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Knowledge, Attitude, and Practice towards needle-stick injury and prevention of hepatitis B infection among Healthcare Workers in a Tertiary Care Hospital in South Kashmir, India.

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Abstract

Background: Needle-stick injury poses a risk of transmitting pathogens such as hepatitis B, hepatitis C, and HIV, with healthcare workers being particularly vulnerable. However, it is often underreported, and there is a notable lack of knowledge, attitude, and practice studies addressing this issue in our institution. This study highlights the significance of needle-stick injury prevention and raises awareness about hepatitis B among healthcare workers. **Methods**: A cross-sectional study was conducted at GMC Hospital in Anantnag using convenience sampling. Data were collected from consenting healthcare workers via pre-tested questionnaires assessing knowledge, attitude, and practice related to needle-stick injury and hepatitis B. Statistical analysis was performed using Excel 2016 and IBM SPSS version 23, with Fisher's exact test ($p < 0.05$) used for association analysis. **Results**: Of 130 healthcare workers, 36.9% participants had good knowledge regarding needle-stick injury and hepatitis B, 20.8% participants demonstrated a low-to-fair attitude, and 50% participants exhibited good practices. Healthcare workers aged 40-60 had the highest rate of good practices (72.7%). Nurses (40.4%) and emergency staff (50%) displayed better knowledge, while laboratory technicians (61.1%) had lower practice scores. Among those affected by needle-stick injury, 25.4% reported an incident, with 40% occurring in surgical units. Needle-stick injury incidents were higher among female (65.6%) than male participants (34.3%), and only 36.2% of healthcare workers had completed a hepatitis B vaccination series. **Conclusion**: This study emphasizes the need for targeted interventions to improve needle-stick injury prevention practices and enhance vaccination completion among healthcare workers, fostering a safer healthcare environment.

Keywords: needles, exposure, infection, vaccination.

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1. Introduction

Needle-stick injury (NSI) represents a critical occupational health and safety challenge encountered by healthcare professionals globally (1). A needle stick injury is an inadvertent wound caused by different types of sharp objects used by healthcare professionals like fluid collection needles, catheter stylets, hypodermic needles, IV cannulas, etc. These injuries occur due to unsafe practices, gross negligence, or improper handling and manoeuvring of needles used in different activities related to patient care like sample collection, diagnostic

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aspiration procedures, recapping and disposal of needles (2). While adherence to universal guidelines has contributed to a reduction in the risks associated with needle-stick injuries over the past few decades, such injuries still occur, albeit at a significantly lower rate (3).

According to the World Health Organization (WHO), there are over 2 million occupational exposures annually among 35 million healthcare workers (HCWs) worldwide (4). It is estimated that approximately 32.4% to 44.5% of healthcare workers globally report experiencing at least one accidental needlestick injury each year (5). In India, the prevalence of needle-stick injuries ranges from 61% to 79.5%, while the frequency is reported at 2.3 to 4.5 incidents per healthcare worker per year (6).

Needle-stick injuries are preventable; nevertheless, their occurrence presents a significant risk for the transmission of various pathogens, among which the most severe include the Hepatitis B virus (HBV), Hepatitis C virus (HCV), and Human Immunodeficiency virus (HIV) (7). The WHO has reported that over 90% of these infections arise from insufficient adherence to standard precautions in healthcare settings within low-income countries (8).

Reporting of needle stick injuries is essential for treatment and prevention of diseases transmitted by such events (9). In developing countries, it is assumed that nearly three-fourths (75%) of the NSIs are not reported (10). The reporting of such injuries prompts an evaluation for post-exposure prophylaxis, facilitates the early detection of seroconversion, and aids in mitigating anxiety, emotional distress, and other psychological repercussions (9,10). Therefore, comprehensive educational programs aimed at enhancing healthcare workers' awareness and understanding of the various aspects of needle-stick injuries and their preventive measures are critically important and urgently required (10).

Adhering to universal precautions, sterilization of medical devices, proper biomedical waste management, and vaccination are key to preventing hepatitis B infections (11). However, there is a lack of knowledge among HCWs towards the risks of occupational exposure to HBV infection. It has been seen by a study from the Lao democratic People's Republic that 86.5 % of medical students had poor awareness on routes of HBV transmission and the severity of the disease (12). Another study from Cameroon reported poor practices among the study participants, with 55.9 % accidental exposure to blood and only a 10 % vaccination rate against HBV (13).

