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Best Practices For Preventing Needlestick Injuries Among Healthcare Workers: A Focus On Safety Protocols And Implementation Strategies

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Abstract:
Background: *In hospitals, healthcare workers are at high risk of infection from blood-borne pathogens, such as hepatitis B and C viruses and human immunodeficiency. Occupational exposure to needle-stick injuries (NSIs) continues to be a major health problem in the healthcare systems of developing countries. Awareness of hazards is essential to establishing a policy and occupational health safety system that significantly improves employee performance, morale, and productivity.*
Objectives of the study*: This study aimed to assess levels of awareness, practices, and perceptions about NSIs among healthcare workers and their association with demographic and functional characteristics.*
Methodology: *This descriptive cross-sectional study was conducted on healthcare workers in Thi-Qar Province. Five out of 10 hospitals in Thi-Qar governorate were selected using a multi-stage random sampling method, with 50% of the hospitals selected, which are (Rifai Teaching Hospital, Second Bint Al-Huda Teaching Hospital, third Muhammad Al-Moussawi Children's, four Al-Habboubi Hospitals, and five Souq Al Shuyoukh General Hospital). After that, a stratified random sampling technique of 400 healthcare workers in Thi-Qar province hospitals who are enrolled in the five hospitals. Stratified random sampling techniques were conducted according to the workplace of HCWs. Then participants were selected by simple random sampling from each unit or department with the various functional titles. The data was collected through direct interviews with every healthcare worker by using a self-design questionnaire for the period from 3 August 2024 until 31 December 2025.*
Result: *The results of this study indicate that 54.8% of health workers have a moderate awareness level. Regarding assessment of practices, the results found that 59.2% of health workers have a good practices level. As for assessment of perception, most health workers (66.0%) have a neutral perception level. Furthermore, the results explain that high education, those live in urban areas, married, functional titles such as physicians, dentists, and Bacteriologists, and those work in laboratory units, operation rooms, and dental units have good assessment scores for awareness about needle stick injuries at significantly level <0.05. also, these results explain that high education, married, functional titles such as physicians, dentists, and Bacteriologists, and long service years have good assessment scores for practices about infection prevention and control measures at a significant level <0.05. The present results reveal that there is a significant relationship between demographic characteristics (such as gender, and marital status) and overall perception scores (P value <0.05). The results found there was a positive correlation between overall awareness score with overall practice score (P<0.001; r=0.482) and overall perception score (P<0.001; r=0.317). Also, there were a positive correlation between the overall perception score and with overall practice score (P<0.001; r=0.506).*
Conclusions: *There were fair levels of awareness and perception in most healthcare workers about needle stick injuries. While there was good practice among more than half of the healthcare workers. The results found there were positive correlation between overall awareness score, overall practice score and overall perception score of health care workers.*

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Recommendations: This study recommended that each hospital develop a multi-pronged strategy to address needlestick injuries among healthcare workers by encouraging educational and training programs, and developing a protocol for documented reporting of needlestick injuries.

Keywords: *healthcare workers, safety injections, practice*

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INTRODUCTION

Needle-stick injuries (NSIs) are unintended wounds caused by contact with the end of a sharp instrument, such as syringe needles or shattered ampules. NSIs pose occupational health and safety problems for healthcare workers (HCWs) on a global scale [1]. The majority of injuries occur during surgical operations, blood sample collection, intravenous line administration, and negligent waste disposal practices [2]

Healthcare workers are at high risk of needlestick injuries (NSIs) during their practice in clinical settings they are exposed to sharp hazards while handling medical equipment, such as administering medications or taking blood samples [3]. Injections, blood collection, needle recapping and disposal, garbage handling, and body fluid movement in the syringe to a sample container are all important actions that cause NSIs[4].

The level of risk depends on the number of patients with that infection in the healthcare facility and the precautions the healthcare workers observe while dealing with these patients. There are more than 20 blood-borne diseases, but those of primary significance to healthcare workers are hepatitis due to either the hepatitis B virus (HBV) or hepatitis C virus (HCV) and acquired immunodeficiency syndrome (AIDS) due to human immunodeficiency virus (HIV)[5]. According to a different survey, most needlestick injuries among staff members occur among nurses. Laboratory employees are at the same risk as other healthcare professionals. According to a report, nurses, lab workers, and midwives are more likely to get injuries from needle sticks and sharp objects [6].

In healthcare facility workplaces, exposure to human fluids or blood via needle stick injuries is regarded as the principal occupational hazard. Furthermore, almost three million healthcare workers are exposed to blood-borne viruses each year, with blood serving as the primary source of exposure for nearly all occupationally acquired diseases [7].

