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Compliance with standard precautions, sharp injuries, and blood and body fluid exposure among healthcare workers

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ABSTRACT

Background & Aim: Healthcare workers are exposed to certain infectious diseases through needlestick injuries and exposure to blood and other bodily fluids. This study aimed to determine the prevalence of needlestick injuries and blood and other body fluids exposure among healthcare workers at Namazi Hospital in Shiraz, Iran.
Methods & Materials: This cross-sectional study was conducted on 656 Healthcare workers, including students and staff in medical, nursing, laboratory, service, and operating room groups, at the Namazi Hospital, in 2019. A questionnaire with four parts, including demographics, questions about using sharps containers, needle recapping, masks, and glasses, and the experience of sharps injuries or blood and body fluid exposure and reporting them, was distributed using the quota sampling method. To analyze the results, the T-test and Chi-square test were performed.
Results: Nearly 75.2% of the participants always used sharps containers, and 21.7% never recapped syringes. Sharps injuries and blood and body fluid exposure occurred in 40.7% and 39.8% of the participants. Occupation (P<0.001), being a student (P: 0.048), and age (P: 0.008) were associated with sharp injuries. Occupation (P: 0.001), gender (P: 0.016), and age (P<0.001) differed in exposed and no exposed participants to blood and body fluids. The prevalence of reporting exposure was not significantly different between men and women, occupation groups, students and staff, and different ages (P> 0.05).
Conclusion: Hospital managers should provide effective educational interventions to protect against occupational hazard exposures. Also, they should provide protective equipment for Healthcare workers.

Introduction

Globally, healthcare interventions predispose Health Care Workers (HCWs) to healthcare-associated infections (HCAIs) (1), including hepatitis B virus (HBV), hepatitis C virus (HCV), human immune deficiency virus (HIV), etc. (1-3). The risk of HBV, HCV, and HIV transmission is estimated at 30% - 60%, - 10% - 50%, and nearly 0.3%, respectively (4). The risk of blood-borne pathogen infection is higher in developing countries due to the high frequency of these pathogens, lack of adherence to protection guidelines, and overuse of injection for treatment (5).

HCWs experience physical and mental burdens due to occupational exposure to infectious diseases. To reduce the risk, the Centre for Disease Control (CDC) defined precautions to prevent these infectious diseases, including safe handling and disposal of sharps, protective barriers, and hand washing (5). Despite the implementation of universal precautions worldwide, HCWs'

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compliance with these standards was reported to be insufficient in many studies (6-9).

Despite advances in standard precautions, Needle sticks, sharp injuries, and exposure to human blood and body fluids are among serious concerns for HCWs (10). Among different HCWs, needle stick injuries (NSIs) are prevalent among nurses, doctors, and laboratory staff. Among them, nurses' risk of NSIs is more prevalent (11). Despite the high frequency of NSIs, and blood and body fluid exposure, some HCWs do not report the exposure. They do not take specific action for post-exposure prophylaxis due to lack of time or lack of attitude. Underreporting NSIs threatens the health of HCWs, and also the extent of this problem is not obvious (12).

Occupational exposure to infectious diseases has economic, social, and health consequences for hospitals. Identifying the prevalence of occupational exposure and the frequency of using standard precautions is the first step toward avoiding occupational exposure. Also, reporting the exposure is important for hospital safety measures. Information about occupational exposure and its report is crucial for hospital managers. Some systematic reviews were conducted in recent years about the prevalence of sharp injuries or blood and body fluids in Iranian HCWs (13-15). Although one study included in these systematic reviews was from Shiraz (16), no comprehensive study evaluated standard precautions, Sharp injuries, and blood and body fluid exposure in different groups of HCWs simultaneously in Shiraz. The present study investigated the prevalence of compliance with standard precautions, sharps injuries, and blood and body fluid exposure in the HCWs (including students or staff in medical, nursing, laboratory, service, and operating room groups) at the Namazi Hospital, Shiraz, Iran, in 2019.

Methods

This cross-sectional study was conducted on 656 HCWs at the Namazi Hospital from May to June 2019. The ethical approval codes were obtained by the ethical committee of the Shiraz University of Medical Sciences (Ethical code: IR.SUMS.MED.REC.1398.327). At the time of the survey, 2,282 HCWs were employed at the Namazi Hospital. Considering the prevalence of NSIs in Iranian nurses as 44% (13), α: 0.05, and d: 0.04, the sample size was calculated as 592. Estimating a 10% withdrawal rate, the final sample size was considered as 658.

