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ORIGINAL: Prevalence of Needle Stick and Sharp Injuries Among Surgical Specialist Hospital-Cardiac Center in Erbil City: A Cross-Sectional Study

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ABSTRACT

Introduction: Needle-stick and sharp injuries (NSSI) pose a serious problem and a major risk of work-related transmitted diseases among healthcare workers. The extent of NSI in the Kurdistan region / Iraq hospitals has been unknown. The factors related to NSIs among healthcare workers were evaluated in the present study. The main purpose of this study is to determine the prevalence of NSSI and its associated factors among the respondents.

Material and Methods: The cross-sectional study was conducted on 150 randomly selected healthcare staff with a working experience of at least 1 year in the hospital. The study location is a surgical specialist hospital-cardiac center, situated in Erbil/Iraq. The self-administered questionnaire was used to collect information on socio-demographic, employment and individual characteristics, as well as data on NSSI, suffered in the past 12 months.

Results: The majority of participants (34%) were in the 30 to 35year age group. Most were male (60.7%), married (61.3%), have at least degree qualification (89%). The prevalence of NSSI was 67%. Needle stick was the main frequent of NSSRs (66%). Needle recap was all the time done among health workers 104 (69%), they almost use both hands for recap 136 (91%). Education, working environment satisfaction, sleeping quality of the health staff have been considered the main indicators of NSSI.

Conclusion: The rate of NSSI was considered high in this study compared to the rates in many developing countries. Arrangement schedules for work and sleeping of staff could decrease the NSSI rate.

Introduction

Needle-stick and sharp injuries (NSSI) pose a serious problem and a major risk of work-related transmitted diseases among healthcare workers (HCW) in developing and developed countries (1). Each year, about 3.5 million globally and around 600,000–1,000,000 workers in the United States suffered from NSSI (2,3). For healthcare worker, NSSIs is defined as any transcutaneous injury, a penetrating attempt

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wound from a sharp object or needle that possibly will consequence in contact to blood or else other body fluids. Intravenous cannulation, unsuitable needle disposal, needle recapping, and set of drips are the most common accomplishments causing NSSIs according to many studies (4,5). The magnitude of NSSI risks and associated practices among HCWs was not well understood, particularly in developing countries (6). Several studies have stated that although the prevalence of blood borne pathogens in many developing countries is unusual, many exposures to NSSI in these countries remain undocumented (6,7), for instance, only 4% of the global prevalence of work-related HIV infection is reported in sub Saharan Africa, where about 70% of the world's HIV-infected people lives (7). In different researches for NSSI occurrences, various risk factors have been proposed like inappropriate routine of using protective kit, working in intensive care or in surgical units, inadequate work experience, and low information level of blood-borne infections (1,8). Research studies have been conducted on work-related NSSI contacts, but it is not yet clear why HCWs do not report sharp injury incidents (9,10). It is commonly accepted that the socio-demographic, occupational and individual factors are contributory factors to get NSSIs. Accident at work affects the well-being of people in the workplace, and therefore need to be prevented from occurring (8). It seems that the most important points for no reporting are factors such as heavy work, fear of job loss, and lack of knowledge about the importance of NSIs. Further studies are needed to determine the cause of this behavior. NSSI prevention are an essential factor of workplace prevention programs, and HCW's instruction on safety procedures needs to be a continuing activity at a hospital. The factors related to NSSIs among HCW were evaluated in the present study.

Methods

Study Design and Study Population

The cross-sectional study design was used to determine the proportion of NSSI and its associated factors. This study was conducted on 150 randomly selected HCW, including nurses, doctors, laboratory staff and nursing assistants with a working experience of at least one year in the hospital. The study location is a surgical specialist hospital-cardiac center, situated Erbil / Iraq. Medical employees consist of doctors, nurses, laboratory staffs and nursing assistances are approved may work full time or part time and given rights to supply health care to patients in a special hospital or different health care facility.

Materials

The self-administered questionnaire, which was written in both English and Kurdish language was used to collect information. The questionnaire is divided into various sections. Section A collect information on socio-demographic background, such as gender, age, race, marital states and educational level. Section B is for the job position, length of employment, and working hours. Individual factors are collected in Section C, which collects information on the sleep pattern, overtime work and fatigue feeling. The last section, Section D, contained details of the occurrence of NSSIs suffered in the past 12 months, as well as the reasons for reporting or not reporting these injuries.

