

Factors associated with needle stick and sharp injuries, among healthcare workers in Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia: facility based cross-sectional survey

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doi: 10.3396/IJIC.v9i4.030.13

Abstract

Needle stick and sharp injuries are occupational health hazards to healthcare workers. Every day they are exposed to deadly pathogens through contaminated needle and other sharps injuries. The aim of this study was to assess the prevalence and factors associated with needle stick and sharp injuries among healthcare workers in Felege Hiwot Referral Hospital.

Facility based cross-sectional survey was conducted from 1-5 July 2012, using questionnaire. All healthcare workers contacted in the study period were included. Data was analyzed using SPSS version 16.0. Binary logistic regression was used to identify factors associated with needle stick and sharp injuries.

From the total 332 healthcare workers enrolled, 216 (65.1%) were females. Nearly 2/3rd were diploma holders, and Nurse by profession. Hundred three (31.0%) had needle stick and sharp injury at least once in the previous 12 months. Three fourth of the injuries were due to needle stick. Those whose monthly income was \geq 1000.00Eth Birr, satisfied on their job, and worked in waste handling unit were likely 4.1, 2.8, and 4.1 more likely to get injured than their counterparts respectively (Adjusted Odds ratio [AOR] =4.1, 95% Confidence Interval [CI] 1.27-13.14, AOR=2.78, 95% CI 1.01-7.63, and AOR=4.1, 95% CI 1.27-13.14). Those who worked in maternity unit were 80% less likely to get injured than those who worked in Emergency units (AOR= 0.20, 95% CI 0.05-0.78).

Nearly 1/3rd of participants had needle stick and sharp injury at least once in the previous year. Suboptimal practices and behaviours that put them at risk to the injury were identified. Authorities should give on job training, and regular supportive supervision. Further research is needed to determine the incidence of the injury, and the type of disease they would acquire.

Keywords: Needlestick injuries and epidemiology; Occupational exposure; health personnel

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Introduction

Needle stick and sharp injuries (NSIs) are common health hazards that occurred in the working environment. Research findings on needle stick injury indicated that it ranged from 21% to 95%.¹ These preventable injuries expose healthcare workers to over 20 different blood borne pathogens, and resulted in 1000 infections per year.² Needle stick injury accounted for 86% of all occupationally related infection transmissions. The most common blood borne pathogens transmitted with NSIs are hepatitis B, hepatitis C and HIV.³⁻⁴ The World Health Organization (WHO) has reported that worldwide 2.5% of HIV, and 40% of hepatitis B and C cases among healthcare workers were due to occupational exposure.⁵

On average, healthcare workers (HCWs) in Africa suffer two to four needle stick injuries per year.⁶ According to CDC, up to 86% of needle stick injuries can be prevented using safer needle devices.⁷ The extent of the problem and factors associated to its occurrence is limited in the study area. Therefore, the study aimed to assess the magnitude of the problem, and factors associated to needle stick and sharp injury among healthcare workers at Felege Hiwot Referral Hospital (FHRH), Bahir Dar Ethiopia.

Methods and materials

Facility based cross-sectional survey was conducted from 1 to 5 July 2012 to assess the magnitude of and factors associated to needle stick and sharp injury among HCWs. The study was conducted at Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia, located 565 Km Northwest of Addis Ababa. HCWs included in the study were doctors, health officers, nurses, midwives, laboratory personnel, and waste handlers. All HCWs contacted during the study period were included in the study. The Hospital has been established in 1963 and is currently a Referral Hospital serving more than 5 million people, offering different types of health care services to the surrounding community. It has a total of 287 beds and about 500 clients visited the health facility daily.⁸

Data collection tools

Anonymous self administered questionnaire was used to collect the data. The questionnaire elicits information on HCWs demographic characteristics,

frequency/nature of exposures, and the risk factors for occupational exposures. The questionnaire was initially constructed in English and was subsequently translated into the local language Amharic and was then re-translated into English via an expert who was fluent in both languages. The questionnaire was pre-tested before the actual data collection. Four clinical nurses were recruited to facilitate the data collection process and one day training was given.

Variables of the study

Occurrence of needle stick and sharp injury in the previous 12 month was the dependent variable, and Socio-demographic variables such as age, sex, job category, level of education, occupation, work experience, behavioural factors such as needle recapping, risk perception, awareness on diseases transmission by shapes injury, job satisfaction, reporting pattern, use of personal protective equipment, and working environment such as health safety training, length of working hours/week, existence of safety guidelines, availability of sharp disposal containers, working department, presence of work guidelines were the independent variables.

