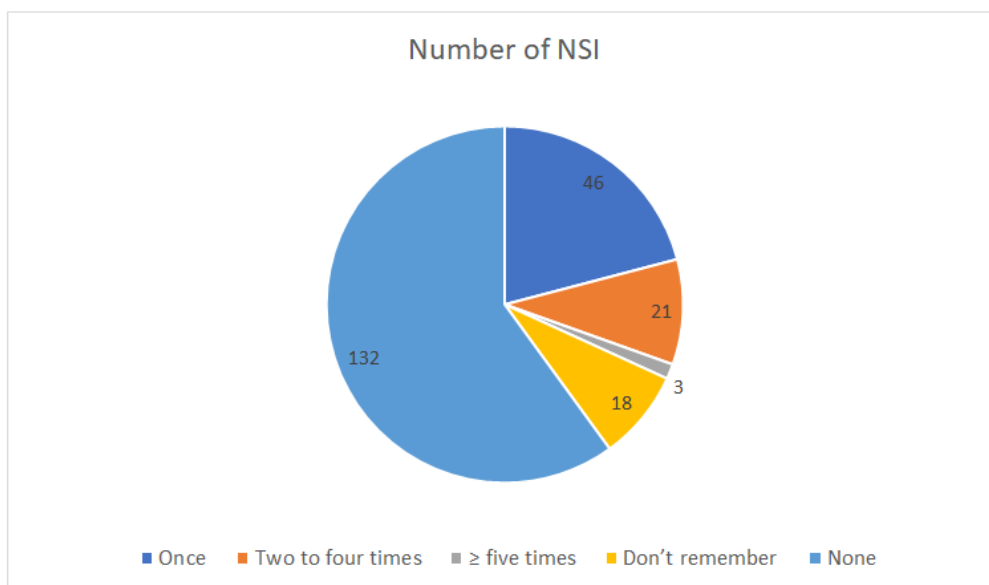


Figure 1: Illustrates number of needle stick injuries among participants

As illustrated in Table (2), The data presented provides insights into parameters related to experiences regarding Needlestick Injuries (NSIs) among a sample size of 220 individuals. It reveals that a significant portion of respondents experienced NSIs, with 20.9% reporting one incident, 9.5% reporting between two to four occurrences, and only 1.4% reporting five or more incidents. The majority, constituting 60.0%, reported no NSI experiences. In terms of injury types, 22.7% reported superficial injuries, 13.2% moderate injuries, and 2.3% severe injuries, while the majority (61.8%) reported no injuries. When it comes to reporting NSIs, 20.9% responded positively, whereas 16.8% chose not to

report, citing reasons such as being too busy at the time of injury or lack of awareness about reporting protocols. Notably, 80.9% of individuals washed the affected area with soap and water post-injury, while 45.0% got tested for HIV, hepatitis B, and hepatitis C. Identifying the source patient and receiving post-exposure prophylaxis were common actions taken after an injury with rates of 51.8% and 45.0% respectively. The involvement of various medical devices in NSIs was also detailed, with 56.4% classified under 'Others'. The locations and causes of these injuries varied, emphasizing the need for vigilance and adherence to safety protocols in healthcare settings.

Table 2: Parameters related to Experiences regarding needle stick injuries (NSIs) (n=220)

Parameter	No.	Percent (%)	
Number of NSI	Once	46	20.9
	Two to four times	21	9.5
	≥ five times	3	1.4
	Don't remember	18	8.2
	None	132	60.0
Injury type	Superficial (little or no bleeding)	50	22.7
	Moderate (skin punctured, some bleeding)	29	13.2
	Severe (deep stick/cut, or profuse bleeding)	5	2.3
	None	136	61.8
Reporting the NSI	Yes	46	20.9
	No	37	16.8
	I don't have injury	137	62.3
Reasons for not reporting the NSI (n=35)	Being too busy at the time of the injury	17	48.6
	Sharps which caused injury never used by patient	9	25.7
	No knowing than he/she should report	9	25.7
Receive medical attention within 2 h after injury.	Yes	41	18.6
	No	44	20.0
	I don't have injury	135	61.4
Action taken after injury (Multiple responses question) *	Washed with soap and water	178	80.9
	Get tested for HIV, hepatitis B, and hepatitis C	99	45.0
	Identify the source patient	114	51.8

