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Needle-Stick Injuries and Contributing Factors among Healthcare Workers in Public Health Facilities in Jigjiga Zone, Eastern Ethiopia

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Abstract: A crossectional study was conducted from December to January 2013 with the objective of determining the prevalence of needle-stick injuries and contributing factors among healthcare workers (HCWs) in public health facilities in Jigjiga zone, Ethiopian Somali Regional State (ESRS). Data was collected from 316 randomly selected health care workers using structured questionnaire which was supplemented with focus group discussion (FGD). The study revealed that 30.1% of health care workers experienced needle-stick injury within the last one year, out of which 67(70.52%), 25(26.32%), 2(2.1%) and 1(1.05%)suffered one, two, three and greater than five injuries respectively. Factors associated with occurrence of injuries were the type of health facility, work experience, ward they work in, knowledge on standard precaution, provision of sharp containers and average hour involved in work and organization with policy/protocol. The observation evidenced that, needle-stick injuries were common problem among health care workers in studied health facilities suggesting a need for identification of hazards and implementation of a comprehensive prevention program to reduce needle-stick injuries in the area.

Key words: Needle-Stick · Injuries · Health Care Workers · Public Health Facilities

INTRODUCTION

Injection is a skin perforating procedure done with a syringe and needle to enter a substance for preventive, treatment, or recreational purposes and is the most commonly used medical procedure. It is estimated that 12 billion injections are administered each year worldwide [1]. The Canadian Centre for Occupational Health and Safety defines needle stick injuries as wounds caused by needles that accidentally puncture the skin. Needle stick injuries can cause hazard for people who work with hypodermic syringes and other needle equipment [2]. The Centers for Disease Control (CDC) estimate that about 600,000 to one million needle stick injuries occur each year. Unfortunately, about half of these needle stick injuries go unreported [3].

Needle-stick injury (NSI) is a major occupational health and safety issue faced by healthcare professionals globally. Globally, more than 35 million health care workers face the risk of sustaining a percutaneous injury with a contaminated sharp object every year. Centers for Disease Control and Prevention estimated that approximately 385,000 needles and sharps-related injuries occur every year to HCWs in the United States [4].

Two millions Needle stick injuries are reported in health care providers every year. But these are only the reported cases and about 40-70% cases of needle stick injuries are unreported in developing countries [5]. According to the WHO, the global burden of disease from sharps injuries to health care workers includes 40% of all hepatitis infections and 4.4 % of all HIV infections among health workers [4]. In South Africa, 91% of junior doctors reported sustaining a needlestick injury in one year and 55% of these injuries came from source patients who were HIV-positive [6].

More important than the economical factors of blood and body fluid exposure is the psychological trauma to the individual as well as the co-workers and family members. This includes delayed childbearing, altered sexual practices and side effects of post exposure prophylactic treatment. These challenges are further complicated if potential chronic disability is developed leading to loss of employment, denial of compensation claims and even liver disease requiring liver transplant [7].

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Challenges of needle stick injuries in the developing world are even more complicated. The WHO stated that while 90% of infections among HCWs are attributed to occupational exposure in the developing world, 90% of the reporting of an occupational exposure to blood and body fluid (BBF) is from the developed world [8].

Each year, the annual global burden of indirect medical cost due to HBV, HCV and HIV/AIDS is estimated to be US$535 million. Globally in the year 2000, unsafe injection was responsible for an estimated 21 million cases of HBV infection, 2 million cases of HCV infection and 260,000 cases of HIV infection, making up 32%, 40% and 5% of infections due to unsafe injection practices respectively [9].

The CDC estimates that the direct costs associated with initial follow-up and treatment of health care workers who sustain needle stick injuries range from $500 to $3,000 depending upon injury and treatment [3]. Viral hepatitis B and C and their chronic consequences accounted for 74 and 61% of the deaths, respectively and HIV accounted for the remainder [10]. However, quantification of NSI burden is still unavailable in Africa which made the serious consequences of NSI injury to go unnoticed.