Data quality assurance

Pretested questionnaire was used to collect the data and training was given to the data collection facilitators. Moreover the collected data was checked for completeness daily by supervisors.

Data processing and analysis

The data was coded and entered into EPI INFO version 6 statistical packages, and then exported to SPSS version 16.0 for analysis. Binary logistic regression analysis was carried to identify the predictors of needle stick and sharp injury. Independent variables that had a p-value less than or equal to 0.2 were entered in to multivariate logistic regression model (backward stepwise procedure) to control confounders. The strength of association of predictor variables was assessed using odds ratio and P- value ≤ 0.05 at 95% CI was considered statistically significant. The findings of the study were presented in text and tables.

Ethical considerations

Ethical clearance was obtained from ethical review board of College of Medicine and Health Science,

Bahir Dar University. Permission was obtained from Hospital administrators. Verbal consent was obtained from each participant after the objective of the study was explained. Participants were also informed that all data obtained from them was kept confidential by using codes instead of any personal identifiers.

Result

Socio demographic characteristics of study participants A total of 332 HCWs were enrolled in to the study, of whom 216 (65.1%) were females. The majority (86.7%) were Orthodox Christian by religion, and nearly two third (62.3%) were diploma holders by qualification, 71.4% were clinical Nurses by profession, and 63.3% were married. One hundred eighty nine HCWs had five years or less work experience (Table I).

Working environment, injury exposure, and related characteristics

Majority of the respondents (91.6%) were concerned about the health risks of needle stick and sharp injury, of whom the risk was perceived high in 297 (89.5%) of the respondents. Nearly two thirds (63.7%) had recapped the needle at least once, and one third (34.7%) had recapped the needle using two hands. Nearly all respondents (98.5%) knew the diseases transmitted through needle stick and sharp injury. Regarding to the degree of the injury, 113 (57.7%) respondents replied that the injury they suffered was superficial. Respondents reported that emergency conditions and unexpected patient movement during the procedure were the main reasons to the occurrence of the injury. Nearly half, 107 (46.1%) of

Table I: Socio demographic characteristic of health care workers (n=332) at Felege Hiwot Referral Hospital, Bahir Dar, Northwest, Ethiopia, 2012

Variables/Response	Frequency	Percent	Variables/Response	Frequency	Percent
Sex of respondent			Profession/Job category		
Male	116	34.9	Janitors/cleaners	45	13.6
Female	216	65.1	Nurses	237	71.4
Age of respondent			Health Officers	13	3.9
20-24	27	8.2	Laboratory personnel	10	3.0
25-29	154	46.5	Medical Doctor	21	6.3
30-34	85	25.7	Anaesthetist	6	1.8
35-39	36	10.9	Service year		
40+	29	8.7	<5years	189	56.9
Religion			6-10years	78	23.5
Orthodox	288	86.7	>= 10years	65	7.2
Muslim	19	5.7	Currently working Department		
Protestant	25	7.5	Emergency unit	71	21.4
Educational status			Paediatric ward	43	13.0
Read and write	12	3.6	Maternity ward	48	14.5
Primary education(1-8)	7	2.1	Laboratory Unit	13	3.9
High school (9-10)	23	6.9	Operation theatre unit	30	9.0
Technical and vocational	5	1.5	Medical Ward	51	15.1
Diploma	207	62.3	Surgical Wards	39	11.7
Degree and above	78	23.5	Waste handlers unit	37	11.1
Marital status			Monthly income (1US # =18.50 Ethiopian Birr)		
Married	210	63.3	<1000 Eth Birr	64	19.3
Unmarried	122	36.7	1000 Eth Birr	268	80.7

Table II: Participant's behaviour, and working environment among health care workers in Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia July 2012.