Research on knowledge, attitudes, and practices is valuable for evaluating the tendencies, competencies, and awareness of specific issues within a community (11). Despite the high prevalence of hepatitis infections within the local population in our context, there is a paucity of data concerning the knowledge, attitudes, and practices(KAP) related to needle-stick injuries and occupational exposure to HBV among healthcare professionals. Consequently, the objective of this study was to evaluate the KAP regarding NSIs and HBV infection among healthcare personnel at the Government Medical College in Anantnag, South Kashmir. The findings from this study can serve as a crucial tool for formulating public health policies tailored to our context, taking into consideration the awareness, beliefs, and health-seeking behaviors of the at-risk population.

2. **Methodology**:

The study was a cross-sectional study conducted by the Department of Microbiology in association with the Hospital infection control committee of Government Medical College Anantnag, a tertiary care hospital that is the only teaching hospital in south Kashmir with 430 beds, including 110 beds of Maternity and child care hospital and a Daily footfall of around 3500.

A total of 130 healthcare workers working in different patient care areas of the associated hospitals of GMC Anantnag were included in the study. Doctors and health care personnel not involved directly in the management of patients (nursing managers, tutorial staff) were excluded. Doctors were excluded as the same questionnaire could not be used to assess and compare their KAP to other HCWs because of the difference in qualification of the two groups, which could act as a confounding factor. The purpose of the study was communicated to each participant, and consent was obtained before their enrollment. Participants were assured that their information would remain confidential and be used solely for research purposes. Ethical clearance was sought from the institutional ethics committee, and there were no ethical issues involved.

Data collection was conducted utilizing a semi-structured, self-administered questionnaire. This instrument was initially pre-tested on a small cohort of HCWs and subsequently revised and validated by faculty members from the Microbiology department, along with members of the hospital's infection control committee. The questionnaire was designed to gather pertinent information regarding NSI exposure, causative factors, procedural context, immediate actions taken post-exposure, notifications to relevant authorities, laboratory investigations, post-exposure prophylaxis, vaccination status against hepatitis B, and knowledge of standard workplace practices. Additionally, demographic details of participants, including designation, age, sex, and work experience, were also examined.

The questionnaire aimed to find the infection control KAP among HCWs along with the potential factors contributing to NSIs and hepatitis B infection. Data collected was checked, and 130 questionnaires, which were complete and without any ambiguity, were analyzed using Excel 2016 and IBM SPSS version 23, and 2-sided Fischer test was used to evaluate the variables and the p-value. The scoring system for different levels of KAP is given in Table 1.

3. Results

Among a total of 130 HCWs, the majority (63.8%) of the participants were between 18 and 30 years of age. Most of the HCWs were male (59.2%). The main job category was ourses (43.9%) followed by technicians (41.5%). As far as the qualification concerned, 86.2% of the HCWs were graduates, and only 13.8% had a master's degree. 55.4% of the participants had a working experience of less than 10 years, and only 5.4% had more than 30 years of experience. HCWs from medical and surgical units were 33.1% and 29.2%, respectively (Table 2)

Overall, the level of knowledge regarding NSI and Hepatitis B was good in only 36.9% of participants. A low to fair attitude was seen in 20.8% of participants, while the practices were good in 50% of HCWs (Fig 1). There was no significant difference in the level of knowledge, attitude, and practices between the genders. Healthcare workers who were in the 40-60 years age group had best practices (72.7%) as compared to the workers of lesser age groups. This was statistically significant. Nurses (40.4%) were seen to have better knowledge than other HCWs, however, the level of practices were mostly low to fair in laboratory technicians (61.1%) as compared to other categories (Table 3).

The level of knowledge and attitude among different qualifications did not show much difference, however, the practices were good mostly in HCWs with master's degrees (61.1%) than with the bachelor's degree (48.2%), and this was not statistically significant. (Table 3). It was also seen that most of the workers in medical units (55.8%) and the emergency department (50%) had good knowledge as compared to HCWs in surgical units (26.3%) and laboratory personnel (20%). This was statistically significant (Table 3). The level of practices was best in surgical units where 73.7% participants had good practices while it was low to fair mostly in medical units (69.8%). These findings were, however, not statistically significant. (Table 3)

In our study, 25.4% of HCWs had a history of NSI during their course of work (Table 3), and amongst them, 40% were encountered while working in surgical units, followed by the emergency department. (25%). Also, female HCWs (65.6%) encountered more NSIs than males (34.3%).