In Ethiopian Somali region no studies have been conducted about the prevalence of NSIs among health care personnel. By considering the existing scarcity of information about NSIs in highly risk groups especially health professionals, the current zonal based study was planned to be under taken to measure the prevalence of NSIs and contributing factors among highly exposed study groups.

MATERIALS AND METHODS

Study Area and Period: A cross-sectional study was conducted from December to January 2013 in Jigjiga Zone, Ethiopian Somali Regional state. The health facilities found in the zone are 1 regional hospital, 19 functional health centers and 60 health posts. In this zone, health service coverage is estimated to be forty nine percent.

Study Design: An institutional based cross-sectional study design supplemented by qualitative was employed to determine needle-stick injuries and contributing factors among health care workers.

Source of Population: The source population of this study was all health care workers who are working in health care facilities in Jigjiga zone during data collection time.

Study of Population: Health care workers who were in frequent contact with patients in selected public health institutions by the time of visit.

Sample Size: The sample size was determined using a single population proportion formula.

$$n = \frac{(Z\alpha/2)^2 P(1-P)}{d^2}$$

where:
n is sample size,
α =0.05 or Zα/2=1.96,
p=0.5,
d=0.05 as a margin of error.

$$n = \frac{(Z\alpha/2)^2 P(1-P)}{d^2}$$

$$= \frac{(1.96)2(0.5)(1-0.61)}{(0.05)^2}$$

= 384.

Since the source population is <10,000, the finite population correction formula was employed. Therefore, design effect of 1.5with 5% non-response rate; the total sample size was 329.

Sampling Technique: Multistage sampling procedure was used to select study subjects. First Jigjiga zone was selected purposively. Then the health facilities were stratified into hospital and health centers. There are 19 health centers, 1 hospital in Jigjiga zone. Among them 11 health centers and 1hospital were selected by simple random sampling. The number of health care workers in each health facility was assigned proportionally to the sample size. Finally the sample was selected by simple random sampling technique from formed sampling frame.

Data Collection: The quantitative data was collected using a structured self-administered pre tested questionnaire. The questionnaire was developed in English and translated into Afan Somali and Amharic then back to English to check its consistency. The questionnaire was pre-tested among 5 % of the respondents in Hiwot Fana and Jegola hospitals.

In order to understand contributing factors for occurrence of NSIs four focus group discussion (FGD) was conducted. To obtain comprehensive information, HCWs were selected from different departments and different professions and discussion was conduct with purposively selected health care workers. Open ended questionnaire or interview guideline was used to conduct FGD, The discussions were recorded by tape after getting a verbal consent from participants. Then it was transcribed into Amharic and translated into English and finally narrated manually.

Data Analysis: Before entry, data were cleaned and coded. The data were entered into Epi data soft ware version 3.01 and processed and analyzed using SPSS Version 15. Descriptive statistics like frequency, mean, median and mode was used and presented in the form of tables, graphs and charts. Crude odds ratio with 95% confidence interval was calculated to determine presence of association between explanatory variables and needle-stick injuries among health care workers. Adjusted odds ratio that control for potential confounding variable was calculated using logistic regression model in SPSS statistical program. Also a multivariate analysis was done in order to see any association between needle-stick injuries among health care workers and factors influencing the dependent variable. Statistical significance was considered at $P < 0.05$.

RESULTS

Socio-Demographic Characteristic of Study Population: A total of 329 HCWs was selected in the study. Thirteen questionnaires which were either filled partially or completed incorrectly were excluded. This gave a non-response rate of 4%. The final analysis was done for 316 (96%) HCWs. Respondents were selected from the 11 sampled health centers and one hospital. One hundred seventy three 173 (52.58%) respondents were from health centers and 143 (43.46%) were from hospital. Out of 316 respondents, 163 (51.6%) were males while 153 (48.4%) were females. Majority of the respondents were Somali, 184 (58.2%) (Table 1).

Prevalence of Needle-Stick Injuries: Among the HCWs with NSIs, nurses had the highest number of 59 (62.1%), followed by midwives (14.74%), medical laboratory technicians (12.63%), health officer (5.26%), general practitioner (3.16%) surgeon and others (1.05%).