Question/Response	Frequency	Percent
Were you concerned about the risk of needle stick/sharp injury		
Yes	304	91.6
No	28	8.4
How do you rate the risk of needle stick/ sharps injuries		
Not risky	2	0.6
Low risk	10	3.0
Moderate risk	23	6.9
High risk	297	89.5
Do you think needle stick or sharps injury is avoidable?		
Yes	294	88.6
No	38	11.4
Do you think disease is transmitted by needle & sharp injuries		
Yes	327	98.5
No	5	1.5
Did you recap needles after use?		
Never	124	37.3
Sometimes	146	44.0
Mostly	51	15.4
All the time	11	3.3
How do you recap the needles after use		
With one hand	141	65.3
Using two hands	75	34.7
Do you use personal protective equipments?		
Yes	314	94.6
No	18	5.4
Was safety box available at your work place?		
Yes	298	89.8
No	34	10.2
Did you receive medical care after injury? (n=195)		
Yes	104	53.3
No	91	46.7
Did you report your injury to concerned body?		
Yes	125	53.9
No	107	46.1
Reason for not reporting (n=103)		
I don't think it is important to report	84	81.6
Fear of stigma	6	5.8
Thought patient was low risk for HIV	13	12.6
Were safety guidelines available at your work Env't?		
Yes	246	74.1
No	86	25.9

Question/Response	Frequency	Percent
Was working guidelines available at your work place?		
Yes	251	75.6
No	81	24.4
Was there protocol for reporting the injury in your organization?		
Yes	284	74.7
No	84	25.3
Ever had training on occupational health safety?		
Yes	154	46.4
No	178	53.6
Number of hours worked/week		
Up to 40 hours	96	28.9
More than 40 hours	236	71.1
Are you satisfied on your job		
Yes	252	75.9
No	80	24.1
Are you satisfied with the working environment		
yes	220	66.3
No	112	33.7

the participants who sustained the injury didn't report the injury to the concerned body. Among those who didn't report, in 12.6% of them, the reasons mentioned was that they perceived the patient had low risk of being HIV positive. Nearly 90% of participants replied safety box was available at their work place. From the total participants, 178 (53.6%) reported that they had training on infection prevention (Table II).

Regarding to injury exposure: Of the total respondents, 62 (18.7%), 103 (31.0%), and 196 (59.0%) had experienced needle stick and/or sharp injury at least once in the last 2 weeks, 12 months, and in their entire job career respectively. Of those who ever sustained the injury, 104 (53.1%) were exposed more than once. More than three fourths of the injuries were caused by needle stick and it was superficial in 87% of the participants (Table III).

Regarding to the factors associated to needlestick and sharp injury

Healthcare workers whose monthly income was ≥ 1000.00 Eth Birr (1US Dollar =18.50 Eth Birr) were 4 times more at risk to sustain a needle stick and sharp injury than those whose average monthly

income was less than 1000.00 Eth Birr (AOR=4.08, 95% CI 1.27-13.14). Those who were satisfied on their job were about 3 times more likely to sustain needle stick and sharp injury than those who were not satisfied on their job (AOR=2.78, 95% CI 1.01-7.63); and those who worked in waste handling unit were 4 times more likely to experience needle stick and sharp injury than those who worked in Emergency Unit (AOR=4.08, 95% CI 1.27-13.14); but those who worked in the maternity ward were 80% less likely to get injured by needle stick and sharp injury than those who worked in emergency unit (AOR=0.20, 95% CI 0.05-0.78). Those who previously notify their injury were 77% less likely to encounter the injury than those who didn't notify to the concerned body (AOR=0.33, 95% CI 0.15-0.71). Availability of safety box at work place, infection prevention training, professional qualification, and utilization of personal protective devices were not statistically significant (Table IV).

Discussion

Healthcare workers are at risk to occupational health hazards mainly due to accidental exposure to injuries such as needle stick and/or other sharp materials. Among HCWs, the prevalence of needle stick and

sharp injury in the previous twelve months prior to the survey was 31%, implying that, needlestick and sharp injuries are common occupational health hazards to HCWs in the study area. The finding is higher when compared to studies done in Switzerland, Malaysia, & South Africa where the proportion of injury in the last 12 months was 9.7%, 23.5%, and 23.5% respectively.⁹⁻¹¹ It is in line with a study done in Germany (31.4%).¹² But the proportion was lower than studies done in United Kingdom, Ethiopia, SSA, Egypt and India where the prevalence of needle stick and sharp injury reported were 38%, 51.6%, 57%, 67.9% and 80.1% respectively.¹³⁻¹⁷ The possible difference in the proportion of injury could be the study design used, the socio-demographic/economic status, and cultural characteristics of study participants. Also it could be due to the difference in the study health facility set ups, and even the year of the study. But whatever is the difference in the proportion of needle stick and sharp injury, healthcare workers are at much higher risk to acquire blood borne pathogens such as HIV and other infectious diseases through needle stick and sharp injuries.

