Needlestick Injury Incidence, Knowledge, Attitude, and Practice Among Healthcare Workers in National Guard Primary Health Care.

Abstract

Background: Needlestick injuries (NSIs) pose a critical occupational hazard to healthcare workers (HCWs), exposing them to blood-borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).
Objective: To investigate the incidence of NSIs and evaluate the level of knowledge, attitude, and practice regarding NSIs among HCWs in National Guard Primary Health Care Centers (PHCs) in the Western Region of Saudi Arabia.
Methods: A cross-sectional study was conducted using a stratified cluster sampling technique across six National Guard PHCs. Data were collected via a validated self-administered electronic questionnaire assessing sociodemographic characteristics, NSI history and circumstances, knowledge, attitudes, and preventive practices. Comparative statistics were evaluated using Pearson's Chi-square test.
Results: A total of 156 HCWs completed the study (55.1% nurses, 35.9% physicians, and 9.0% dentists). Overall, 24.4% of participants reported experiencing at least one NSI (n = 38). Among those injured, 81.6% reported a single incident, with hypodermic needles being the most frequent device (26.3%) and recapping or procedural use being the primary activities (23.7% each). The hand was the primary site of injury (92.1%). While overall baseline knowledge and adherence to safe practices were high (>90% compliance for safe disposal and HBV vaccination), significant deficits were observed in HCV vaccination awareness (30.8% correct). HCWs with a history of NSI demonstrated significantly greater knowledge regarding the risks of recapping compared to those without prior injury (P = 0.010). Only 78.9% reported their injury through appropriate systems, and under 40% underwent post-exposure serological testing.
Conclusion: Although knowledge and adherence to preventive practices are generally robust, critical gaps remain in NSI reporting, post-exposure prophylaxis compliance, and continuing education on safe devices.

Key Points

What is already known on this topic: Needlestick injuries (NSIs) are a leading occupational hazard for healthcare workers, exposing them to HBV, HCV and HIV, and underreporting and incomplete post-exposure follow-up remain common, with limited data from Saudi primary care.

What this study adds: In six National Guard primary health care centers, 24.4% of 156 healthcare workers reported at least one NSI. Knowledge and safe practices were generally high (>90% safe sharps disposal and HBV vaccination), but only 30.8% answered the HCV vaccination item correctly, 78.9% of injured workers reported their injury, and fewer than 40% had post-exposure serological testing.

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How this study might affect research, practice or policy: Findings support periodic mandatory training on safe devices and post-exposure protocols, simpler reporting systems, structured post-exposure follow-up, and psychosocial support. Future research should evaluate whether such interventions improve reporting and post-exposure care.

Introduction

Healthcare workers (HCWs) are routinely exposed to occupational hazards, among which needlestick injuries (NSIs) represent one of the most critical threats to safety. An NSI is defined as an accidental percutaneous puncture wound caused by a needle or other sharp medical instrument contaminated with blood or body fluids. Worldwide, it is estimated that over two million occupational NSIs occur annually [1], with prevalence rates reaching up to 44.5% among HCWs [2].

The primary clinical risk associated with NSIs is the potential transmission of blood-borne pathogens, predominantly hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Beyond the physical health risks, occupational exposures inflict psychological distress; studies indicate that 42% to 60% of HCWs experience substantial stress and depression post-exposure due to fear of infection [3].

In the Kingdom of Saudi Arabia, occupational exposures remain a variable challenge across different care settings and regions [4, 5]. Although institutional protocols, safety-engineered devices, and disposal guidelines exist, gaps in compliance and underreporting remain common. This study aims to determine the incidence of NSIs and evaluate the levels of knowledge, attitude, and practice regarding sharps safety among HCWs in National Guard Primary Health Care Centers (PHCs) in the Western Region of Saudi Arabia.