Different groups of HCWs, including the medical group (N=179), the nursing group (N=311), the laboratory staff (49), the service staff (N=62), and the operating room staff (N=57), were included in the study using the quota sampling method. Among them, 212 participants were students (32.2%). Participants who did not provide oral consent for participation in the study were excluded. A self-administered questionnaire was designed and distributed among the participants, and it took about 15 minutes to complete.

The designed questionnaire had four parts: Part 1 examined demographics, including age, gender, occupation (medical group, nursing group, laboratory staff, service staff, and operating room staff), current student status, educational status, work experience (year), and working hours in the hospital per month. Part 2 included four questions about using sharps containers, needle recapping, and using masks and glasses. The questions were scored based on a Likert-type scale (1-5), including never, seldom, sometimes, often, and always. Part 3 included a question about experiencing at least one sharps injury in the previous year and a question about reporting the sharps injury. Part 4 included a question about experiencing at least one blood and body

fluid exposure in the previous year and a question about reporting the experience. The face validity of the questionnaire was assessed. The content validity index (CVI) and the content validity ratio (CVR) for every item were applied to assess content validity, which yielded values of 0.83 and 0.79, respectively. The reliability of the questionnaire was assessed (Cronbach alpha: 0.638).

To analyze the results, an independent sample T-test and Chi-square test were performed using the SPSS IBM statistics software (IBM Corp., New York, USA) for Windows version 20. The significance level was set as 0.05.

Results

Among 657 participants, 656 ones completed the questionnaire (Response rate: 99.8%). The majority of the participants were female (70.5%) and nurses (47.3%). Only 32.2% of the participants were students. The mean±SD of the participants' age was 29.72±6.83 years (Table 1).

Table 1. The participants' characteristics

Qualitative variables	**N**	**%**
Gender		
Women	464	70.5
Men	194	29.5
Current student		
Yes	212	32.2
No	446	67.8
Occupation		
Medical	179	27.2
Nurse	311	47.3
Laboratory	49	7.4
Service	62	9.4
Operating room	57	8.7
Level of education		
Less than diploma	16	2.4
Diploma	148	22.6
Bachelor	401	61.1
Masters	19	2.9
PhD and higher	72	11
Quantitative variables	**Mean±SD**	
Age (year)	29.72±6.83	
Work experience (year)	5±9.4*	
Working hours in the hospital per month	202.97±79.80	

* Median±IQR

Nearly 75.2% of the participants always used sharps containers, and only 21.7% of them never recapped syringes. Approximately 21% and 24.4% of the participants always used masks and glasses. The frequency of always using sharps containers, never recapping syringes, and always using masks and glasses among medical staff was 69.9%, 15.7%, 5.6%, and 6.3%, respectively. In nurses, the frequency of always using sharps containers, never recapping syringes, and always using masks and glasses was 82.3%, 35.4%, 19.4%, and 36.6%. The frequency of always using sharps

containers, never recapping syringes, and always using masks and glasses among laboratory staff was 69.4%, 40.8%, 26%, and 2.2%, respectively. Service staff reported the frequency of always using sharps containers, never recapping syringes, and always using masks and glasses as 46.8%, 20.9%, 47.3%, and 29%. In operating room staff, the frequency of always using sharps containers, never recapping syringes, and always using masks and glasses was 91.2%, 14%, 21%, and 29.8%, respectively (Table 2).

Table 2. The description of the participants' protective practice and needle recapping

Variables	Never N (%)	Rarely N (%)	Seldom N (%)	Usually N (%)	Always N (%)
Using sharps containers					
Medical	2(1.1)	7(3.9)	19(10. 8)	25(14.2)	123(69.9)
Nurse	7(2.4)	16(5.4)	11(3.7)	18(6.2)	242(82.3)
Laboratory	1(2)	9(18.4	1(2.0)	4(8.2)	34(69.4)
Service	1(1.6)	15(24.2)	7(11.3)	10(16.1)	29(46.8)
Operating room	0(0.0)	0(0.0)	0(0.0)	5(8.8)	52(91.2)
Total	11(1.7)	47(7.4)	38(6)	62(9.7)	480(75.2)
Recapping					
Medical	28(15.7)	19(10.6)	35(19.6)	39(21.9)	57(32.2)
Nurse	108(35.4)	97(31.8)	40(13.1)	20(6.6)	40(13.1)
Laboratory	20(40.8)	7(14.3)	0(0.0)	2(4.1)	20(40.8)
Service	13(20.9)	11(17.7)	6(9.6)	5(8.3)	27(43.5)
Operating room	8(14.1)	6(10.5)	16(28.1)	6(10.5)	21(36.8)
Total	177(27.1)	140(21.5)	97(14.9)	72(11.2)	165(25.3)
Using mask					
Medical	1(0.5)	59(33.3)	86(48.6)	21(11.8)	10(5.6)
Nurse	3(0.9)	14(4.6)	139(45.8)	89(29.3)	59(19.4)
Laboratory	17(36.9)	3(6.5)	10(21.7)	4(8.7)	12(26.2)
Service	4(6.4)	1(1.7)	14(22.5)	15(24.2)	28(45.2)
Operating room	0(0.0)	2(3.5)	7(12.2)	21(36.9)	27(47.4)
Total	25(3.8)	79(12.2)	256(39.6)	150(23.2)	136(21.2)
Using glasses					
Medical	52(32.5)	59(36.9)	26(16.3)	13(8.1)	10(6.2)
Nurse	39(16.4)	25(10.5)	50(21.0)	37(15.5)	87(36.6)
Laboratory	37(75.5)	0(0.0)	4(8.2)	2(4.1)	6(2.2)
Service	12(19.4)	14(22.6)	11(17.7)	7(11.3)	18(29.0)
Operating room	0(0.0)	9(15.8)	17(29.8)	14(24.6)	17(29.8)
Total	140(24.7)	107(18.9)	108(19.1)	73(12.9)	138(24.4)