Parameter	No.	Percent (%)	
	99	45.0	
Device involved in the last incident.	Intravenous (IV) cannula	39	17.7
	Butterfly needle	7	3.2
	Hypodermic needle	15	6.8
	Phlebotomy needle	8	3.6
	Lancets/ Razors/ Scissors	5	2.3
	Suture needles	22	10.0
	Others	124	56.4
When the sharps injuries occurred	During use	29	13.2
	After use and before disposal	37	16.8
	Between steps in procedures	12	5.5
	During disposal	6	2.7
	While re-sheathing or recapping a needle	12	5.5
	Work area where recent injury occurred (N = 91) Patient room	1	.5
	Intensive/Critical care unit	3	1.4
	Operating room/Recovery	2	.9
	Outpatient clinic/Office Others	4	1.8
	None	214	51.8
The cause of most recent NSI (n=182)	Manipulating needle in a patient	26	14.3
	Clean up	26	14.3
	Recapping	46	25.3
	Collision with healthcare worker or sharp	7	3.8
	Disposal related	22	12.1
	IV-line related	18	9.9
	Handling/passing device during or after use	18	9.9
	Stress during training	19	10.4

*Results may overlap

The data presented in Figure (2) indicates that most individuals surveyed (200 out of 220) consistently adhere to the practice of disposing of sharp items into their designated disposal container. This is a positive finding, as proper disposal of sharp items significantly reduces the risk of injuries and potential hazards in the workplace or community setting. However, it is concerning that a small minority of respondents (20 out of 220) admitted to not always following this protocol. It

is essential for all individuals to understand the importance of responsible waste management and to consistently adhere to established safety guidelines to protect themselves and others. It is important to emphasize the significance of proper disposal procedures and to continue promoting awareness and education on this vital aspect of waste management. By doing so, we can ensure a safer and healthier environment for everyone.

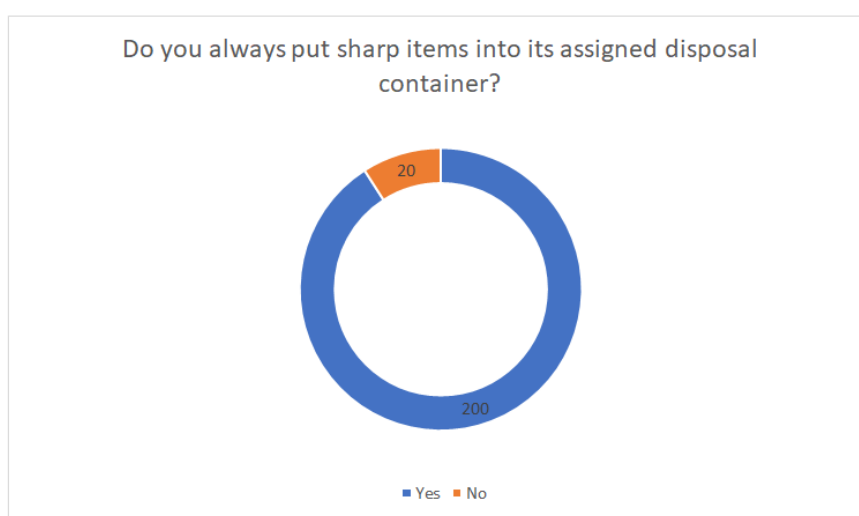


Figure 2: Illustrates if participants put sharp objects in its assigned disposal container