Table 1: Socio-demographic characteristic of HCWs in Jigjiga zone, Ethiopia in 2013

Variables	Frequency	Percentage
Type of health facility		
Hospital	143	45.3
Health center	173	54.7
Age(in years)		
<20		
3		
0.9		
20-29	163	51.6
30-39	107	33.9
40-49	32	10.1
50-59	10	3.2
≥ 60	1	0.3
Sex		
Male	163	51.6
Female	153	48.4
Religion		
Orthodox	92	29.1
Muslim	204	64.6
Protestant	18	5.7
Catholic	2	0.6
Ethnicity		
Somale	184	58.2
Oromo	29	9.2
Amhara	76	24
Tigray	13	4.1
Others	14	4.4
Marital status		
Married	155	49.1
Single	148	46.8
Divorced	12	3.8
Widowed	1	0.6
Profession		
General practitioner	10	3.2
Surgeon	3	0.9
Gynecologist	4	1.3
Medical laboratory technician	37	11.7
Nurse	180	57
Midwifery	42	13.3
Health officer	38	12
Others	2	0.2
Service year		
<1year	24	7.6
1-5 years	178	56.3
6-10years	59	18.7
11-15years	30	9.5
>15years	25	7.9

Table 2: Pattern of needle stick injuries among health care workers in various department in Jigjiga zone, Ethiopia in 2013

	Frequency Number	Percentage
Medical ward	16	16.84
Surgical ward	15	15.8
Delivery room	14	14.7
Pediatric ward	13	13.7
Emergency room	12	12.63
Operation room	18	18.94
ICU	2	2.1
Others unit	5	5.26

Injuries by principal areas of practice among HCWs was (16.84%), (15.8%), (14.7%), (13.7%), (12.63%), (18.94%), (2.1%) and (5.26%) in the medical ward, surgical ward, delivery room, pediatric ward, emergency, operation room, Intensive care unit and others units respectively (Table 2).

Among the total respondents for the last 12 months, ninety five (30.1%) of HCWs experienced needle-stick injuries. Of those HCWs injured in the last 12 months, 67(70.52%) encountered 1 injury, 25(26.32%) encountered 2 injuries, 2(2.1%) encountered 3 injuries and 1(1.05% encountered greater than five injuries. Sixty four (67.37%) of the participants had their first exposure to NSIs but 31(32.63) respondents had history of NSIs previously.

Regarding the action taken after NSIs, 43(45.26%) of HCWs did washing of the site by antiseptic, 33(34.74%) had drawing out blood from pricked site, 10(10.52%) did pressing of the site being pricked and 9(9.47%) washed the site with running water (Table 3).

Among the HCWs, most injuries involved the injection needle (62.11%) followed by suture needle (30.52%) and Stylet needle (4.21%).

Standard precaution practices and knowledge of needle-stick injuries and its predictors: Most of the respondents, 228 (72.2%) reported that they were at risk for contracting blood borne disease as a result of NSIs and 88(27.8%) did not. This study showed that a few respondents, 14 (4.4%), 72 (23.4%) and 16 (5%) HCWs were unaware of the fact that hepatitis B, hepatitis C and HIV can be transmitted by NSI.

Concerning a vaccine currently available, 15 (4.7%), 39 (12.3%) and 287 (90.8%) of respondents replied HIV, HCV and HBV have vaccine.

Out of total respondents, 255 (80.7%) wear glove during administering of injection, obtaining blood sampling and removing cannula and handling blood infusion, 113(35.8%) wear for invasive procedure, 71 (22.5%) wearing for cleaning up blood spills/sprays/leaks and 7 (2.2%) replied wear glove was not usually necessary.

Organizational Climate and Staffing as Predictors of Needle-Stick Injuries: Two hundred eight one (281) HCWs reported their organization provide sharp containers at point of use and 35 (11.1%) did not provide sharp containers at point for use. Concerning average hours per week of HCWs involved in direct patient contact, the participants reported 30-40 hours, (25%), 40-50 hours (23.4%), 30-20 hours (20.9%), >50 hours (17.4%) and <20 hours (13.3%).