Materials and Methods

Study Design and Setting

A cross-sectional study was conducted across six National Guard Primary Health Care Centers in the Western Region of Saudi Arabia (Iskan Jeddah, Specialized Clinics [SPC], Staff Health/KSAU, Bahrah, Iskan Taif, and Al Sharaeaa).

Population and Sampling

The study target population comprised practicing physicians, dentists, and nurses. Trainees, medical students, and interns were excluded. Based on a total sampling frame of 298 HCWs (125 physicians, 36 dentists, and 137 nurses), a minimum sample size of 169 participants was calculated using Epi Info (95% confidence level, 5% margin of error, 50% hypothesized outcome frequency). A stratified cluster sampling technique based on profession and center was utilized, followed by simple random selection within strata. A total of 156 complete responses were obtained and analyzed.

Data Collection Tool

Data were collected electronically using a validated, self-administered structured questionnaire. The questionnaire was obtained from an author of a previously published study conducted in Abha, Saudi Arabia [6], in which its content validity was assessed by four academic experts. The tool evaluated four key domains: (1) Demographics and Background, (2) Knowledge of disease

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transmission and prevention, (3) Attitude measured on a 5-point Likert scale, and (4) Practice and exposure history.

Statistical Analysis

Data were analyzed using SPSS. Categorical variables were expressed as frequencies (n) and percentages (%). Comparisons of categorical data between HCWs with and without a history of NSI were performed using Pearson's Chi-square (χ^2) test. A P-value < 0.05 was considered statistically significant.

Ethical Considerations

Electronic informed consent was obtained from all participants prior to survey initiation. Data confidentiality was strictly maintained throughout data processing. Ethical approval was secured through the Institutional Review Board at King Abdullah International Medical Research Center (KAIMRC; approval number NRJ23J/215/08). The questionnaire was used with the agreement and permission of Abdullah Alsabaani, an author of the original study [6].

Results

A total of 156 healthcare workers completed the study. Nurses constituted the largest professional group (55.1%, n = 86), followed by physicians (35.9%, n = 56) and dentists (9.0%, n = 14). The majority were female (64.1%, n = 100) and fell into the 30–39 years age bracket (41.0%, n = 64). Over half of the participants possessed more than 10 years of clinical work experience.

Table 1. Demographic Characteristics of Study Participants (N = 156)

Variable	Category	n	%
Profession	Nurse	86	55.1
	Physician	56	35.9
	Dentist	14	9.0
Gender	Female	100	64.1
	Male	56	35.9
Age (Years)	20–29	22	14.1
	30–39	64	41.0
	40–49	48	30.8
	50–59	22	14.1
Primary Healthcare Center	Specialized Clinics (SPC)	50	32.1

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	Bahrah	31	19.9
	Iskan Jeddah	29	18.6
	Iskan Taif	28	17.9
	Staff Health / KSAU	9	5.8
	Al Sharaeaa	9	5.8
Years of Practice	< 1 year	3	1.9
	1–5 years	29	18.6
	6–10 years	47	30.1
	11–15 years	27	17.3
	16–20 years	35	22.4
	> 20 years	14	9.0
	Missing	1	0.6

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97 **Table 2. Assessment of Knowledge Among Healthcare Workers (N = 156)**

Knowledge Item	Total n (%)	With NSI n (%)	Without NSI n (%)	P-value*
NSI defined as accidental puncture (Correct)	155 (99.4)	38 (100.0)	117 (99.2)	0.560
Recapping needle after procedures recommended (No)	48 (30.8)	18 (47.4)	30 (25.4)	0.010
Most common cause is during/after use (Correct)	150 (96.2)	37 (97.4)	113 (95.8)	0.722
Three HBV doses provide full protection (Correct)	146 (93.6)	36 (94.7)	110 (93.2)	0.770
HCV can be prevented by vaccination (No)	48 (30.8)	15 (39.5)	33 (28.0)	0.099
Post-exposure HCV management is chronic care (Correct)	92 (59.0)	22 (57.9)	70 (59.3)	0.970