Based on the data presented in Table (3) regarding participants' knowledge questions related to Needle Stick Injuries (NSI) among a sample size of 220 individuals, it is evident that a significant percentage of participants possess knowledge about NSI prevention measures. The majority, 92.3%, correctly defined NSI as wounds caused by needles puncturing the skin accidentally. However, concerning preventive actions such as recapping needles and disposing of them in sharps containers, there seems to be a knowledge gap, with only 39.1% and 39.1% of participants complying, respectively. Similarly, while 87.3% recognized the need for three doses for full protection from Hepatitis B, only 48.2% correctly identified that Hepatitis C can be prevented by a vaccine. Furthermore, the data show a high awareness (93.2%) among participants regarding the potential transmission of blood-borne diseases like HBV, HCV, and HIV through needle stick injuries. Notably, a significant proportion (84.5%) acknowledged

that Hepatitis B poses the highest risk of transmission in such incidents compared to HIV. The findings also reveal variations in participants' awareness of post-exposure measures, with 87.7% being aware of the guidelines to follow after sustaining a needle stick injury in the workplace. However, there was inconsistency in knowledge about immediate actions post-injury, with only 42.7% correctly identifying washing hands with soap and water as the appropriate response. Additionally, while 70.5% recognized tetanus vaccination as part of the treatment following a needle stick injury, there was a misconception among 54.1% of participants that there is no approved post-exposure prophylaxis for HCV. Overall, this data underscores the importance of continuous education and training to enhance knowledge and adherence to proper protocols among healthcare workers to effectively mitigate the risks associated with needle stick injuries and blood-borne pathogens.

Table 3: Participants knowledge questions related to NSI (n=220)

Parameter		No.	Percent (%)	
Prevention	<i>NSI is defined as wounds caused by needles that accidentally puncture the skin.</i>	No	17	7.7
		Yes	203	92.3
	<i>Recap of the needle after performing nursing procedures is recommended to decrease the risk of needle stick injury.</i>	No	134	60.9
		Yes	86	39.1
	<i>Disposing in a sharps container after performing procedures is recommended to decrease the risk of needle stick injury.</i>	No	17	7.7
		Yes	203	92.3
	<i>Three doses are required for full protection from Hepatitis B.</i>	No	28	12.7
		Yes	192	87.3
	<i>Hepatitis C disease can be prevented by vaccine</i>	No	114	51.8
		Yes	106	48.2
Disease transmission	<i>Needle stick Injuries may transmit blood-borne diseases like hepatitis B virus (HBV), hepatitis C virus (HCV), and (HIV).</i>	No	15	6.8
		Yes	205	93.2
	<i>Hepatitis B & C, HIV are blood-borne pathogens that medical staff are most commonly exposed to when they experience needle stick injury.</i>	No	21	9.5
		Yes	199	90.5
	<i>In needlestick injury, Hepatitis B carries the greatest risk of transmission.</i>	No	30	13.6
		Yes	190	86.4
	<i>The percentage transmission of HBV is higher than HIV owing to needle stick injury.</i>	No	34	15.5
		Yes	186	84.5
Post-exposure measures	<i>Are you aware of the procedure and guidelines to follow if you sustain a needle stick injury in your workplace?</i>	No	27	12.3
		Yes	193	87.7
	<i>If you have a needlestick injury your immediate action will be to wash your hand with water only.</i>	No	126	57.3
		Yes	94	42.7
	<i>If you have a needlestick injury your immediate action will be to wash your hand with soap and water.</i>	No	50	22.7
		Yes	170	77.3
	<i>If you have a needlestick injury your immediate action will be to wash your hand with an antiseptic solution.</i>	No	104	47.3
		Yes	116	52.7
	<i>There is currently no approved post-exposure prophylaxis for HCV.</i>	No	101	45.9
		Yes	119	54.1
	<i>Concerning needle stick injury from HCV infected patient, HCV antibody testing should be performed at 4–6 months.</i>	No	57	25.9
		Yes	163	74.1
	<i>Tetanus vaccine is part of the treatment after experiencing needlestick injury.</i>	No	65	29.5
		Yes	155	70.5