Table 3: Actions performed by Health care workers after NSIs in Jigjiga zone, Ethiopia in 2013

	Frequency Number	Percentage
Washing of the site by antiseptic	43	45.26
Drawing out blood from pricked site	33	34.74
Pressing of the site being pricked	10	10.52
Washed the site with running water.	9	9.47

Table 4: Possible reasons for non-reporting NSIs among health care workers (HCWs) in Jigjiga zone, Ethiopia, 2013.

Variables	Frequency	Percentage
Low consideration for risk	11	37.93
Concerns about confidentiality	11	37.93
Fear of acquiring HBV,HCV and HIV/AIDS	3	10.34
Accept injury as occupational hazards	2	6.9
Had been vaccinated for hepatitis B	2	6.9

Among a total of the respondents, 176 (55.7%) reported their organization did not have policy/protocol responding to NSIs. Of those respondents, 119 (85%) of HCWs knowledgeable about the presence of the policy/protocol in their organization and 95 (67.9%) of them accessed it in hard copy.

One hundred fifty seven (49.7%) replied that there were no designated person/department responsible for responding to sharp related incidents.

Regarding needle/sharp related injury data, 182 HCWs answered that there is no needle /sharp injury data routinely provided to staff in their organization.

Among the respondents, 99 (31.3%) of HCWs had participated in training focusing on needle/sharp injury while 217 (68.7%) were not.

Reporting Needle-Stick Injury Cases: Of the respondents those who had NSIs, only 66 (69.47%) had given reports of the incident and 29 (30.53%) did not. The most common reasons for failure to report the incident of NSIs, as declared by most of the participants which were 11 (37.93%) include the belief that they were at low risk of infection and concerns about their confidentiality, 3 (10.34%) for fear of acquiring HBV, HCV and HIV/AIDS, 2 (6.9%) of them accept NSIs as occupational hazards and 2 (6.9%) claimed they had been vaccinated against Hepatitis B (Table 4).

Factors Associated with Occurrence of Needle Stick Injuries among Hcws (Multivariate): Based on the results of the binary logistic regression analysis the following variables were significant; type of health facility, total length in profession, kind of wards, knowledge on blood born diseases, provision of sharp container, average

Table 5: Factors associated with occurrence of needle-stick injuries among HCWs in Jigjiga zone, Ethiopia, 2013.

	Sustained NSIs			
Variables	No	Yes	Crude OR (95% CI)	AOR
Type of health facility				
Hospital	81	62	3.247 (11.963-5.31)	2.452 (1.243-4.837)*
Health center	140	33	1.00	1.00
Ward /department working				
Medical ward	31	16	2.477(1.090-5.629)	
Emergency room	23	12	2.504(1.026-6.114)	
Surgical ward	11	15	6.5459(2.515-17.034)	
Operation room	6	8`	6.400(1.936-21.159	4.187(1.024-17.112)*
Others	72	15	1.00	1.00
length in professional service				
<1years	22	2	0.098 (0.019-0.511)	0.074 (0.012-0.466)*
1-5years	131	47	0.389 (0.166-0.912)	
>5years	13	12	1.00	1.00
Knowledge on blood born disease				
Yes	151	77	1.98 (1.10-3.57)	
No	70	18		
Wear glove for invasive procedure				
Yes	52	61	3.17 (1.92-5.23)	2.624 (1.446-4.761)*
No	43	160	1.00	
Average hours' work				
>50 hours	13	12	3.467 (1.203-9.988)	3.940 (1.124-13.812)*
<20 hours	10	32	1.00	1.00
With policy/protocol				
No	133	43	1.828 (1.125-2.970)	1.809 (1.010-3.862)*
Yes	88	52	1.00	
Sharp container				
Yes	79	202	0.464 (0.227-0.948)	0.349 (0.150-0.815)*
No	16	19	1.00	

P<0.05 and *indicates those with significant association

hours per week involved in patient contact, time at which needle-stick injuries occur more have policy/protocol on needlestick. These factors were further analyzed using multiple logistic regression using enter stepwise elimination method (Table 5).