In this study, the majority of HCWs who sustained needle stick and sharp injury were Nurses. It is in agreement with a study done in Egypt,¹⁶ and it is much higher as compared to studies done in Switzerland, South Africa, SSA, Nigeria, and Saudi Arabia.^{9-10,15,18-19} The possible difference may be due to the job description given to nurses where in Ethiopia a lot of exposure-prone procedures such as medication administration, and wound care are handled by nurses. At the same time the ratio of nurse to patient is not proportional as set by the WHO. Therefore Ethiopian Nurses in general, and Felege Hiwot referral Hospital nurses in particular, are more likely to get exposed to such injuries than nurses who worked in another country.

The study results revealed that needle stick was the major cause for the injury (77.3%). It is in agreement with a study done in South Africa.¹⁰ The fact that HCWs were mainly injured by needle stick, may be due to inappropriate needle handling practice and/or might have poor perception in infection prevention. Regarding to the frequency of the injury, 75.7% of participants had experienced the injury once, and 24.3% more than once. The study is almost in

agreement to a study done in Egypt.¹⁶ Implying that HCWs might practice recapping and/or might dispose of needles inappropriately. In the study area the practice of needle recapping after use is still prevalent among HCWs, where almost three fourths of the respondents (74.7%) reported that they were recapping the needles immediately after use, and from them one third (34.7%) were recapping using two hand technique. The practice of recapping was almost similar to studies done in India and in Nigeria.¹⁷⁻¹⁸

Considering the non reporting practice of health care workers to the concerned body, from the study participants 53.9% didn't report their injury to higher officials. This proportion is higher than that reported from Germany and UK¹²⁻¹³ but lower than that from Malaysia, Egypt, and Nigeria.^{11,16,18} Participants were asked why they didn't report to the concerned body, and the reasons as to why they didn't report were; I don't think it is important to report (81.6%), and patient looks low risk for HIV (12.6%). But it is a wrong perception because a person who looks healthy doesn't mean he/she is free from communicable diseases such as HIV, Hepatitis B and C, and in developing countries like ours, due to high HIV prevalence and no adequate vaccination access to hepatitis B and C, it is important to consider everybody is at risk, and therefore precaution should be taken not to infect himself/herself and/or others.

Health care workers whose monthly income was ≥ 1000 Eth Birr (1 US Dollar = 18.50 Ethiopian Birr) were 4 times more likely to encounter needle stick and sharp injury than those whose monthly income was below 1000 Eth Birr. This may possibly be since they have high professional qualification, they are suppose to engage in invasive procedures and/or work overload, and even might have extra works in private health institutions or within the government institution itself so that might put them at more risk to such injuries than their colleagues.

Healthcare workers who were satisfied on their job were nearly three times more at risk to encounter sharp injury than those who were not satisfied on their job. Possibly may be due to the fact that, since they were satisfied on their job, they might be involved in different hospital activities, and/or might be eager in

Table III. Needle and sharp injury handling method of health care workers (n=332) at Felege Hiwot Referral Hospital, July, 2012

Question/Response	Frequency	Percent
Ever experience needle & sharp injury in your entire job (n=332)		
Yes	196	59
No	136	41
Frequency of injury experienced in entire job career (n=196)		
Once	92	46.9
More than once	104	53.1
Needle & Sharps injury occurred in the last 2 weeks (n=332)		
Yes	62	18.7
No	270	81.3
Frequency of injury occurred in last 2 weeks (n=62)		
Once	46	74.2
More than once	16	25.8
Needle & Sharp injury occurred in last 12 months (n=332)		
Yes	103	31
No	229	69
Frequency of sharp injury in last 12 months (n=103)		
Once	78	75.7
More than once	25	24.3
Material caused the injury		
Needle	150	77.3
Lancet/Scalpel/blade	34	17.5
Glass/other sharp objects	10	5.2
Type of injury sustained		
Deep	24	12.3
Superficial	171	87.7

helping and caring for patients that could lead them to be at much higher risk than those who were not satisfied in their job.

Participants who sustained superficial injury were three times more to encounter needle stick and sharp injury than those who sustained deep injury. Possibly those who sustained superficial injury might consider the incidence of the injury is less risky and/or even might forget the previous injury exposure because they might consider such superficial injury could not lead them to acquire the disease so may not take care to protect themselves from accidental injury than those who sustained deep injury.