Data collection

The questionnaire was distributed directly to the respondents. They were informed about the purpose of the study and those participating in did so on a voluntary basis. Besides, the respondents were made sure that their answers will be kept confidential and will only be used for research purposes. After the respondents have finished answering the questions, the questionnaires were collected immediately.

Data Analysis

The data was analyzed using the IBM Statistical Package of Social Sciences

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(SPSS) version 21. Initially, the data was analyzed descriptively using frequency, and percentage. Inferential analysis (Chi-square test) was used to determine the association between NSSIs and the independent variables (socio-demographic, occupational, and individual factors). Finally, a multivariate analysis using multiple logistic regressions was performed to determine the factors associated with the occurrence of NSSIs. The results were considered statistically significant if $P < 0.05$.

Ethical Consideration

This study had received ethical clearance from the Ethics Committee for Research Involving Human Subjects of surgical specialist hospital-cardiac center dated 22nd April 2017 and permission to do the study was given by the authority of the study location.

Results

Most of the health staff in the area were male 91 (61%), and age were between 30-35 years, 51(34%), and married 92 (61%). Most of the participant have a diploma degree 133 (88.6%) (***Table 1***). For the occupational characteristics, out of 150 respondents, 62% of them are permanent staff, work as nurses, 74% of them had been in service for less than 5 years (57%) and most of them work in shifts (74.7%). Majority of the respondents (83.3%) working 40 hours, did not do overtime work (68.7%) and did not have part-time work (58.3%) (***Table 2***).

Data on the individual characteristics shows that out of 150 respondents, majority (57%) of them sleep less than 6 hours a night, 52% did not feel sleepy during working time and 48% did not feel tired at work. Majority of the respondents (47.3%) have a normal BMI (***Table 3***). 67% (101) of the respondents reported having sustained from NSSIs (***Figure 1***).

The more frequent cause of injury among respondents is syringe needle 80 (53.3%), and nearly 31 (30%) of workers were injured more than three times in the last one year (***Table 4***).

Pearson‟s chi-square test was used to determine the association among socio-demographic characteristics, employment characteristics, and individual factors with NSSI. ***Table 5*** below illustrates the result of the analysis. Overall, 101 (67%) of workers suffered from NSSI during the last years of during their experience working in hospital. There is statistically significant association among educational level, sleeping hours per night, getting enough sleep at night, quality

Table 1. Socio-demographic characteristics of the respondents (n=150)

Variables	Frequency	Percentage
Gender		
Male	91	60.7
Female	59	39.3
Age (Year)		
< 25	24	16.0
25-29	39	26.0
30- 35	51	34.0
> 35	36	24.0
Marital status		
Single	58	38.7
Married	92	61.3
Highest Educational level		
Primary school	4	2.7
Secondary school	13	8.7
Diploma degree and above	133	88.6

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Table 2. Distribution of the respondent by occupational characteristics (n=150)

Variables	Frequency	Percentage
Type of employment		
Permanent	93	62.0
Contract	57	38.0
Job Title		
Nurse	111	74.0
Physician	14	9.3
Others	25	16.7
Experience working in Hospital (year)		
< 5	65	43
> 5	85	57
Work in shifts		
Yes	112	74.7
No	38	25.3
Working hours per week (Hours)		
40	125	83.3
> 40	25	16.7
Working overtime		
Yes	47	31.3
No	103	68.7
Part-time work		
Yes	61	40.7
No	89	58.3

Table 3. Distribution of the respondent according to individual characteristics (n=150)

Variables	Frequency	Percentage
Sleeping hours per night		
< 6	85	57
> 6	65	43
Feeling sleepy at work		
Yes	36	24
No	78	52
Sometimes	36	24
Feeling fatigue at work		
Yes	42	28.0
No	72	48.0
Sometimes	36	24.0
Body Mass Index		
Under weight	3	2.0
Normal	71	47.3
Overweight	57	38.0
Obese	19	12.7

of sleeping at night, body mass index, and satisfied with the working environment with NSSI, (X^2=10.88,P=0.004), (X^2=4.004, P=0.045),(X^2=13.263,P=0.010), (X^2=11.359, P=0.003), (X^2=8.275, P=0.041), and (X^2=6.831, P=0.033), respectively.