According to estimates, 1.6%, 4.1%, and 7.8% of healthcare workers in nations like India are exposed to sharps injuries that are infected with HIV, hepatitis C, and hepatitis B annually, respectively. Experts anticipate a significant lifetime risk of infection. Experts estimate that occupational exposure to blood and other bodily fluids puts around 56 percent of health professionals in Southeast Asia at the highest risk throughout their careers [7].

Needlestick injuries not only result in physical harm and psychological effects but also economic loss. The most appropriate method for trainees to practice without fear is vaccination The practice of the universal provisions in medical training can stop NSIs in hospitals and laboratories [8]. Those injuries and blood-borne infections can be prevented by applying various strategies such as immunization for hepatitis B virus, post-exposure prophylaxis, and procedures to prevent percutaneous injuries [9].

Preventing NSI is an essential part of any blood-borne pathogen prevention program in the workplace. About prevention, when exposures occur, the risk of infection can be significantly reduced by following protocols for PEP. Guidelines have been issued for managing HCWs who have had occupational exposure to blood-borne pathogens. This includes urgent valuation of the source and exposed person's status and timely administration of hepatitis B immune globulin (HBIG), hepatitis B vaccine, and/or HIV PEP where applicable. For HCV, testing should be performed to determine if infection develops [9].

Aim of study:

1. Identify the standard procedures implemented to prevent needlestick injuries among healthcare workers.
2. Evaluate the effectiveness of these safety protocols in reducing the incidence of needlestick injuries.
3. Analyze healthcare workers' awareness and compliance with established safety measures.
4. Provide recommendations for improving safety practices to minimize occupational hazards.

MATERIAL AND METHOD:

Study design:

It is a descriptive cross-sectional study conducted on healthcare workers in Thi-Qar hospitals.

Setting and period of the study:

The study included health workers in five hospitals in Thi Qar province, Iraq. Which is located 360 km south of the Iraqi capital Baghdad, which are (Rifai Teaching Hospital, Second Bint Al-Huda Teaching Hospital, third Muhammad Al-Moussawi Children's, four Al-Habboubi Hospitals, and five Souq Al Shuyoukh General Hospital). The data were collected during the period from the 3rd of August 2024 till the 31st of December 2025. The time allocated for data collection is 5 days per week, 5 hours (per day from 9.00 A.M - 2.00 P.M).

Sample size:

According to the Epi, info was used to calculate the sample size based on the following factors: population size (14,819), predicted rate of 50.0%, and CI of 95% margin of error (0.05). At THI-Qar Hospitals, 374 HCWs were included in the projected sample size. To strengthen the research, we chose 400 HCWs. **As shown in Table (2.1).**

Table (2.1): Epi info program for estimating sample size of HCWs

Inclusion and exclusion criteria

Inclusion criteria:

1. Health workers who worked in selected hospitals, and were available at the time of the study.
2. The study included all sexes and ages of healthcare workers who work in department places at risk for needle sticks.
3. All Healthcare workers who worked in morning shift

Exclusion criteria:

1. A health worker who refused to participate in the study.
2. The staff with administrative and healthcare positions who work in administrative departments are not exposed to needle stick injuries.

3. Employees who newly contracted blood-borne diseases during their work

2.5 Sampling Technique

Five out of 10 hospitals in Thi-Qar Governorate were selected using a multi-stage random sampling method, with 50% of the hospitals selected, as shown in **Table (2.2).**

After that, a stratified random sampling technique of 400 healthcare workers in Thi-Qar province hospitals who are enrolled in the five hospitals. Stratified random sampling techniques were conducted according to the workplace of HCWs. Then participants were selected by simple random sampling from each unit or department with the various functional titles, as explained in **Table (2.3).**

Table (2.2): Names of hospitals taken randomly according to a multi-stage random sampling method

Hospitals	No.	%	The randomly selected according to sample size (400 HCWs) from each hospital
Al-Habboubi Hospital	1593	22.3	89
Al-Rifai Teaching Hospital	1622	22.7	91
Souq Al Shuyoukh General Hospital	1734	24.3	97
Muhammad Al-Moussawi Children's Hospital	756	10.6	43
Bent Al-Huda Teaching Hospital	1438	20.1	80
Total	**7143**	**100**	**400**

Table (2.3): Number of HCWs taken randomly according to stratified and simple random sampling methods