Sharps injuries and blood and body fluid exposure occurred in 268 (40.7%) and 261 (39.8%) participants. Among participants experiencing sharps injuries and blood and body fluid exposure, only 166 (61.9%) and 80 (30.7%) of them reported their exposure.

Comparing the prevalence of sharp injuries in different groups showed a significant difference in the frequency of sharp injuries according to occupation. The frequency of sharp injuries was 66.7% in operating room staff, 46.8% in service staff, 45.3% in medical staff, 35.4% in nurses, and 20.4% in laboratory staff (P<0.001). Nearly 46.2% of Students had sharp injuries, but only 38.1% of personnel were exposed to these injuries (P: 0.048). Participants' ages significantly differed between the two groups (P: 0.008). Among participants who reported they had sharp injuries, the frequency of reporting the injury was compared between groups. There was no significant difference between groups (P>0.05) but, the frequency of nonreporting sharp injuries was noticeable in all groups (Table 3).

Comparing the prevalence of exposure to blood and body fluid in different groups showed a significant difference in the

frequency of blood and body fluid exposure according to occupation. The frequency of blood and body fluid exposure was 52.6% in operating room staff, 43.6% in medical staff, 41.4% in nurses, 26.5% in laboratory staff, and 19.4% in service staff (P:0.001). The frequency of blood and body fluid exposure was significantly higher in men than women (P: 0.016). Participants' ages significantly differed between exposed and no exposed groups (P<0.001). The frequency of reporting the exposure Among participants who reported blood and body fluid exposure was compared between groups. There was no significant difference between groups (P>0.05), but the frequency of nonrepeating blood and body fluid exposure was more than 50% in all groups (Table 4).

Table 3. Comparing the frequency of sharps injuries and their reporting among the participants

Variable	Exposure to sharp injuries N (%)		P-value	Reporting sharp injuries N (%)		P-value
Occupation	**Yes**	**No**		**Yes**	**No**	
Medical	81 (45.3)	98 (54.7)	<0.001*	50 (61.7)	31 (38.3)	0.316*
Nurse	110 (35.4)	201 (64.6)		69 (62.7)	41 (37.3)	
Laboratory	10 (20.4)	39 (79.6)		6 (60)	4 (40)	
Service	29 (46.8)	33 (53.2)		22 (75.9)	7 (24.1)	
Operating room	38 (66.7)	19 (33.3)		19 (50)	19 (50)	
Gender						
Woman	186 (40.1)	278 (59.9)	0.603*	112 (60.2)	74 (39.8)	0.381*
Man	82 (42.3)	112 (57.7)		54 (65.9)	28 (34.1)	
Current student						
Yes	98 (46.2)	114 (53.8)	0.048*	57 (58.2)	41 (41.8)	0.334*
No	170 (38.1)	276 (61.9)		109 (64.1)	61 (35.9)	
Age (Mean±SD)	28.8±6.5	30.3±6.9	0.008**	29.2±6.6	28.3±6.4	0.295**

* Chi-square test, ** Independent sample T-test

Table 4. Comparing the frequency of blood and body fluid exposure and its reporting among the participants