Upon reviewing Table (4) detailing participants' practice questions related to NSI (needlestick injuries) with a sample size of 220, several significant trends emerge. Firstly, it is evident that most participants,

approximately 81.8%, do not recap needles with two hands before disposal while only 18.2% adhere to this safe practice. Additionally, nearly 84.5% of the participants confessed to bending needles before

disposal, indicating a worrisome lack of adherence to proper needle disposal protocols. Alarming, only 6.8% of the participants reported that the safety box or disposal container is usually available, highlighting a potential infrastructure issue. On a positive note, a vast majority, approximately 90.9%, claimed they always put sharp items into their assigned disposal container. Furthermore, an encouraging 89.5% of the participants have been vaccinated against Hepatitis B, a crucial

preventative measure for healthcare workers. However, the data also reveals a concerning gap in training, with only 70.9% of participants receiving training on the use of safe devices in the last year. Overall, these findings underscore the importance of targeted interventions and training programs to improve compliance with safe needle disposal practices and enhance occupational safety in healthcare settings.

Table 4: Participants' practice questions related to NSI (n=220)

<i>Parameter</i>	<i>Yes</i>	<i>No</i>
<i>Do you recap needles with 2 hands before disposal?</i>	40 18.2%	180 81.8%
<i>Do you bend needles before disposal?</i>	34 15.5%	186 84.5%
<i>Is the safety box/disposal container usually available?</i>	205 93.2%	15 6.8%
<i>Do you always put sharp items into its assigned disposal container?</i>	200 90.9%	20 9.1%
<i>Have you been vaccinated against Hepatitis B?</i>	197 89.5%	23 10.5%
<i>Have you received training on the use of safe devices in the last year?</i>	156 70.9%	64 29.1%

The data presented in Table (5) regarding participants' attitudes towards Needle Stick Injury (NSI) practices among a sample size of 220 individuals offers valuable insights that merit thoughtful consideration. It is notable that a significant portion of participants expressed concern about the risk of needle stick injuries, with 40.5% strongly agreeing and 22.7% agreeing that they are worried about such injuries. This underscores the importance of implementing robust safety measures to mitigate this apprehension and ensure a secure work environment for healthcare workers. Additionally, the data reveals a concerning sentiment among participants, with 44.1% believing patient care is more important than the safety of healthcare workers. This highlights a crucial area for education and intervention to emphasize the equal significance of both patient care and healthcare worker safety in healthcare settings. Moreover, most participants (67.3%) agreed that all sharp injuries at work

should be reported immediately, indicating a positive inclination towards proactive reporting, and addressing occupational hazards promptly. It is evident from the responses that there is a shared belief in the preventability of needle stick injuries, as indicated by 52.7% strongly agreeing and 25.0% agreeing that such injuries are preventable. This underscores the importance of promoting preventive measures and safety protocols to reduce the incidence of needle stick injuries in healthcare settings. Finally, the majority opinion (65.0%) on the necessity of disposing of sharp objects waste by a professional company rather than in domestic waste underscores a collective understanding of the importance of proper biohazard disposal practices. Overall, this data underscores the importance of continuous education, training, and reinforcement of safety protocols to enhance workplace safety and prevent occupational hazards such as needle stick injuries.

Table 5: Participants' attitude towards NSI practices (n=220)

<i>Parameter</i>	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
<i>I am worried about having needle stick injury</i>	32 14.5%	17 7.7%	32 14.5%	50 22.7%	89 40.5%
<i>Patient care is more important than the safety of HCWs</i>	97 44.1%	31 14.1%	41 18.6%	21 9.5%	30 13.6%
<i>All sharp injuries at work should be reported immediately.</i>	12 5.5%	15 6.8%	17 7.7%	28 12.7%	148 67.3%
<i>I think needle stick injury is preventable.</i>	12 5.5%	13 5.9%	24 10.9%	55 25.0%	116 52.7%
<i>Sharp objects waste should be disposed of by a professional company not in domestic waste.</i>	13 5.9%	6 2.7%	19 8.6%	39 17.7%	143 65.0%

Table (6) shows that participants believe that needle stick injuries may transmit blood-borne diseases has statistically significant relation to nationality (p

value=0.002). It also shows statistically insignificant relation to gender, age, profession, position, years of work practice, and areas of practice.