Hospitals	Workplace	Total no. of HCWs for each unit or department	Percentage (%) of HCWs according to total number (7143)	The randomly selected according sample size (400 HCWs)
Al-Habboubi Hospital	Consultant clinic	119	1.67	7
	General wards	254	3.56	14
	Emergency	347	4.86	19
	Laboratory	371	5.19	21
	Operation room	196	2.74	11
	pharmacy	203	2.84	11
	Dental unit	103	1.44	6
	Total	**1593**	**22.30**	**89**
Al-Rifai Teaching Hospital	Consultant clinic	121	1.69	7
	General wards	259	3.63	14
	Emergency	353	4.94	20
	Laboratory	378	5.29	21
	Operation room	199	2.79	11
	pharmacy	207	2.89	12
	Dental unit	105	1.47	6
	Total	**1622**	**22.7**	**91**
Souq Al Shuyoukh General Hospital	Consultant clinic	130	1.82	7
	General wards	277	3.88	16
	Emergency	378	5.29	22

Hospitals	Workplace	Total no. of HCWs for each unit or department	Percentage (%) of HCWs according to total number (7143)	The randomly selected according sample size (400 HCWs)
	Laboratory	403	5.64	22
	Operation room	213	2.98	12
	pharmacy	221	3.09	12
	Dental unit	112	1.57	6
	Total	**1734**	**24.27**	**97**
Muhammad Al-Moussawi Children's Hospital	Consultant clinic	56	0.784	3
	General wards	121	1.69	7
	Emergency	165	2.31	9
	Laboratory	176	2.46	10
	Operation room	93	1.3	5
	pharmacy	96	1.34	6
	Dental unit	49	0.686	3
	Total	**756**	**10.57**	**43**
Bent Al-Huda Teaching Hospital	Consultant clinic	107	5.99	6
	General wards	230	12.88	13
	Emergency	313	17.53	17
	Laboratory	335	18.76	19
	Operation room	176	9.86	10
	pharmacy	184	10.30	10
	Dental unit	93	5.21	5
	Total	**1438**	**20.13**	**80**

Data collection method:

After converting the questionnaire into Arabic form (Appendix B) the local language, and employing closed-ended questions, the data was gathered through in-person interviews with every healthcare worker. The researcher filled out a structured questionnaire, which was used to interview participants and gather data. The questions were asked in plain Arabic.

Scoring Criteria:

- **Variables and measurement:**

Dependent variable: The total awareness/perception/practices score.

Independent variables: demographic variables such as age, sex, material status, residence, and education level. Also, functional variables such as workplace, functional title, and years of work.

- **Assessment of Practices:**

The questions regarding assessment of practices" The rating and scoring of items are five points Likert scale applied for rating practices. The Likert respondent scale was used to rate the five levels in positive phrases. A grade of (5) was given for "Always," (4) for "Often," (3) for "Sometimes," (2) for "Rarely," and (1) for "Never." The scoring system was designed to reflect agreement. The questions in practices "With 14 questions on practices, the minimum score was 14, the maximum score was 70, and the median score was 42. A score between 50 and 74% was deemed acceptable/moderate (42-56), less than 50% was deemed poor (<42), and a score of more than 75% was regarded good (>56) (Shareef & Al-Sarray, 2022).

Ethical consideration

The researcher attached each questionnaire and explained it in Arabic Language all participants were informed about the aim and content of the study, and the confidentiality of the participants was ensured and all the data collected was used for research purposes only.

RESULTS AND DISCUSSION

1.1 Demographic and functional characteristics of healthcare workers

In Table 1.1, the results of this study indicate that most health care workers belonging ages 20-29 years (62.5%), followed by those aged 30-39 years (28.0%), while the lowest percentage (3.8%) of HCWs are aged 50-59 years. The mean age is 29.8±7.1 (with a range; of 20-59) years. The gender ratio is 70.8% male to 29.2% female. Most HCWs live in urban areas (75.8%) compared to rural (24.2%). The highest proportion has a diploma (48.5%), followed by a bachelor's (42.5%), secondary (5.5%), and Postgraduate (Higher Diploma, Master, PhD) (3.5%). Finally, 60.5% of HCWs were married, while 39.5% of them were single.