Those who worked in waste handling unit were four times more likely to sustain needle stick and sharp injury than those who worked in emergency unit. This could be due to the nature of their work where most waste products produced during patient management may not be stored appropriately before being disposed and also they collect waste from different departments. At the same time the reason could be the professional or working area difference, where those who worked in the emergency unit could be health professionals who could have better knowledge on infection prevention than those who worked in waste handling unit.

Table IV. Factors associated with occurrence of sharp injury among Health care worker in Felege Hiwot Referral Hospital, Bahir Dar Ethiopia, 2012

Variable Response	Needle stick & Sharp injury in the last 12 months		95%	
	Yes	No	COR	AOR
Average monthly income				
<1000Eth Birr	26	38	1	1
>=1000Eth Birr	77	191	1.69 (0.97-2.99)	4.1 (1.27-13.14)**
Get care after injury				
Yes	68	36	0.33 (0.18-0.59)*	0.75 (0.32-1.80)
No	35	56	1	1
Report injury to higher officials				
Yes	72	53	0.3 (0.17 - 0.52)*	0.33 (0.15- 0.71)**
No	31	76	1	1
Job satisfaction				
Yes	67	185	2.26 (1.34-3.81)*	2.78 (1.01-7.63)**
No	36	44	1	1
Satisfaction on working Env't				
Yes	59	161	1.77 (1.09 - 2.86)*	0.93 (0.38-2.27)
No	44	68	1	1
Department currently working				
Emergency unit	19	52	1	1
Paediatric Ward	12	31	1.06 (1.13-5.96)	0.73 (0.24-2.22)
Maternity	13	35	2.45 (0.97- 6.19)	0.20 (0.053-0.78)**
Operation theatre room	1	19	2.13 (0.58-8.16)	0.29 (0.08-1.02)
Medical ward	17	34	1.64 (0.61-4.38)	0.49 (0.16 -1.51)
Surgical ward	9	30	1.89 (0.79-4.52)	1.16 (0.36-3.77)
Waste handler Unit	18	19	3.16 (1.18-8.46)*	4.1(1.27-13.14)**

* -significant at COR, **-significant at AOR

Health care workers who notified the occurrence of the injury to the concerned body before the survey were 77% less likely to be exposed to needle stick and sharp injury than those who didn't report after they encountered the injury. This could be due to the fact that those who reported to the concerned body could have been advised from higher officials so that they learn from their previous exposure and also might be reminded from families/relatives not to encounter such an injury again so that could take more safety measure than those who didn't report.

Those who sustained needle stick injury were 90% less likely to encounter another injury than those who had injury by other sharp objects. This could be explained by the fact that, healthcare workers might consider needle as the main vehicle for disease transmission than other sharp injuries. Therefore those who sustained needle injury might consider them more at risk and might take more prevention action than those who sustained injury due to other types of injury materials.

Those who worked in the maternity ward were 80% less likely to get injured by needle stick and sharp objects than those who worked in Emergency unit. This could be explained in that since mothers are in labour, risk of high blood contamination is expected and maternity unit might have better access to protective equipments than emergency department. In addition at emergency unit cases would come unexpectedly and may need immediate intervention, at this time, healthcare workers might give less attention on utilization of personal protective equipments, but rather might rush up to save the life of the people.

Limitation of the study

Cross sectional study by its nature cannot establish cause and effect relationship. Since participants have been asked a one year exposure experience, there might be recall bias.

Conclusion and recommendation

This study revealed that one third of study participants had needle stick and sharp injury at least once in the previous 12 months. Nurses were more affected than other healthcare workers. Even though majority of respondents were concerned about risk of needle stick and sharp injury, and nearly all knew the diseases transmitted through it, one third of the study participants were recapping the needle using two-hand techniques. Monthly income, job satisfaction, and working in waste handling unit were the predictors for needle stick and sharp injury. On job training should be given to healthcare workers, and hospital administrators should create room for discussion on how to alleviate the problem. Further research is needed to determine the actual incidence of needle stick and sharp injury exposure, and the type of disease they would acquire.

Acknowledgement

We would like to acknowledge the administrators of Felege Hiwot Referral Hospital for permitting us to conduct the research. Our gratitude goes to study participants. We also thank the language editor.

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