Logistic regression analysis was used to predict the factors related to not NSSI. The model accounted for 79.9 % of the variance in not NSSI. The result of this analysis showed that eight variables, with a significant odds ratio (***Table 6***). In this

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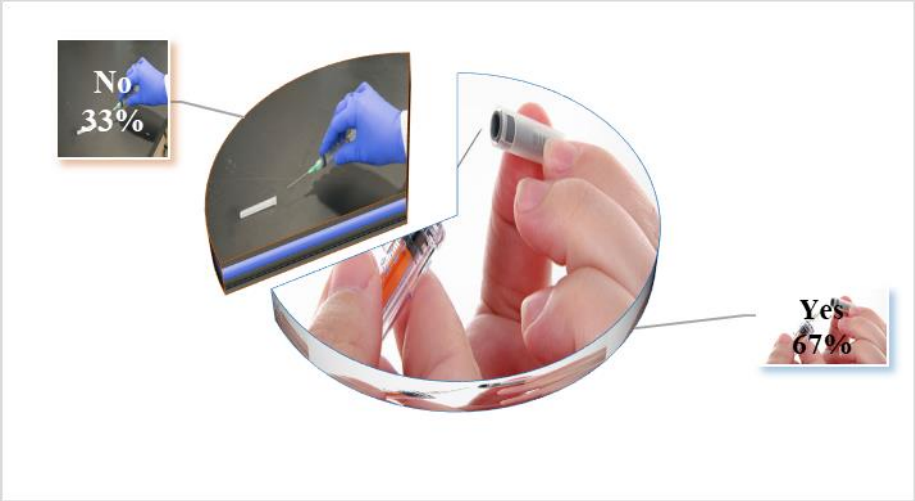

Figure 1. Proportion of NSSIs (n=150)

Table 4. Materials that cause NSSIs and frequency of injures

What material was cause the injury?	Frequency	Percentage
Lancet/Scalpel/blade	21	14.0
Syringe needle	80	53.3
Glass/other sharp objects	17	12.0
Suture needle	18	12.0
Seldinger needle	6	4.0
Others	7	4.7
How many times have you had needle & sharp injuries in last 12 months	**Cardiac center the**	
Once	29	29.4
Twice	26	25.5
Three	15	14.7
More than three times	31	30.4
Total	101	100.0

model, those who feel that they have good night sleep (OR=20.53, P=0.003), and good quality sleep were more likely to not suffer from NSSI (OR=7.26, P=0.023). And those who are more satisfied with working environment were more likely to not suffer from NSSI (OR=5.381, P= 0.010). Having other job and overtime work have come out with negative outcome.

Discussion

The aim of this study was to find out the NSSI proposition among health worker. Most of health worker in this study were male (60.7%), married (61%) and have a diploma degree (89%). This study found that the prevalence of NSSI among respondents are (67%) and nearly 30% of them had NSSI three times in last years. Needle stick were the main causes of the NSSI (66%). This is mainly due to most of the staff have overtime work (71%), and nearly half of the health worker unsatisfied with the work environment, certain independent variables are significantly associated with NSSI. Another reason may relate to needle recap which is done by (67%), and most of them use both hand for recap (91%). Some other studies also revealed that recapping needles as the main cause of NSSI (11,12). Stressful work environment and needle recapping have been identified as the reasons for NSSI (13,14). Similarly regarding to working environment this study found that NSSI was significantly associated unsatisfied with job

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Table 5. Association between sociodemographic characteristics with NSSI