Table (1.1): The distribution of healthcare workers according to the demographic characteristics

Demographic characteristics		No.	%
Age groups	20-29 years	250	62.5
	30-39 years	112	28.0
	40-49 years	23	5.8
	50-59 years	15	3.8
	Mean ± SD (Range)	**29.8±7.1 (20-59)**	
Gender	Male	283	70.8
	Female	117	29.2
Residence	Rural	97	24.2
	Urban	303	75.8
The educational level	Secondary	22	5.5
	Diploma	194	48.5
	Bachelor	170	42.5
	Postgraduate (Higher Diploma, Master, PhD)	14	3.5
Marital status	Single	158	39.5
	Married	242	60.5

The present results found that most healthcare workers belonging to ages 20-29 years (62.5%). These results agreed with the study findings conducted in Yemen [10] which found that most participants belonged to ages <30 years (68.7%). Also, these results agreed with the studies of Hossain *et al.*, (2021) and Birhanu *et al.*, (2021) which revealed that the mean ± SD of HCWs aged 28.9±5.2, and 27.96±5.6 years respectively. A possible explanation for the increase in the proportion of this age group may be due to the employment of large numbers of recent graduates from medical and health professions in the last five years in health institutions.

In this study, there was a distinct male preponderance of 70.8%. This result is in agreement with the study findings done by Suleiman *et al.*, (2020) which revealed that 63.3% of the HCWs were males.

The study revealed that the majority of participants in the studied hospitals were from urban areas. These results are consistent with the study findings done by Daham, (2020) which found participants proportion in

the study for urban more than rural. The possible explanation for the increase in participants from urban areas may be due to the large number of job opportunities in urban areas more than in rural areas, in addition to the presence of health and scientific institutions, which leads to the transition from rural to urban areas.
The highest percentage of HCWs had a diploma, followed by a bachelor's degree. These results agreed with the study findings conducted in Turkey (Toktaş and Çavuş, 2022) which found that the majority of the participants had university certificates (diplomas, and bachelor's). Also, these results agreed with the study findings done by Birhanu *et al.*, (2021) which found that 58.6% of the participants have an educational level Bachelor and diploma. While Hossain *et al.*, (2021) reported that 64.9% of HCWs were Bachelors, this result is higher than the current study. Due to healthcare system structure and labor needs, the biggest proportion of HCWs have a diploma. Diplomas typically lead to technical or practical jobs like nursing or allied health, which are vital for meeting patient demands. In HCW-intensive locations, these programs are shorter and more accessible, allowing faster entrance into the workforce.
In this study, the results found that 60.5% of HCWs were married, while 39.5% of them were single. These results are consistent with the study findings done by [16], which found that 57.03% of HCWs were married. In addition, these results are agreed with the study findings conducted by Hossain *et al.*, (2021) which found that most of the healthcare workers were married. Another study by Aluko *et al.*, (2016) revealed that 61.7% of HCWs were married.
In Table 1.2, the present results reveal that the majority of workers are medical assistants (30.3%), followed by medical Technicians (20.8%), laboratory assistants (9.8%), physicians (6.3%), technical nurses (6.3%), university nurse (5.5%), skilled nurse (5.5%), pharmacists (5.5%), bacteriology (4.3%), Dentists (2.3%), Biochemistry (2.0%), and pharmacist assistants (1.8%). Regarding health facilities, the results report that laboratory units make up 23.3%, followed by 21.8% of emergency units, 16.0% of medical wards, 12.8% of pharmacies, 12.3% of operation rooms, 7.5% of consultant clinics, and 6.5% of dental units. Most HCWs (60.0%) have experience up to 5 years, followed by 6-10 years (27.3%), over 20 years (5.0%), 11-15 years (4.5%), and 16-20 years (3.3%). Finally, 60.5% of HCWs have no courses about infection prevention and control measures. While only 32.3% of HCWs have 1-2 times courses about infection prevention and control measures.

Table (1.2): The distribution of healthcare workers according to the functional characteristics

Functional characteristics		**No.**	%
Functional Title	Physician	25	6.3
	Dentist	9	2.3
	Pharmacist	22	5.5
	Medical Technician	83	**20.8**
	Biochemistry	8	2.0
	Bacteriology	17	4.3
	laboratory assistant	39	9.8
	Medical assistant	121	**30.3**
	Pharmacist assistant	7	1.8
	Technical nurse	25	6.3
	university nurse	22	5.5
	Skilled nurse	22	5.5
Workplace	Consultant clinic	30	7.5
	General wards	64	**16.0**

	Emergency	87	**21.8**
	Laboratory	93	**23.3**
	Operation room	49	12.3
	pharmacy	51	12.8
	Dental unit	26	6.5
Years of work	1-5 years	240	60.0
	6-10 years	109	27.3
	11-15 years	18	4.5
	16-20 years	13	3.3
	>20 years	20	5.0
	Mean ± SD (Range)	**6.3±5.1 (1-30)**	
Number of courses	Non	242	60.5
	1-2 times	129	32.3
	≥3 times	29	7.2

The present results reveal that the majority of workers are medical assistants, followed by medical technicians. These results agreed with the study findings done by Giurgiu *et al.*, (2016) who found that most of the participants were medical technicians. The possible explanation for the increase in the number of medical technicians and medical assistants in this study may be explained by the structure of the Iraqi Ministry of Health, which states that the job title of the medical technician is a title branched into several other titles within health institutions, namely: medical technician and assistant specializing in community health, a medical technician in a medical laboratory, and medical technician in Radiology, anesthesia, physiotherapy and optics.