The majority of the participants (93.1%) had knowledge of the diseases that could be transmitted by NSI, and 91.5% of HCWs knew that it needs to be reported; however, only 3.8% knew to whom it should be reported. 89.2% participants knew that the healthcare records of the source/patient are to be checked; however, 43.8% were not knowing what exactly needs to be checked. It was also seen that 72.3% participants knew that post-exposure prophylaxis was necessary after a NSI, however, 96.9% did not know that they required follow up for a specific period after getting a needle stick injury. (Table 4)

Regarding the transmission of hepatitis B, only 39.2% of participants knew that HBV had the maximum probability of getting transmitted after an NSI. Further, 72.3% did not know that hepatitis B is incurable, however, 96.9% knew that it could be prevented by vaccination (Table 4).

Table 5 depicts the attitude of our HCWS. Most (89.2%) of the participants considered NSI as preventable, and 72.3% agreed to the fact that prophylaxis is required if they encounter an NSI. It was also seen that 90.8% of HCWs were of the opinion that the hepatitis B vaccine was safe, however, 46.2% were not vaccinated against hepatitis B. Among the 53.8% vaccinated healthcare workers of our institute, only 36.2% had completed vaccination with all 3 doses. Also, 33.1% of participants had no knowledge that post-vaccination anti-HBs antibody levels need to be checked.

Table 5 depicts the level of the practices of our HCWs. 96.2% followed the standard precautions, but 69.2% participants didn't knew that blood should not be squeezed after a NSI and only 13.1% knew that use of antiseptics after NSI is unnecessary. Disposing of the used needles in sharp boxes and refraining from recapping of needles were practised by most of our participants. However, 35.4% of workers had the practice of disassembling the used needles with their hands. (Table 6).

Table 1: Scoring system for knowledge, attitude, and practice towards Needle Stick Injury

	Score		
	Low	**Fair**	**Good**
Level of Knowledge	0-3	4-7	>7
Level of Attitude	0-2	3-5	>5
Level of Practice	0-3	4-7	>7

Table 2: Basic characteristics of healthcare workers in the study

S.No.	Basic characteristics of healthcare workers	n $\sum n=130$	(%)
1.	**Gender**		
	Male	53	(40.8)
	Female	77	(59.2)
2.	**Job Category**		
	Nurse	57	(43.9)
	Technician	54	(41.5)
	Others	19	(14.6)
3.	**Highest qualification**		
	Bachelor	112	(86.2)
	Masters	18	(13.8)
4.	**Duration of work experience**		
	<10 Years	24	(18.5)
	1 -10 Years	72	(55.4)
	11 -20 Years	17	(13.1)
	21 -30 Years	10	(7.7)
	>30 Years	7	(5.4)
5.	**Place of posting**		
	Emergency Department (casualty)	14	(10.8)
	Laboratory Personnel	35	(26.9)
	Medical Unit	43	(33.1)
	Surgical Unit	38	(29.2)
6.	**History of needle stick injury**		
	Yes	33	(25.4)
	No	97	(74.6)