HBV carries greatest transmission risk (Correct)	132 (84.6)	34 (89.5)	98 (83.1)	0.301
No approved PEP for HCV (Correct)	79 (50.6)	20 (52.6)	59 (50.0)	0.944
HCV antibody testing at 4–6 months (Correct)	105 (67.3)	26 (68.4)	79 (66.9)	0.922
HBV risk higher than HIV post-NSI (Correct)	114 (73.1)	28 (73.7)	86 (72.9)	0.769
HBV, HCV, HIV are blood-borne pathogens (Correct)	146 (93.6)	35 (92.1)	111 (94.1)	0.872
Recapping alone decreases risk (No)	27 (17.3)	13 (34.2)	14 (11.9)	0.001
Tetanus vaccine part of post-NSI treatment (Correct)	81 (51.9)	23 (60.5)	58 (49.2)	0.337
Aware of workplace NSI guidelines (Yes)	143 (91.7)	37 (97.4)	106 (89.8)	0.144
Immediate soap & water washing (Yes)	125 (80.1)	25 (65.8)	100 (84.7)	0.038
Immediate washing with water only (No)	118 (75.6)	23 (60.5)	95 (80.5)	0.043

Table 3. Attitudes Toward Needlestick Injury and Prevention (N = 156)

Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Worried about having a needlestick injury	14 (9.0)	15 (9.6)	45 (28.8)	45 (28.8)	37 (23.7)
Concerned because containers aren't changed often	45 (28.8)	50 (32.1)	26 (16.7)	19 (12.2)	16 (10.3)
Patient care is more important than HCW safety	86 (55.1)	41 (26.3)	18 (11.5)	5 (3.2)	6 (3.8)
All sharps injuries should be reported immediately	7 (4.5)	1 (0.6)	4 (2.6)	31 (19.9)	113 (72.4)
Needlestick injuries are preventable	7 (4.5)	7 (4.5)	16 (10.3)	59 (37.8)	67 (42.9)
Sharps waste should be disposed by professional co.	10 (6.4)	4 (2.6)	11 (7.1)	48 (30.8)	83 (53.2)

Table 4. Safe Practice Behaviors Among Healthcare Workers (N = 156)

Practice Item	Total n (%)	With NSI n	Without NSI	P-value*

		(%)	n (%)	
Do not recap needles with two hands (Yes)	142 (91.0)	34 (89.5)	108 (91.5)	0.700
Do not bend needles before disposal (Yes)	148 (94.9)	35 (92.1)	113 (95.8)	0.374
Safety container usually available (Yes)	153 (98.1)	37 (97.4)	116 (98.3)	0.715
Always put sharp items in assigned container (Yes)	153 (98.1)	37 (97.4)	116 (98.3)	0.715
Vaccinated against Hepatitis B (Yes)	144 (92.3)	36 (94.7)	108 (91.5)	0.518
Received safe device training in last year (Yes)	74 (47.4)	19 (50.0)	55 (46.6)	0.716

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103 **Table 5. Characteristics of Needlestick Injuries (n = 38)**

Variable	Category	n	%
Frequency of Injury	Once	31	81.6
	2–4 times	5	13.2
	≥ 5 times	2	5.3
Time Since Last Injury	> 1 year ago	26	68.4
	Within last year	6	15.7
	About 1 year ago	4	10.5
	Missing	2	5.2
Device Involved	Hypodermic needle	10	26.3
	Suture needle	6	15.8
	Lancet	5	13.2
	IV cannula	4	10.5
	Other devices	13	34.2
Activity During Injury	Recapping needle	9	23.7

	Needle use / Procedure	9	23.7
	Injecting / Drawing blood	8	21.1
	Uncooperative patient	6	15.8
	Surgery / Suturing	6	15.8
Severity	Superficial	23	60.5
	Moderate	13	34.2
	Severe	2	5.3
Anatomical Site	Hand	35	92.1
	Forearm	3	7.9