Variable	Exposure to blood and body fluid N (%)		P-value	Reporting blood and body fluid exposure N (%)		P-value
Occupation	**Yes**	**No**		**Yes**	**No**	
Medical	78 (43.6)	101 (56.4)	0.001*	23 (29.5)	55 (70.5)	0.404*
Nurse	128 (41.4)	181 (58.6)		43 (33.6)	85 (66.4)	
Laboratory	13 (26.5)	36 (73.5)		4 (30.8)	9 (69.2)	
Service	12 (19.4)	50 (80.6)		5 (41.7)	7 (58.3)	
Operating room	30 (52.6)	27 (47.4)		5 (16.7)	25 (83.3)	
Gender						
Woman	170 (36.8)	292 (63.2)	0.016*	48 (28.2)	122 (71.8)	0.297*
Man	91 (46.9)	103 (53.1)		32 (35.2)	59 (64.8)	
Current student						
Yes	91 (42.9)	121 (57.1)	0.257*	25 (27.5)	66 (72.5)	0.415*
No	170 (38.3)	274 (61.7)		55 (32.4)	115 (67.6)	
Age (Mean±SD)	28.4±5.5	30.5±7.4	<0.001**	29.1±6.4	28.2±5.1	0.275**

* Chi-square test, ** Independent sample T-test

Discussion

This study's findings showed that compliance with standard precautions is inappropriate in HCWs. This low compliance is consistent with other studies (9, 17). Consistent with other studies (17,18), operating room staff and nurses had more acceptable behavior in this study than other HCWs. Due to their job responsibilities, nurses, laboratory staff, and operating room staff have more exposure to sharps and blood and body fluids. Occupational activities such

as injections, taking blood, recapping the syringe, and transferring body fluids from the syringe to the test tube could cause exposure to infectious diseases (19). Implementing clinical education in nursing schools and retraining courses in hospitals for nurses could be the cause of better practice.

Experiencing sharps injuries and blood and body fluid exposure were noticeable among HCWs in this study (40.7% and 39.8%). Ghanei Gheshlagh et al. (15) analyzed 44 studies from 21 different cities in Iran and found a prevalence of 42.5% for sharps injuries among HCWs. A systematic review in Iran in 2017 estimated the prevalence of blood and body fluid exposure in different studies as 13-79%, with the average prevalence being 46.47% (14). Students in medical fields get to know occupational health during their studies. Also, retraining courses are held in hospitals for employees. However, the frequency of occupational exposure shows that HCWs do not well understand its importance. Regularly monitoring occupational exposures in employees and using incentive and punishment mechanisms can help reduce the frequency of these exposures.

The frequency of reporting occupational exposure was not acceptable in this study. Underreporting was very frequent in blood and body fluid exposure (69.3%) than in sharp injuries (38.1%). Underreporting of sharps injuries is common among HCWs worldwide, ranging from 22% to 82% (18, 19). Reporting occupational exposure to sharps, blood, and body fluids is challenging for HCWs. They think that hospital managers do not support them. Sometimes they don't have enough knowledge or appropriate belief about reporting occupational exposure. Managers should encourage HCWs to report these exposures.

Our study showed that operating room staff, students, males, and younger HCWs were more exposed to occupational hazards. A contradiction was found in this study. Despite the better adherence to standards, operating room staff experienced a higher frequency of occupational exposures. Other studies showed that operating room staff (20), service staff, midwives, laboratory staff (21), and nurses (22) are more susceptible to sharp injuries. Also, male staff (23), operating room staff (24), and nurses are more susceptible to blood and body fluid exposure. Nurses are at a greater risk for sharp injuries in Iran due to their crucial occupation, high ratio of patients to nurses, and lack of protective equipment (25). Operating room staff suffer pressure to complete their task. Lack of time and busy schedule dispose them of sharp injuries, especially in governmental hospitals (20). Lack of experience exposed young HCWs and students to sharp injuries. Hospital managers should provide motivational education to the students and young staff to influence their knowledge, attitude, and practice.

The cross-sectional design of the study, self-reporting, and using closed-ended questions are limitations of this study. The large sample size and consideration of compliance with standard precautions and occupational hazards simultaneously are strengths of this study. We suggest Qualitative studies to explore the reason for noncompliance with standard precautions.

Conclusion

The frequency of compliance standard precautions in Namazi Hospitals' HCWs is unacceptable. The prevalence of hazardous behaviors in medical and service staff is considerable. The frequency of un-reporting exposure is also high. Operating room staff and young HCWs are more susceptible to occupational exposure to sharp injuries and blood and body fluids. Students are more at risk of sharp injuries. The frequency of blood and body fluid exposure is more in men than women. It is suggested to plan educational programs and encouraging mechanisms to

promote the current status of safety in Namazi Hospital.

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Conflicts of Interest

The authors declare no conflict of interest.

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