DISCUSSION

Given the finding in the study and reflecting on the objective of the study, it is clear that needle-stick injuries are an issue for health care workers working in health institution. In this study, the type of health facility, work experience, ward they work in, knowledge on standard precaution, provision of sharp containers, average work hours and organization with policy/protocol were factors which contribute to needle-stick injuries.

Among the total respondents, in the last 12 months, 95 (30.1%) of HCWs experienced needle-stick injuries. Of those HCWs injured in the last 12 months, 67 (70.52%) encountered 1 injury, 25 (26.32%) suffered 2 injuries, 2 (2.1%) suffered 3 injuries and 1 (1.05%) greater than five injuries. This finding is consistent with the study of Hanafi *et al*. [12] in which more than two-thirds of HCWs (67.9%) had sustained at least 1 NSI per year. Of these workers, 33.0% suffered 1 injury, 18.0% 2 injuries, 12.0% 3 injuries and 5.0% more than 3 NSIs.

As to the professional category HCWs with NSIs, nurses had the highest number (63.63%), followed by midwives (15.9%), medical laboratory technicians (11.36%), health officer (3.41%), general practitioner (2.27%) and surgeon and gynecologist (1.14%) in this study. This finding is consistent with a study conducted in Iran, where 62.3% of nurses, of 11.0% physicians and 14.2% of support staff had NSI respectively [12]. The qualitative aspect of this study supports this idea as one respondent of the FGD stated that compared with physicians, nurses have a higher risk of exposure, because nurses are the ones who do the procedures ordered by physician which include direct contact with blood and body fluid.

In this study operation room was the most prevalent site of NSI occurrence 18 (18.94%). Study conducted by Nasiri [11] and Mohammad [1] consistent with this finding, in which operation room was the most prevalent site of NSIs occurrence (18.9%). Another study conducted in Saudi Arabia revealed that emergency room (ER) and medical wards had the highest NSSIs proportion (20.3%) for each of them, followed by the operating theaters (14.3%), then the surgical wards (11.3%) [16]. this difference might be attributed to the differences in the number of cases and procedures done from setting to setting.

As to the work experience of health care workers in this study; those who worked less than one year were less likely (AOR 0.074) to experience NSIs than those who worked for more than 15 years. Similarly the study conducted by Hanafi *et al*. [12] support this finding HCWs with more than five years of work experience were significantly less likely to be injured (AOR 0.34).

Concerning the organizational climate and staffing those organizations which provide sharps container/safety boxes at bed side, portable and attached to procedure trolley were less likely exposed to NSIs (AOR 0.349). This finding is related with a study carried out by Clarke [13].

Regarding the hours per week involved in direct patient contact, those health care workers who worked more than fifty (>50 hours) were significantly associated with NSIs than those working less than twenty <20hours). This finding is in line with study conducted by Mustafa [14] which revealed the prevalence of sharp and needle stick injury in nurses who worked more than 8 hours per day was higher than for those who worked 8 hours or fewer per day (86.5 and 77.1% respectively) [14].

Concerning reporting of incidents, around one third 33 (30.53%) of the respondents failed to report the needle-stick injury. In west India reasons for not reporting were perceived non-infectiousness, insignificant exposure, timeliness and previous immunization for hepatitis B, unchanged outcome and missing instructions on how to report incident. These accounted for 83% of the reasons given for not reporting [17]. Finding in Pakistan revealed that almost all

the nurses (99.3%) did not report their injury to hospital administration and 99% of those nurses who did not report their injury they consider absence of reporting system in the hospitals as main cause of non-reporting the NSIs [5]. This difference might be due to many activities done on infection prevention in health facilities as supported by qualitative findings.

CONCLUSION

Needle-stick injuries were common problems among health care workers in the health facilities where this study was conducted. This study demonstrated the highest prevalence of needle-stick injuries among nurses. About 30.53% of the respondents, who had needlestick injuries, did not report the incident. Regarding PEP about 42.42% of the respondents who experienced needle-stick injuries did not took post exposure medication. Taken as a whole, the present work evidenced that, needle-stick injuries were common problem among health care workers in studied health facilities suggesting a need for identification of hazards and implementation of a comprehensive prevention program to reduce needle-stick injuries in the area.

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