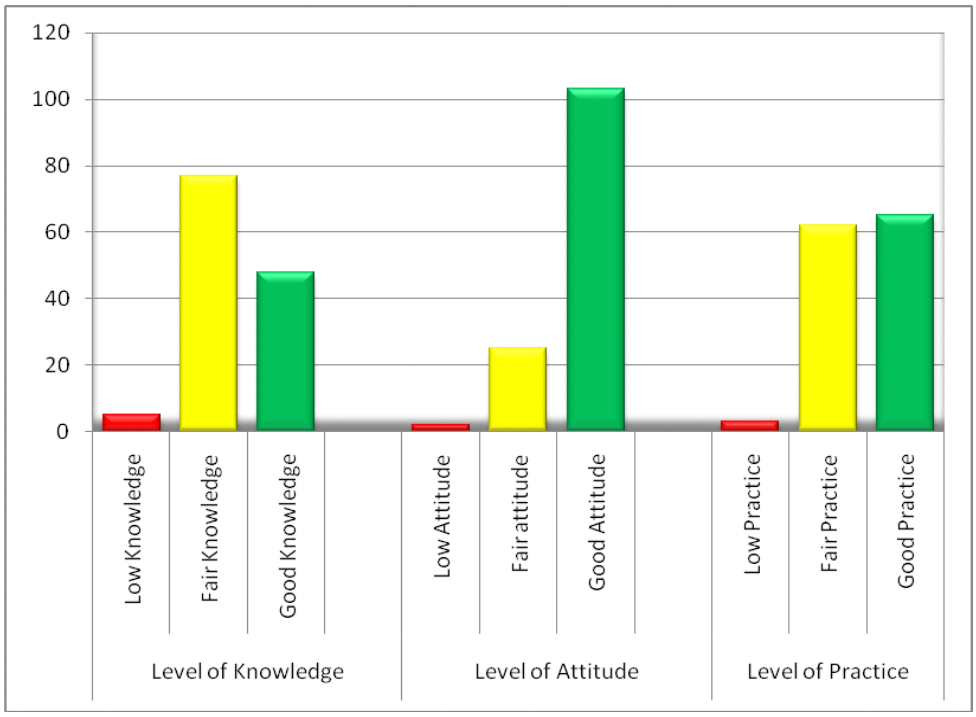

Figure 1: Overall level of knowledge, attitude, and practice of participants

Table 3: Participant parameters and level of knowledge, attitude and practices

PARAMETER		Level of Knowledge			Level of Attitude			Level of Practice		
		low n(%)	fair n(%)	good n(%)	low n(%)	Fair n(%)	good n(%)	Low n(%)	fair n(%)	Good n(%)
Gender	Male(n=53)	2(2.6)	45(58.4)	30(39)	2(2.6)	16(20.8)	59(76.6)	3(3.9)	34(44.2)	40(51.9)
	Female(n=77)	3(5.7)	32(60.4)	18(34)	0(0)	9(17)	44(83)	0(0)	28(52.8)	25(47.2)
Age Group	18-30 Years(n=83)	4(4.8%)	42(50.6)	37(44.6%)	2(2.4)	15(18.1)	66(79.5)	1(1.2)	45(54.2)	37(44.6)
	31-45 Years(n=25)	0(0)	19(76)	6(24)	0(0)	5(20)	20(80)	2(8)	11(44)	12(48)
	46-60 Years(n=22)	1(4.5)	16(72.7)	5(22.7)	0(0)	5(22.7)	17(77.3)	0(0)	6(27.3)	16(72.7)
Job Category	Nurse(n=57)	0(0)	34(59.6)	23(40.4)	1(1.8)	15(22.8)	43(75.4)	3(5.3)	24(42.1)	30(52.6)
	Technician(n=54)	1(1.9)	35(64.8)	18(33.3)	1(1.8)	7(13)	46(85.2)	0(0)	33(61.1)	21(38.9)
	Others(n=19)	4(21)	8(42)	7(37))	0(0)	5(26.3)	14(73.7)	0(0)	5(26.3)	14(77.7)
Highest Qualification	Bachelor(n=112)	4(3.6)	65(58)	43(38.4)	2(1.8)	20(17.8)	90(80.4)	3(2.7)	55(49.1)	54(48.2)
	Masters(n=18)	1(5.6)	12(66.7)	5(27.8)	0(0)	5(27.8)	13(72.2)	0(0)	7(38.9)	11(61.1)
Place Of Posting	Emergency Department (Casuality) (n=14)	1(7.1)	6(42.9)	7(50)	0(0)	7(50)	7(50)	0(0)	5(35.7)	9(64.3)
	Lab.staff(n=35)	4(11.4)	24(68.6)	7(20)	0(0)	9(25.7)	26(74.3)	0(0)	20(57.1)	15(42.9)
	Medical unit(n=43)	(0)	19(44.2)	24(55.8)	2(4.7)	4(9.3)	37(86)	0(0)	30(69.8)	13(30.2)
	Surgical unit(n=38)	0(0)	28(73.7)	10(26.3)	0	5(13.2)	33(86.8)	3(7.9)	7(18.4)	28(73.7)