Table 6: Relation between if participants think that needle stick injuries may transmit blood-borne diseases like hepatitis B virus (HBV), hepatitis C virus (HCV), and (HIV) and sociodemographic characteristics

Parameters		Needle stick Injuries may transmit blood-borne diseases?		Total (N=220)	P value*
		No	Yes		
Gender	Female	11 73.3%	163 79.5%	174 79.1%	0.570
	Male	4 26.7%	42 20.5%	46 20.9%	
Age	20–29	3 20.0%	66 32.2%	69 31.4%	0.728
	30–39	9 60.0%	94 45.9%	103 46.8%	
	40–49	2 13.3%	28 13.7%	30 13.6%	
	≥50	1 6.7%	17 8.3%	18 8.2%	
Nationality	Saudi	13 86.7%	92 44.9%	105 47.7%	0.002
	Non-Saudi	2 13.3%	113 55.1%	115 52.3%	
Profession	Dentist	0 0.0%	3 1.5%	3 1.4%	N/A
	Doctors	2 13.3%	44 21.5%	46 20.9%	
		laboratory	0 0.0%	2 1.0%	
	Nurses	11 73.3%	147 71.7%	158 71.8%	
		Pharmacist	1 6.7%	4 2.0%	
	Therapist	0 0.0%	1 0.5%	1 0.5%	
		Other	1 6.7%	4 2.0%	
	Position	Resident/general	3 20.0%	42 20.5%	
Specialists		2 13.3%	52 25.4%	54 24.5%	
		Consultant	1 6.7%	5 2.4%	6 2.7%
Other		9 60.0%	106 51.7%	115 52.3%	
Years of work practice	≤2	1 6.7%	51 24.9%	52 23.6%	0.599
	3–5	2 13.3%	25 12.2%	27 12.3%	
		6–10	5 33.3%	48 23.4%	
	11–15	4 26.7%	49 23.9%	53 24.1%	
		≥16	3 20.0%	32 15.6%	
	Areas of practice	Emergency department	2	35	

Parameters	Needle stick Injuries may transmit blood-borne diseases?		Total (N=220)	P value*
	No	Yes		
	13.3%	17.1%	16.8%	
General practice	0	8	8	
	0.0%	3.9%	3.6%	
Intensive Care Unit	2	29	31	
	13.3%	14.1%	14.1%	
Laboratory	0	6	6	
	0.0%	2.9%	2.7%	
Medicine/Medical department	1	35	36	
	6.7%	17.1%	16.4%	
Obs-Gynae	1	11	12	
	6.7%	5.4%	5.5%	
OPD	5	21	26	
	33.3%	10.2%	11.8%	
Pediatrics	0	31	31	
	0.0%	15.1%	14.1%	
Surgery/Surgical department	3	15	18	
	20.0%	7.3%	8.2%	
Other	1	14	15	
	6.7%	6.8%	6.8%	

*P value was considered significant if ≤ 0.05 .

DISCUSSION

Needle stick injuries (NSI) has always been one of the most important risk factor for healthcare workers (HCWs) for transmission of various infections. There are more than twenty blood-borne diseases, but those of primary significance to health-care workers are due to hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) [26]. A HCW is placed at a risk of such infections by percutaneous injuries or contact of mucous membrane or nonintact skin with contaminated fluids. The causes include various factors such as type and design of needle, recapping activity, handling/transferring specimens, collision between HCWs or sharps, during clean-up, manipulating needles in patient line-related work, passing/handling devices, or failure to dispose the needle in puncture-proof containers [27]. According to recent estimates, approximately 1000,000 HCWs in US and 100,000 HCWs in UK receive NSI from conventional needles and sharps every year [28]. Thus, we aimed in this study to assess the prevalence of NSI among health care workers in King Saud Medical City and to assess their knowledge, attitude and practices regarding needle stick injuries.