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105 **Table 6. Actions Taken Following Needlestick Injury (n = 38)**

Action Taken	n	%
Washed with soap and water	28	73.7
Get tested for HIV, HBV, and HCV	15	39.5
Alert supervisor / Initiate reporting system	14	36.8
Identify source patient	14	36.8
Obtain Post-Exposure Prophylaxis (PEP)	11	28.9
Washed with iodine or alcohol	10	26.3
Report to employee health services	10	26.3
Squeeze blood from wound	7	18.4
Take Tetanus Anti-Toxoid (TAT)	7	18.4
Apply local pressure	4	10.5

106 ## Discussion

107 The present study investigated the incidence, knowledge, attitude, and practice related to
108 needlestick injuries (NSIs) among healthcare workers (HCWs) in National Guard Primary Health

Care Centers in the Western Region of Saudi Arabia. The findings reveal a nuanced landscape: while knowledge and adherence to safe practices were high, there remain significant areas for intervention, especially regarding attitudes, incident reporting, and post-exposure management.

Incidence and Demographics

In our sample, 24.4% of HCWs reported experiencing at least one NSI, a figure comparable to international studies indicating a range of 20–40% annual incidence among HCWs [2, 7, 8]. Nurses comprised the majority of cases, reflecting their high exposure to invasive procedures, consistent with findings from other regional and global studies [9, 10, 11]. The predominance of female participants and mid-career professionals (6–20 years' experience) aligns with the demographic composition of healthcare workforces in Saudi Arabia and other Middle Eastern countries [12].

Knowledge, Attitude, and Practice

Overall, HCWs demonstrated high levels of knowledge regarding NSI risks, transmission of blood-borne pathogens (HBV, HCV, HIV), and preventive measures [13, 14, 15]. Notably, almost all participants correctly identified key aspects such as the definition of NSI, HBV vaccination, and the need for immediate washing post-exposure. However, deficits were observed regarding the incorrect practice of needle recapping and confusion about HCV vaccination [16, 17].

Most participants expressed positive attitudes towards injury prevention and occupational safety, with more than 80% disagreeing that patient care should outweigh staff safety and over 90% agreeing that all sharps injuries should be reported [18, 19]. However, more than half of HCWs reported anxiety about NSIs, highlighting ongoing anxiety and possible normalization of risk [20].

The study found good adherence to recommended practices: over 90% of HCWs did not recap or bend needles prior to disposal, and nearly all used safety boxes for sharps disposal [21, 22]. Nevertheless, only 47.4% had received recent training on safe devices, suggesting the need for more continuous and structured education [23].

Reporting and Post-Exposure Management

Despite high knowledge and generally safe behaviors, underreporting of NSIs remained a concern, with only 78.9% of those injured reporting the events, and 71.1% seeking prompt medical attention [24, 25]. The most common immediate response was washing with soap and water (73.7%), but less than 40% underwent recommended post-exposure serological testing, and fewer than 30% received PEP [26]. The low rates of reporting and follow-up highlight the need to reinforce institutional support for exposed HCWs [1].

Implications for Policy and Practice

These findings support calls for:

- Mandatory, periodic training on NSI prevention and post-exposure protocols [27].
- Simplification and encouragement of injury reporting systems [25].
- Regular audits of sharps disposal container availability and replacement [28].
- Psychosocial support for HCWs experiencing NSI-related anxiety [20].
- Enhanced focus on non-nursing staff and early-career HCWs [23, 29].

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Limitations

This study's cross-sectional design precludes causal inference. Its focus on National Guard PHCs in one region may limit generalizability, although the results align with broader Saudi and global trends. Self-reported data may underestimate actual NSI incidence due to recall or social desirability bias.

Conclusion

There has been substantial progress in NSI knowledge and safe practice among HCWs in Saudi primary care settings. However, gaps in reporting, training, and anxiety management persist. Continuous education, system-level changes, and a supportive institutional culture are urgently needed to further reduce NSI incidence and consequences.

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