Table 4: Knowledge parameters related to Needle Stick Injuries

S.NO.	**Questions**	**Response**	**n** ***∑n=130***	**(%)**
1.	Do you know what a needle stick injury is?	Know	130	(100)
		Doesn't Know	0	(0)
2.	What are the diseases that you think can be transmitted by needle stick injury?	Know	121	(93.1)
		Doesn't Know	9	(6.9)
3.	Should the needle stick injury be reported?	Know	119	(91.5)
		Doesn't Know	11	(8.5)
4.	To whom should needle stick injury be reported?	Know	5	(3.8)
		Doesn't Know	125	(96.2)
5.	Should the health records of the source/patient (if traced) be checked?	Know	116	(89.2)
		Doesn't Know	14	(10.8)
6.	What do we need to check in the health records of the source/patient?	Know	73	(56.2)
		Doesn't Know	57	(43.8)
7.	If the health records of the source/patient are not available, do we need to test the source/patient?	Know	113	(86.9)
		Doesn't Know	17	(13.1)
8.	How long does a Health Care Worker need to follow up after a needle stick injury?	Know	4	(3.1)
		Doesn't Know	126	(96.9)
9.	What is the precaution that should be followed by the Health Care Worker during the follow-up period?	Know	14	(10.8)
		Doesn't Know	116	(89.2)
10.	Which blood-borne virus has the highest probability of transmission by needle stick injury?	Know	51	(39.2)
		Doesn't Know	79	(60.8)
11.	Can hepatitis-B disease be cured?	Know	36	(27.7)
		Doesn't Know	94	(72.3)
12.	Can hepatitis B infection be prevented by vaccination?	Know	126	(96.9)
		Doesn't Know	4	(3.1)

Table 5: Attitude parameters related to Needle Stick Injuries

S.NO.	**Questions**	**Response**	**n** ***∑n=130***	**(%)**
1.	Do you think needle stick injuries are preventable?	Yes	116	(89.2)
		No	14	(10.8)
2.	Is post-exposure prophylaxis really necessary after needle stick injuries?	Yes	94	(72.3)
		No	36	(27.7)
3.	Do you think the healthcare worker should know his baseline status for blood-borne viruses?	Yes	125	(96.2)
		No	5	(3.8)
4.	Should the baseline status for blood-borne viruses (if not known) be checked immediately after needle stick injuries?	Yes	116	(89.2)
		No	14	(10.8)
5.	Do you feel comfortable taking care of people with Hepatitis B Virus infection?	Yes	95	(73.1)
		No	35	(26.9)
6.	Do you think all the patients should be screened for the Hepatitis B Virus before they receive health care?	Yes	118	(90.8)
		No	12	(9.2)
7.	Do you think a hepatitis B vaccine is safe?	Yes	118	(90.8)
		No	12	(9.2)
8.	Is it necessary to check post-vaccination, Anti HBs antibody levels?	Yes	87	(66.9)
		No	43	(33.1)

Table 6: Practice parameters related to Needle Stick Injuries

S.no.	Questions	Response	n (%) ∑*n=130*
1.	Do you follow standard precautions (Hand Hygiene, use of PPE, especially gloves) while handling sharps?	Yes	125 (96.2)
		No	5 (3.8)
2.	The pricked finger is placed in the mouth immediately after needle stick injuries?	Yes	3 (2.3)
		No	127 (97.7)
3.	The blood is squeezed from the wound immediately after needle stick injuries?	Yes	90 (69.2)
		No	40 (30.8)
4.	Are antiseptics & disinfectants used immediately after needle stick injuries?	Yes	17 (13.1)
		No	113 (86.9)
5.	Was the site washed thoroughly with water only immediately after needle stick injuries?	Yes	105 (80.8)
		No	25 (19.2)
6.	Do you dispose off used needles in sharp boxes after use?	Yes	123 (94.6)
		No	7 (5.4)
7.	Do you recap the needles after use?	Yes	98 (75.4)
		No	32 (24.6)
8.	Do you disassemble the used needles and sharps with your hands?	Yes	46 (35.4)
		No	84 (64.6)
9.	Does the passing of sharps by a non-touch approach (not directly by hands) and according to a plan decided earlier help in preventing needle stick injuries?	Yes	98 (75.4)
		No	32 (24.6)
10.	Have you been vaccinated against hepatitis B infection?	Yes	70 (53.8)
		No	60 (46.2)
11.	If yes, how many doses have to be taken?	Not Vaccinated	61 (46.9)
		One Dose	6 (4.6)
		Two Doses	16 (12.3)
		Three Doses	47 (36.2)

4. Discussion

Needle-stick injuries in healthcare represent a significant route for the transmission of various infectious agents, including hepatitis viruses. These viral infections contribute to the growing burden of chronic liver diseases, particularly as their prevalence continues to rise in our settings (14).