As regard the prevalence of NSI, we have found that a substantial 132 individuals out of 220, reported not experiencing any instances of NSI. Regarding their knowledge towards NSI, 92.3% accurately defined NSI, only 39.1% followed preventive measures like recapping needles and proper disposal. Knowledge gaps were evident, with 87.3% recognizing the need for three Hepatitis B doses but only 48.2% aware of Hepatitis C prevention via vaccine. Participants were highly aware (93.2%) of blood-borne disease transmission risks,

particularly 84.5% acknowledging Hepatitis B as posing the highest risk. Although 87.7% knew the post-exposure guidelines, only 42.7% correctly identified immediate actions like washing hands post-injury. Concerning their attitude, 44.1% prioritize patient care over healthcare worker safety. 67.3% support immediate reporting of sharp injuries for proactive hazard management. 52.7% strongly agree and 25.0% agree that NSIs are preventable. 65.0% agree on professional disposal of sharp waste. Regarding their practice, 81.8% don't recap needles with two hands, while 18.2% do. 84.5% bend needles pre-disposal. 90.9% always use assigned disposal containers for sharp items. 89.5% were vaccinated against Hepatitis B, but only 70.9% received training on safe devices in the past year. Compared to our study results, a study reported a high incidence of needle stick and sharp injuries among HCWs in Jordan [29]. In South Africa, 91% of junior doctors reported sustaining a NSI in the previous year [30]. Results of another cross-sectional study conducted in Iran among medical and dental students showed that 74.3% had experienced NSIs. Moreover, a study conducted by Yazid *et al.*, [31], revealed that more than 90% believed that needle stick injury could be prevented and more than 95% felt that they would report all needle stick injuries immediately which was much higher than our results. In term of needle recapping, Madhavan *et al.*, [32], reported 51% had the habit. A far better result was reported by Punia *et al.*, where only 13% had the habit [33]. Additionally, a study by Al-Ghazal *et al.*, (2018) [34] surveyed 300 healthcare workers in Saudi Arabia to assess their knowledge and awareness of NSIs. The results revealed that only 60% of participants were aware of the risks associated with NSIs, and only 40% knew the proper reporting procedures for such injuries. Additionally, only

50% of participants correctly identified all the pathogens that can be transmitted through NSIs. Furthermore, a study conducted by Sharma *et al.*, (2016) [35] among 300 healthcare workers in a tertiary care hospital in New Delhi found that only 57% of the participants had received training on needle stick injuries. Furthermore, 46% of the healthcare workers reported experiencing a needle stick injury in the past year. Another study by Ramya *et al.*, (2018) [36] assessed the knowledge and practices regarding needle stick injuries among 150 nurses in a teaching hospital in Chennai. The study found that 64% of the nurses had a poor knowledge score regarding needle stick injuries, and only 45% reported always using safety devices such as safety needles and needle disposal boxes.

CONCLUSION

In conclusion, this research study conducted at a tertiary care hospital in Riyadh, Saudi Arabia, revealed that NSIs remain a prevalent occupational health hazard among healthcare workers. Although a significant number of participants demonstrated adequate knowledge and awareness of NSIs and bloodborne disease transmission risks, there were noticeable gaps in their implementation of preventive measures and immediate post-injury actions. Attitudes towards NSIs varied, with some prioritizing patient care over healthcare worker safety. However, there was strong support for the immediate reporting of sharp injuries and belief in the preventability of NSIs. Adherence to safe needle practices was mixed, with most participants using assigned disposal containers and being vaccinated against Hepatitis B, but not all had received recent training on safe devices. Enhancing education, training, and adherence to recommended practices could help reduce the incidence of NSIs and ensure the safety of healthcare workers in the hospital setting.

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