In this study, the results report that the laboratory unit, followed by the emergency unit, and medical wards. These results are consistent with those [19] who found that the highest proportion of participants reached 117 (26.5%) working in medical Laboratories followed by 82 (18.6%) working in admission unit. While another study by [16] which found that emergency ward (21.3%), Internal ward (19.2%), Laboratory unit (18.5%), women wards (17.6%), Surgery ward (10.3%), Other(14.07%). A possible explanation for the increase in the number of participants in laboratory units may be due to the increased recruitment of graduates of this category due to the increase in specialization in public and private colleges.

In this study, the present results reveal that most HCWs have experience up to 5 years. This result agreed with the study findings done in Ghana [20] which found that Most respondents had been working as health staff for 0–5 years (65.0%). In addition, these results agreed with the study findings done in Northwest Ethiopia develop by [21] which found that the majority of HCWs having experienced up to five years in health institutions. Also, these results consistent with the study findings conducted by Hossain *et al.*, (2021) which found that the median work experience of 4 years. The possible explanation for the increase in the frequency of participants at years of experience less than or equal to 5 may be due to the increase in the frequency of young age groups, as we mentioned in our interpretation of the age groups above.

The results reported that 60.5% of HCWs have no courses about infection prevention and control measures. These results agreed with the study findings conducted in Sulaimani Hospitals, Iraq [22] which found that 55.0% of participants did not attend any training or course on the prevention of needle stick injuries. Also, a study conducted in southeast Ethiopia [23] found that 65.3% of HCWs had not received course training on needle stick injury prevention. A possible explanation for the lack of training on the prevention of needle stick injuries due to that healthcare workers often have demanding schedules and may not have enough time to attend training sessions, which can lead to a lack of knowledge on the importance of the prevention of

needle stick injury practices. Another possible explanation, from my point of view, is that most healthcare workers are newly recruited and their service does not exceed five years, which makes training opportunities and courses limited.

1.2 Practices of healthcare workers

In Table 3.6 ,the current results found that more than half of HCWS (>50.0%) were always experience disinfect the area with an alcohol swab, standard precautions apply to all patient regardless of their diagnosis, perform hand hygiene when they come in contact with the patient, disinfect the area with an alcohol swab, collect and dispose of all needles used during the procedure at the end of the session, use puncture-resistant containers for disposing of sharp objects, ampule injections that have been used disposed of in the clinical waste bin, and putting warning signs on contaminated sharps. While only (47.3%, 47.3%, 39.5%, 48.5%, 43.3%, and 48.5%) of HCWs were always had practices regarding "wearing gloves when performing parenteral injections of medication, removing personal protective equipment (PPE) in the designated area, use a needle cutter, shredder, etc. to dispose of a needle, use two hands to recap needles before disposing of them, changing the safety box after filling the 3/4 size and sharps collection box availability at a distance of hand stretch", respectively.

Table (1.3): The distribution of the participant's responses according to their practices about needle stick injuries

Practices	Never		Rarely		Sometimes		Often		Always	
	No.	%	No.	%	No.	%	No.	%	No.	%
Adherence to the infection prevention guidelines when patient contact	0	0.0	3	.8	20	5.0	110	27.5	267	**66.8**
Always standard precautions apply to all patient regardless of their diagnosis	17	4.3	9	2.3	39	9.8	132	33.0	203	**50.7**
Always wear gloves when performing parenteral injections of medication	2	.5	23	5.8	116	29.0	70	17.5	189	**47.3**
Always perform hand hygiene when they come in contact with the patient	21	5.3	5	1.3	35	8.8	118	29.5	221	**55.3**
Disinfect the area with an alcohol swab	3	.8	58	14.5	41	10.3	93	23.3	205	**51.2**
I remove personal protective equipment (PPE) in the designated area	17	4.3	59	14.8	55	13.8	80	20.0	189	**47.3**
Do you use a needle cutter, shredder, etc. to dispose of a needle?	86	21.5	37	9.3	61	15.3	58	14.5	158	**39.5**
Do you collect and dispose of all needles used during the procedure at the end of the session?	11	2.8	24	6.0	17	4.3	99	24.8	249	**62.3**