The prevention of these infections is of paramount importance and can be effectively attained through the acquisition of relevant knowledge and the cultivation of positive attitudes towards mitigating the transmission of these agents. Additionally, various factors, including socio-demographic variables and health education, have been observed to significantly influence their prevention (15-17). Important public health policies and health intervention protocols are designed using various KAP studies (11).

In our setup, there is a dearth of data regarding the knowledge, attitude, and practices towards occupational exposure to hepatitis B in our health care workers. The current study describes the KAP towards NSI and HBV infection among health care workers at Government Medical College Anantnag.

In our study, the overall level of knowledge regarding NSI and hepatitis among all the participants was mostly low to fair however, nurses (40%) had higher knowledge as compared to other HCWS. Nurses outperformed other staff members, likely due to their education on needle-stick injuries during their academic training, which equips them with a comprehensive understanding of hospital infection control practices and procedures. Our findings were comparable to a study by Madhavan et al., in which 39% of nurses had higher knowledge regarding NSI (1). However, in a study by Vaz K et al., 90% of nurses were found to be more knowledgeable than other HCWs (18).

Attitudes regarding standard precautions, vaccination, and other preventive measures are crucial for addressing occupational hazards such as needle-stick injuries. In this study, the overall attitude was positive among the majority (79.2%) of our HCWs, which aligns with findings from a study by Abdela et al., where 75% of participants exhibited favorable attitude scores (11).

Regarding the overall practices, it was seen that 50% of our HCWs had low to fair practices, which implies their lack of perseverance to defy an NSI and prevent the transmission of hepatitis B infection. However, it was observed that senior HCWs aged 40 to 60 years exhibited superior practice scores (72.7%) compared to other age groups. This can be compared to a study by Balegha AN et al., where senior participants had good practice scores as compared to juniors (19). This may be attributed to the fact that participants with greater years of work experience acquire enhanced skills and knowledge related to adhering to best practices.

In our study, it was also observed that participants holding a master's degree (61.1%) exhibited better practices compared to those with a bachelor's degree (48.2%). This difference can be attributed to the fact that higher education enhances awareness regarding the importance of preventing needle-stick injuries and the risks associated with exposure to blood-borne pathogens. However, in contrast, Bhargava A. et al. reported that graduates had better practice scores than postgraduates in their study (20).

Studies have shown that nurses and technicians consistently adhere to most NSI guidelines and diligently follow aseptic precautions, resulting in high practice scores (20). In contrast, our study revealed that 61.1% of technicians had low to moderate practice scores, while 52.6% of nursing staff demonstrated good practice scores. Additionally, practice scores for nurses were also found to be superior in the study by Zafar A. et al., while assessing KAP towards NSI among their healthcare workers (21). Nurses typically engage more extensively in patient care activities, including the administration of injections, venipuncture,

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intravenous fluid delivery, and other procedures necessitating needle handling. Consequently, they cultivate a routine of adhering to standard protocols and are subject to oversight and guidance from their supervising physicians concerning all infection control practices (22).

There has been considerable variability in the reported incidence of NSI across different studies. Sardesai et al., reported that 45% of their HCWs had a history of NSI during their career (23). In our study, 25.4% of HCWs reported a history of NSI during their work. This figure is significantly lower than that found in the study by Muralidhar S. et al., where 80% of healthcare workers had this history (24). This discrepancy may be attributed to the fact that those studies encompassed a comprehensive range of health professionals from hospitals, health centers, and clinics. Additionally, factors such as workload, resource availability, and the overall work environment may also contribute to the variation observed. Despite achieving high scores in best practices within surgical units, most NSIs occurred among HCWs in these areas. Surgical units are directly involved in procedures that use sharps and expose workers to infectious body fluids. Additionally, the healthcare system is often overburdened with patients, placing increased strain on the available human resources. This imbalance further predisposes HCWs in these units to NSIs. Similar findings have been reported by different studies (25, 26).