Independent Variables	NSSIs		X^2	P-value
	Yes N (%)	No N (%)		
Gender				
Male	58(63.7)	33(36.3)	2.614	0.106
Female	45(76.3)	14(23.7)		
Age (year)				
< 25	14(58.3)	10(41.7)		
25-29	28(71.8)	11(28.2)	2.560	0.465
30- 35	38(74.5)	13(25.5)		
> 35	23(63.9)	13(36.1)		
Marital status				
Single	40(69.0)	18(31.0)	0.004	0.950
Married	63(68.5)	29(31.5)		
Educational level				
Primary school	3(100)	0(0.0)		
Secondary school	4(30.8)	9(69.2)	10.883	0.004
Diploma degree and above	96(72.2)	37(27.8)		
Employment status				
Permanent	66(71.0)	27(29.0)	0.602	0.438
Contract	37(64.9)	20(35.1)		
Working overtime				
Yes	35(74.5)	12(25.5)	1.071	0.301
No	68(66.0)	35(34.0)		
Part-time work				
Yes	37(60.7)	24(39.3)	3.067	0.080
No	66 (74.2)	23(25.8)		
Working in shit				
Yes	69(65.1)	37(34.9)	2.143	0.143
No	34(77.3)	10(22.7)		
Working Experience in Hospital (year)				
< 5	43(66.2)	22(33.8)	0.337	0.562
> 5	60(70.6)	25(29.4)		
Working hours per week (Hours)				
40	88(70.4)	37(29.6)	3.207	0.073
> 40	13(52.0)	12(48.0)		
Job Title				
Nurse	80(72.1)	31(27.9		
Physician	9(73.3)	5(35.7)	5.441	0.066
Other	12(48.0)	13(52.0)		
Do you usually feel sleepy during working time?				
Yes	24(66.7)	12(33.3)		
No	56(71.8)	22(28.2)	0.804	0.669
Sometimes	23(63.9)	13 (36.1)		
Sleeping hours per night				
< 6	64(75.3)	21(24.7)	4.004	0.045
> 6	39(60.0)	26(40.0)		
Feeling fatigue at work				
Yes	29(69.0)	13(31.0)		
No	47(65.3	25(34.7)	0.267	0.875
Sometimes	25(69.4)	11(30.6)		

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(X^2=6.8, P=0.033). Among the socio-demographic characteristics, education level was significantly associated with NSSI (X^2=10.88, P=0.004). Some other study indicates being female and have Nursing Bachelor's Degree significantly associated with (15).

The prevalence of NSSI (69%) in this study was higher compared to findings in many Ethiopian studies 43%, 26%, 19.1%, 37.1%, 58.8%, 18.7%, (5,11,14,16,17) respectively, study in China 27.5% (18), and study among dentist student in Brazil 43.1%, (19). In some Iranian studies the prevalence of NSI were 42.5%, 41.2% respectively and sharp injury was 19.2% (20, 21). The prevalence of NSSI in Serbian student was 29% (22).

Sleep quality is identified as important factor for NSSI. More than half of the respondents in this study (57%) have night sleep of more

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Table 5. Association between sociodemographic characteristics with NSSI

Independent Variables	NSSIs		X^2	P-value
	Yes N (%)	No N (%)		
Getting enough sleep at night				
Always	10(40.0)	15(60.0)		
Usually	27(67.5)	13(32.5)		
Sometimes	46(75.4)	15(24.6)	13.263	0.010
Rarely	15(83.3)	3(16.7)		
Not at all	5(83.3)	1(16.7)		
Quality of sleeping at night				
Well	17(50.0)	17(50.0)		
Normal	53(67.9)	25(32.1)	11.359	0.003
Bad	33(86.8)	5(13.2)		
Body Mass Index				
Under Weight	1(33.3)	2(66.7)		
Normal	51(71.8)	20(28.2)	8.275	0.041
Overweight	41(71.9)	16(28.1)		
Obese	8(42.1)	11(57.9)		
Did you recap needles after use?				
Never	2(66.7)	1(33.3)		
Sometimes	10(47.6)	11(52.4)	5.073	0.167
Mostly	16(72.7)	6(27.3)		
All the time	75(72.1)	29(27.9)		
Are you satisfied with the working environment?				
Yes	52(61.2)	33(38.8)		
No	18(69.2)	8(30.8)	6.831	0.033
Not totally	33(84.6)	6(15.4)		
How do you recap the needles after use?				
With one hand	9(64.3)	5 (35.7)	0.138	0.711
Using both hand	94(69.1)	42(30.9)		
Do you think disease is transmitted by needle & sharp injuries?				
Yes	100(70.4)	42(29.6)	3.815	0.051
No	3(37.5)	5(62.5)		
Do you use personal protective equipment?				
Yes	77(65.8)	40(34.2)	2.014	0.156
No	26(78.8)	7(21.2)		

than 6 hours, and 52% of them do not feel sleepy during working time. While, nearly one quarter (24%) feel that they had poor night sleep qualities, and this is considerably better than sleep qualities in nursing staff in Turkey (79.1%) (23,24). Nurses with poor night sleep qualities were more prone to NSSI (24). Similar finding was observed in this study where high NSSI was found among respondents who did not have enough night sleep (X^2=13.263, P=0.010), or those who did not have good sleep at night (X^2=11.35, P=0.003), as well as those who sleep less than 6 hours at night (X^2=4.004, P=0.045).