Practices	Never		Rarely		Sometimes		Often		Always	
	No.	%	No.	%	No.	%	No.	%	No.	%
Use puncture-resistant containers for disposing of sharp objects.	6	1.5	14	3.5	41	10.3	104	26.0	235	**58.8**
Always ampule injections that have been used disposed of in the clinical waste bin	9	2.3	11	2.8	30	7.5	94	23.5	256	**64.0**
Use two hands to recap needles before disposing of them.	32	8.0	62	15.5	48	12.0	64	16.0	194	**48.5**
I am changing the safety box after filling the 3/4 size.	7	1.8	86	21.5	59	14.8	75	18.8	173	**43.3**
Sharps collection box availability at a distance of hand stretch	6	1.5	30	7.5	100	25.0	70	17.5	194	**48.5**
Putting warning signs on contaminated sharps	8	2.0	61	15.3	35	8.8	61	15.3	235	**58.8**

The current results found that (66.8%) of HCWs always adhere to the infection prevention guidelines when patient contact, 50.7% of HCWs always standard precautions apply to all patients regardless of their diagnosis, and 55.3% of the participants always perform hand hygiene when they come in contact with the patient. This result is similar to Akhtar et al. study in coastal Karnataka [24] which found that most of the participants experienced the procedure and guidelines regarding a needle stick injury.

The highest percentage of HCWs were always wearing gloves when performing parenteral injections of medication. These results agreed with the study findings done by [25] which discovered that 53.4% of HCWs were consistently wearing gloves. Also, [26] mentioned that most student nurses use protective equipment (gloves) when handling sharp instruments and during procedures

More than half of HCWs were always disinfect the area with an alcohol swab. This result is in agreement with [27] reported that majority of the participants use water and soap as preventive measure However, in one study by Ahmed in Egypt shows that nurses mainly used antiseptics to clean sites [28]. This difference between studies may be due to differences in prevention standards for each country.

The highest proportion of HCWs answer with always regarding remove personal protective equipment (PPE) in the designated area, collect and dispose of all needles used during the procedure at the end of the session, use puncture-resistant containers for disposing of sharp objects, ampule injections that have been used disposed of in the clinical waste bin, changing the safety box after filling the 3/4 size, Sharps collection box availability at a distance of hand stretch, and Putting warning signs on contaminated sharps. These results consistent with Studies by [29] and [30] reported a slightly highest proportion of respondents following proper disposal protocol. According to other studies, the majority of nurses used sharp bins for proper disposal of sharps during injection procedures, indicating a positive practice [31] [32]. Proper disposal of contaminated sharps is crucial in preventing accidental needle sticks and potential exposure to bloodborne pathogens. Previous studies have highlighted the significance of using sharps containers for safe disposal, emphasizing the responsibility of healthcare facilities to provide adequate resources for proper disposal [33].

About half of HCWs always use two hands to recap needles before disposing of them. This result is in agreement with the studies findings done in Tertiary care centers in South India and New Delhi, which reported that Punia et al., (2014) (59%) and Muralidhar et al., (2010) (66%) among HCWs experienced

recapping needles is recommended to prevent needle stick injury (NSI). In addition, Another study from southern Ethiopia [31] discovered that 51.9% of healthcare workers were recapping syringe needles.

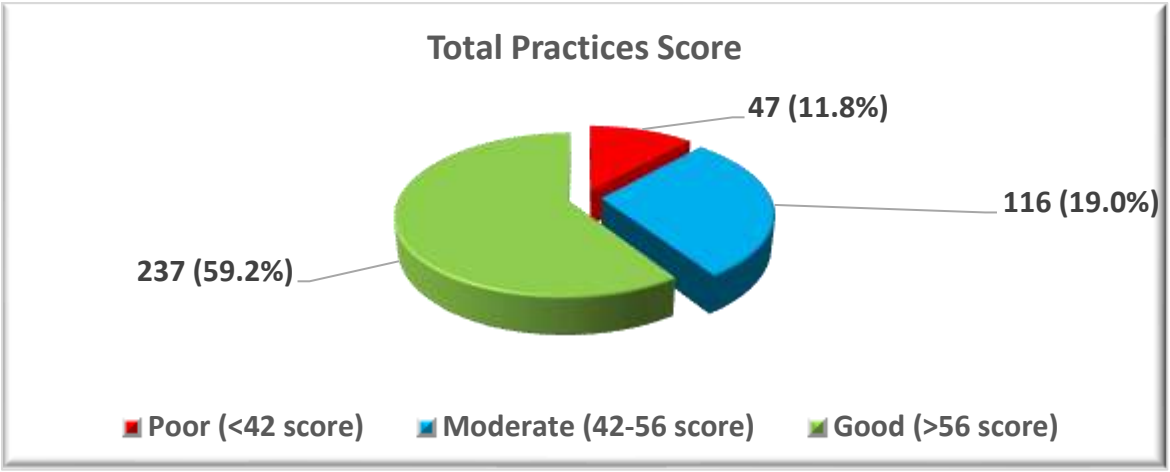

Figure (1.1): The pie chart illustrates the overall practice score of healthcare workers regarding needle stick injuries