The majority (65.6%) of NSI cases in our study occurred among female HCWs, which is consistent with the findings of Sin WW et al. and Nermine MTF et al (27,28). This may be attributed to the mental and physical stress that females experience while juggling both workplace and home responsibilities. However, studies by Saadeh R et al. and Oluwatosin A et al. found a higher incidence of NSI among male HCWs compared to their female counterparts (29, 30).

Understanding the pathogens that can be transmitted through NSIs is crucial for prevention efforts. In our study, the majority (93.1%) of participants demonstrated a strong awareness of the diseases that could be transmitted by NSI. This is similar to the findings of Askarian M et al., which reported an awareness rate of 87.8% regarding the risks associated with NSI transmission (31).

Reporting an NSI is frequently overlooked, yet it is the most critical action an individual should take following such an incident. Healthcare workers often neglect to inform hospital administration about these injuries, which prevents them from receiving the appropriate treatment and follow-up care (32). In our study, 91.5% of participants understood the importance of reporting an NSI, yet only a small percentage (3.8%) knew the appropriate person to whom it should be reported. This gap is largely due to a lack of information provided to HCWs about the existence of a proper reporting system for NSI. Similarly, significant knowledge deficits regarding reporting procedures have been observed in various studies (20, 33).

In our study, the majority of participants (72.3%) were aware of the necessity of post-exposure prophylaxis (PEP) following an NSI. This is comparable to the findings of Alsabaani et al., where 81% of participants reported awareness of PEP. In contrast, a study by Alam M. revealed that only 6% of participants had this knowledge, with a lack of awareness regarding PEP documented in 93% of HCWs (34, 35).

In the management of post-needlestick injuries, adherence to a follow-up protocol at 6 weeks, 3 months, and 6 months is crucial for monitoring potential complications, as the efficacy of PEP hinges on comprehensive follow-up, during which various serological tests, including HBsAg, anti-HCV, and anti-HIV, are conducted to detect any seroconversion (36). The majority of our participants (96.9%) were unaware of the follow-up protocol;

however, a study by Al-Khalidi GZS et al. found that 60% of participants were aware that follow-up was recommended (22). This could be again due to scarcity of proper and complete information to our healthcare workers.

The risk of transmitting hepatitis B from an occupational needlestick injury ranges from 2% to 40% if the source is HBsAg positive, depending on the level of viremia (37). The likelihood of seroconversion is highest for hepatitis B, followed by hepatitis C and HIV (38). In our study, only 39.2% of participants recognized that the likelihood of hepatitis B transmission following a needlestick injury is greater than that of other pathogens. Alsabaani et al., reported that 65.8% of participants were aware of the increased risk of hepatitis B transmission (34). However, this knowledge was much higher (82%) among the participants in a study by Ö'Connor MB et al. (39).

A complete and proper hepatitis B vaccination schedule provides highly effective protection against the virus across all age groups (40). While 72.3% of HCWs in our study were unaware that hepatitis B is incurable, a significant majority (96.9%) recognized the availability of a vaccine to prevent the infection. These findings align closely with the results from a study by FM Dayyab et al., which indicated that 89.5% of HCWs possessed this knowledge (41).

An evaluation of the attitudes of our HCWs toward NSIs revealed that the majority expressed significant concern regarding the repercussions of such incidents and regarded the hepatitis B vaccine as both safe and vital for protection against these infections. This contrasts sharply with the findings of Madhavan A. et al., where healthcare workers exhibited a casual and nonchalant attitude toward the potential consequences of NSIs (1).

Possessing substantial knowledge about NSI without implementing effective practices is of little value. Healthcare workers must adopt comprehensive and conscientious safe practices when handling sharps to foster a safe workplace environment (42). Transmission of infections by NSI can be prevented by standard precautions like proper hand hygiene practices and the use of PPE while dealing with different body fluids of patients (43). A significant majority (96.2%) of our participants adhered to these precautions, and these results are consistent with findings from studies by Qazi et al. and Bhargava A et al (14, 20). In another study conducted by Balegha et al., the majority (87.8%) of participants recognized the necessity of using personal protective equipment when handling patients' bodily fluids (19). However, a study by Goel et al. found that only 58.4% of healthcare workers reported using personal protective equipment during instances of exposure (44).