The results of logistic regression analysis showed that sleep quality is predictor for NSSI. These findings are more parallel with other study (25,26). Those who feel that they have adequate night sleep (OR=20.53, P=0.003), and good quality sleep are more likely to not suffer from NSSI (OR=7.26, P=0.023). And those who are more satisfied with working environment were more likely to not suffer from NSSI (OR=5.381, P=0.010). The extend work to night shift and satisfaction have always determined as predictors of NSSI (27).

Conclusion

The NSSI prevalence in this study (67%) is higher compared to the figures found in other developing countries. Level of education, working environment satisfaction, sleep quality of the health staff have been found to be main factors associated with NSSI. Improvement of work schedule and sleep quality could decrease the NSSI rate.

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Table 6. Logistic Regression predicting likelihood of having NSSI

Variables	Categories	B	Wald	Sig.	Exp(B)	95% CI for EXP(B)	
						Lower	Upper
Gender	Female						
	Male	.29	.22	.635	1.348	.39	4.63
Age	Years	.03	.69	.406	1.036	.95	1.12
Marital Status	Married						
	Single	.46	.53	.466	1.595	.45	5.60
Educational Level	Diploma degree and above						
	Primary school	-22.07	.00	.999	.000	.00	.
	Secondary school	.58	.14	.700	1.800	.09	35.62
Are you currently	Current						
	Permanent	-.04	.00	.944	.955	.26	3.47
Do you usually work overtime at this hospital?	No						
	Yes	.66	.40	.526	1.934	.25	14.88
Do you have a second job or private clinic?	No						
	Yes	1.89	8.28	.004	6.659	1.82	24.26
Overtime	No						
	Yes	2.85	5.77	.016	17.443	1.69	179.47
Experiences	Less than 5 years						
	Less than 5 years	.23	.12	.722	1.266	.34	4.63
Did you recap needles after use?	All the time						
	Never	1.02	.42	.517	2.790	.12	62.00
	Sometimes	-.08	.00	.944	.921	.09	9.25
	Mostly	-.55	.63	.426	.576	.14	2.24
How do you recap the needles after use?	Both hand						
	With one hand	.04	.00	.960	1.045	.18	5.87
Do you think disease is transmitted by needle & sharp injuries?	No						
	Yes	-2.40	3.80	.051	.090	.00	1.01
Do you use personal protective equipment	No						
	Yes	.27	.15	.696	1.319	.32	5.28
Are you satisfied with the working environment?	Not totally						
	Yes	1.68	6.71	.010	5.381	1.50	19.21
	No	1.81	4.44	.035	6.124	1.13	33.04
How often do you think that you get enough sleep night?	Not at all						
	Always	1.97	1.14	.285	7.192	.19	267.32
	Usually	.56	.11	.738	1.767	.06	49.89
	Sometimes	-.09	.00	.957	.913	.03	24.33
	Rarely	.79	.19	.659	2.208	.06	74.44
How would you rate your night sleep	Bad						
	Well	3.02	8.82	.003	20.53	2.79	150.87
	Normal	1.98	5.14	.023	7.26	1.31	40.28
Do you usually feel sleepy during working time?	Sometimes						
	Yes	.54	.476	.490	1.730	.36	8.21
	No	-.90	2.07	.150	.404	.11	1.38
sleep duration	More than 6 hours						
	Less than 6 hours)	-1.37	5.41	.020	.253	.08	.80
Constant		-6.31	5.02	.025	.002		

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Authors' contributions

Study design: F.A.S., J.S., T.R.H.
Writing: D.M.F.J., D.O.Q.
Final revision: All authors

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