In Figure 1.1, the results of this study indicate that 59.2% of health workers have a good practices score, followed by 19.0% of the participants with a moderate practices score, and only 11.8% of HCWs have a poor practices score.

The results of this study indicate that more than half of health workers have good practices. This result agreed with the findings of Yazid et al. (2023), which found that most participants had good practices regarding needlestick injuries. Also, a study by Assefa et al. (2020) revealed that 55.0% of healthcare providers had safe practices of infection prevention.

In Table 1.4, the results of this study reveal that there is a significant relationship between demographic characteristics (such as educational level, and marital status) and overall practice scores (P. value <0.05). These results explain that high education and married HCWs have good assessment scores for practices about infection prevention and control measures.

Table (1.5): The relationship between the overall practice scores and demographic characteristics of HCWs

		Total Practices Score						P-value
		Poor (<42 score)		Moderate (42-56 score)		Good (>56 score)		
		No.	%	No.	%	No.	%	
Age groups	20-29 years	29	11.6	83	33.2	138	55.2	0.207
	30-39 years	15	13.4	27	24.1	70	62.5	
	40-49 years	2	8.7	3	13.0	18	78.3	
	50-59 years	1	6.7	3	20.0	11	73.3	
Gender	Male	28	9.9	82	29.0	173	61.1	0.181
	Female	19	16.2	34	29.1	64	54.7	
Residence	Rural	8	8.2	23	23.7	66	68.0	0.120
	Urban	39	12.9	93	30.7	171	56.4	
The educational level	Secondary	6	27.3	2	9.1	14	63.6	**<0.001**
	Diploma	28	14.4	79	40.7	87	44.8	
	Bachelor	11	6.5	32	18.8	127	**74.7**	

	Postgraduate (Higher Diploma, Master, PhD)	2	14.3	3	21.4	9	**64.3**	
Marital status	Single	27	17.1	53	33.5	78	49.4	**0.002**
	Married	20	8.3	63	26.0	159	**65.7**	

These results explain that high education have good assessment scores for practices about infection prevention and control measures at a significant level <0.05. These results agreed with a similar study done by [35]. We can discuss that higher education levels are associated with better scores on infection prevention and control practices because those with advanced education are more likely to possess knowledge as mentioned in the Awareness Relationships table. Practices help to implement preventive measures correctly. These results explain that married HCWs have good assessment scores for practices about infection prevention and control measures at significantly level <0.05. A study in Tehran [36] reported that Single HCWs had a higher risk of NSIs compared to married HCWs (P<0.05). We can discuss that married HCWS higher feeling of duty and shared accountability may explain their strong infection prevention and control ratings. Married people emphasize health and safety for themselves, their spouses, and their families, encouraging proactive prevention. Shared decision-making and support mechanisms in marital life may also improve knowledge and adherence to optimal practices. This feeling of interconnectivity and the urge to protect loved ones may motivate married people to undertake infection prevention and control.

The results of this study reveal that there is non-significant relationship between demographic characteristics (such as age, gender and residence) and overall practice scores about needle stick injuries (P. value >0.05). these results agreed with the study findings conducted in Yemen [10] which found the same results. We can explain that the lack of a significant difference between the above variables and practices may be the result of health workers being affected by other variables such as job title, or service.

In Table 1.6, the results of this study reveal that there is a significant relationship between functional characteristics (such as functional tittle, and years of work) and overall practice scores (P. value <0.05). These results explain that functional titles such as physicians, dentists, and Bacteriologists, and long service years have good assessment scores for practices about infection prevention and control measures.