Applying running water to cleanse the injury site constitutes the predominant first-aid measure utilized by more than 80% of our healthcare workers. Correspondingly, a study by Chhabra D. et al. revealed that fewer than 90% of injured MBBS and nursing students complied with the established handwashing protocols post-exposure (45). In a study conducted by Sharma R. et al., only 60.9% of participants cleansed the injury site with soap and water, while 14.8% failed to take any action (46). Furthermore, another study indicated that merely 12% of respondents believed in the necessity of thoroughly washing the injury site with soap and running water (47).

There is no substantiation for the efficacy of antiseptic use after an NSI (48). In our study, only 30.8% and 13.1% of participants, respectively, were aware that neither squeezing the wound nor applying antiseptics plays a role in the management of a NSI. Conversely, in a study by Mishra R. et al., 77% of student nurses cleansed the injury site with water and applied spirit, while 73% immediately attempted to squeeze the site post-injury (49).

The risk of sustaining an NSI significantly increases when needles are bent, broken, recapped, or manually removed from disposable syringes (50). In our study, 75.4% of participants engaged in the

hazardous practice of recapping used needles, with only 24.6% refraining from this improper technique. These findings align with those of Balegha et al., where 21.4% of participants consistently avoided recapping needles post-use (19). In contrast, a study by Guruprasad Y. et al. revealed that only 22% of participants would opt to recap used needles, whereas 59% advocated for disposal via a needle destroyer and proper placement in puncture-resistant containers (47). Manual disassembly of used needles and sharps was avoided by 64.6% of participants in our study. Similarly, a study by Vijay, Christy, et al. found that 74.5% of participants refrained from handling and disassembling used sharps and needles by hand (43).

The adoption of a "no-touch" technique, which involves utilizing instruments to minimize direct handling of sharps, along with the prearranged passing of sharps, has been recommended as a preventive measure against NSIs. (51). In our study, 75.4% of participants demonstrated awareness of these preventive protocols. Simon Adams et al., in their study, showed that rare use of this technique is significantly associated with intraoperative needlestick injuries (52).

Proper disposal of used sharps in appropriate-sized sharps containers is critical to preserve the safety of healthcare workers, patients, visitors at hospitals, and the environment (53,54). The majority (94.6%) of our participants regularly disposed of used needles in a designated sharps container. Similarly, a study by Alsabaani A. et al. reported that 95.3% of participants confirmed the availability of sharps containers, with 97.1% consistently using them for the disposal of sharp items (34). Likewise, in another study, the majority of respondents demonstrated an understanding of the concept of sharp medical waste, with 90.0% accurately identifying the appropriate color-coded bin for its segregation (55). However, in a study by Guruprasad Y et al only 59% of participants thought that needles are to be destroyed by a needle destroyer or discarded in puncture-proof containers (47).

In our study, 46.9% of HCWs were unvaccinated against hepatitis B. Various contributing factors may account for this, including demanding schedules, misconceptions about the improbability of patient transmission, limited awareness regarding the severity of hepatitis B, efficacy of the vaccine, perceived low-risk status, and concerns about post-vaccination discomfort, such as arm soreness (56). Vaccination coverage must be enhanced, alongside educational initiatives regarding PEP, to mitigate the risk of HBV infection among healthcare workers. It is ethically imperative for healthcare institutions to ensure that HBV vaccination is provided to high-risk groups within the workforce, thereby facilitating their immunization and safeguarding their health (57).

Conclusion:

It is crucial to recognize that adherence to infection control protocols should be a primary concern within healthcare settings. Our study elucidates potential risk factors and gaps in our preventive strategies, positioning it as a foundational platform for future modifications in the health policies of our institution. Additionally, we aspire to conduct further research employing more robust interventional designs to evaluate and document the impact of our educational training on healthcare workers' knowledge, attitudes, practices, and the actual incidence of needlestick injuries within our institution.

Limitations:

Our study was a cross-sectional study and was conducted in a single institute; thus, we could not substantiate the association between the variables. The self-reported responses could have altered the results. However, a representative sample including HCWs from all areas of our institute is the power of our study.

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