Table (1.6): The relationship between the overall practice scores and functional characteristics of HCWs

		Total Practices Score						**P-value**
		Poor (<42 score)		**Moderate (42-56 score)**		**Good (>56 score)**		
		No.	%	**No.**	%	**No.**	%	
Functional Title	Physician	1	4.0	2	8.0	22	**88.0**	**<0.001**
	Dentist	0	.0	1	11.1	8	**88.9**	
	Pharmacist	4	18.2	7	31.8	11	50.0	
	Medical Technician	8	9.6	21	25.3	54	65.1	
	Biochemistry	0	.0	0	.0	8	**100.0**	
	Bacteriology	0	.0	2	11.8	15	88.2	
	laboratory assistant	4	10.3	20	51.3	15	38.5	
	Medical assistant	20	16.5	52	43.0	49	40.5	
	Pharmacist assistant	0	.0	2	28.6	5	71.4	
	Technical nurse	4	16.0	3	12.0	18	72.0	
	university nurse	0	.0	4	18.2	18	81.8	

	Skilled nurse	6	27.3	2	9.1	14	63.6	
Workplace	Consultant clinic	6	20.0	9	30.0	15	50.0	0.072
	General wards	7	10.9	15	23.4	42	65.6	
	Emergency	14	16.1	25	28.7	48	55.2	
	Laboratory	9	9.7	26	28.0	58	62.4	
	Operation room	3	6.1	14	28.6	32	65.3	
	pharmacy	7	13.7	23	45.1	21	41.2	
	dental unit	1	3.8	4	15.4	21	80.8	
Years of work	1-5 years	28	11.7	65	27.1	147	61.3	**0.009**
	6-10 years	14	12.8	45	41.3	50	45.9	
	11-15 years	3	16.7	1	5.6	14	77.8	
	16-20 years	1	7.7	3	23.1	9	69.2	
	>20 years	1	5.0	2	10.0	17	**85.0**	
Number of courses	Non	25	10.3	77	31.8	140	57.9	0.103
	1-2 times	21	16.3	33	25.6	75	58.1	
	≥3 times	1	3.4	6	20.7	22	75.9	

These results explain that functional titles such as physicians, dentists, and Bacteriologists have good assessment scores for practices about infection prevention and control measures. This result agreed with [37] reported that the doctors scored better than others followed by dentists regarding practice scores of needle stick injuries. We can discuss that these professionals are often subjected to rigorous levels of responsibility, which guarantees that strict precautions are taken to safeguard both themselves and their patients from illnesses linked to healthcare. Their great success in this area is probably a result of their education, experience, and sense of duty.

The results found that HCWs who have long service years have good assessment scores for practices about infection prevention and control measures. This result agreed with [38] discovered that HCWs with more than ten years of work experience had a lower risk of needle stick injury than those with less than or equivalent to five years of work experience. Another study by [39] found that there were more respondents who had 6-10 years in practice as compared with 1-5 years. Another study by [40] reported that the odds of safe practice were higher in participants who having five years or more work experience (AOR = 1.52:95%CI; 1.13, 4.51). The previous studies reported that it is likely that years of practice affect the dexterity in handling sharps to avoid needle stick injuries [41]. [42] says that in order to be an expert in handling sharps, a nurse must repeatedly do the same procedure over and over again thus improving the skills. [43] agreed that the handling of sharps and safety precautions of sharp safety are likely relative to the years of practice.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

1. The study found that most of the healthcare workers have a moderate level of awareness about needle stick injuries.
2. There was a neutral perception in most healthcare workers about needle stick injuries. In contrast, there was good practice among more than half of the healthcare workers.
3. The study concluded that people with high education, those who live in urban areas, those who are married, with functional titles such as physicians, dentists, and Bacteriologists, and those who work in

laboratory units, operation rooms, and dental units have good assessment scores for awareness about needle stick injuries.

4. The results reveal that high education, married, functional titles such as physicians, dentists, and Bacteriologists, and long service years have good assessment scores for practices at a significant level <0.05.

5. The present study explains that males' sex, married, long service years of HCWs, and those who had courses about infection prevention and control measures >3 times have positive assessment scores for perception at a significant level <0.05.

6. Finally, the results found a positive correlation between the overall awareness score, overall practice score, and overall perception score of HCWs.

Recommendations:

1. This study recommended that each hospital should develop a multi-pronged strategy to address needlestick injuries among health care workers by encouraging educational and training programs, and developing a protocol for documented reporting of needlestick injuries.

2. Encourage all healthcare workers to be vaccinated against the hepatitis B virus, thus reducing the risk of transmission of the disease, and to adhere to the correct method of disposing of needles in a safety box.

3. Organizing awareness campaigns through weekly seminars and workshops to highlight blood-borne diseases caused by sharp instruments.

4. Utilize simulation-based training to practice safe injection techniques and emergency responses in case of an accident.

5. Conduct routine audits and feedback sessions to ensure proper use and accessibility of safety equipment.

6. Ensure all employees are aware of post-exposure protocols, including incident reporting, wound treatment, and access to post-exposure prophylaxis (PEP).

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