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ORIGINAL ARTICLE

NEEDLE-STICK INJURIES AND SPLASH WITH BLOOD AND BODY FLUIDS AMONG HEALTHCARE WORKERS IN HOSPITALS OF BALE ZONE, SOUTHEAST ETHIOPIA

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ABSTRACT

Introduction*: Healthcare workers have increased the risk of contracting infection following accidental needle-stick injuries and splashes with blood and body fluids. In Ethiopia, occupational exposures are often under-reported in many healthcare facilities.*

Objective: *This study aims to estimate the prevalence and factors associated with needle-stick injuries and splashes with blood and body fluids among healthcare workers serving in hospitals of southeast Ethiopia.*

Methods*: A cross-sectional study was conducted from February 1 to March 10, 2018. A total of 404 healthcare workers were recruited into the study from five hospitals (one primary, three general and one referral hospital) using a simple random sampling technique. The outcome variables of the present study were the healthcare worker's needle stick injury (yes, no) and exposure to a splash of blood and body fluids (yes, no). Descriptive statistics were used to explore the data and a logistic regression model used to analyze the data. The strength of association was quantified using odds ratio and corresponding 95% confidence interval (CI).*

Results*: A total of 394 healthcare workers participated in the study. Lifetime needle-stick injury was 61.2 % (95% CI: 56.1-66.0%) and the occurrence of needle-stick injury in the previous year was 38.3 % (95%CI: 33.8-43.1%). There was a high prevalence of lifetime [60.2 % (95%CI: 55.6-64.7%)] and previous year [44.9% (95%CI: 39.8-50.0)] exposures to blood and body fluids. Needle recapping (AOR= 2.25; 95% CI: 1.26-4.03) and working in surgical and medical wards (AOR=1.85; 95% CI: 1.06-3.21) were significantly associated with increased odds of needle-stick injury and exposure to body fluid splashes, respectively.*

Conclusions*: The observed high level of occupational exposure to health risks among healthcare workers calls for the urgent need of formulating strategies to promote safe practice and occupational safety protocols along with strict adherence to infection prevention principles.*

Keywords*: Body fluids splash; Needlestick injuries; Hospitals; Infection Prevention; Bale Zone, Ethiopia*

INTRODUCTION

Healthcare workers (HCWs) have increased risk of contracting infection following accidental needle-stick injuries and splashes with blood and body fluids (1). In recent years the transmission of life-threatening infections, such as the Hepatitis Virus and Human Immunodeficiency Virus (HIV), is increasing the potential occupational exposure among HCWs (2-5). The World Health Organization (WHO) estimated that about 3 million HCWs face occupational exposure to bloodborne viruses each year (2 million to HBV, 900,000 to HCV, and 300,000 to HIV), and 40% of HBV and HCV cases among HCWs worldwide are the result of these exposures. Moreover, 90% of the infections that result from these exposures are in low-income countries (3,6,7).

Developing countries, which account for the highest prevalence of HIV-infected patients in the world, also record the highest rate of occupational infections including needle-stick injuries (5).

The current HIV epidemiology of Ethiopia is heterogeneous, with significant variations in the burden of HIV across geographic areas and population groups. Over the past two decades the country has observed remarkable progress in reducing the HIV prevalence rate, from 3.3 percent in 2000 to 0.9 percent in 2017, and AIDS-related deaths from 83,000 deaths in 2000 to 15,600 in 2017 (8). The annualized HIV/AIDS mortality rate reduction from 1990 to 2016 for both sexes was 0.4% (9). It is estimated that 4.4% of all HIV infections amongst healthcare workers are due to occupational injuries (10).

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Post exposure chemoprophylaxis can prevent HIV infection in at risk healthcare workers. In fact, Ethiopia has developed guidelines on infection prevention in healthcare facilities and also employed the use of post-exposure prophylaxis at all levels (2).

However, studies reported that a significant number of the workers (43.4%) had an unfavorable attitude towards post-exposure prophylaxis (PEP) and a low rate of PEP utilization upon exposure to HIV risk conditions (11,12,13).

Few studies present the prevalence of occupational exposure among HCWs in Ethiopia (14-17). Also, there is no standard occupational reporting system in the country; occupational exposures are often under-reported and/or not reported at all in many healthcare facilities. As a result of this, it is difficult to estimate the true burden of injury and exposure in Ethiopian health facilities. Studies also underline that there is a serious concern of needle-stick injuries, splashes with blood and body fluids and safe infection prevention practices among HCWs in different parts of healthcare facilities in Ethiopia (14-16, 18-20). Furthermore, the available research evidence in the country is based on similar study settings and conducted in the northern part of the country (21-25). The only study reported from the current study area did not cover the primary hospital and also did not assess HCWs blood and body fluid exposure (15).

Therefore, this study aims to estimate the burden of and factors associated with needle-stick injuries and splashes with blood and body fluids among HCWs in Bale zonal hospitals, southeast Ethiopia. The results may serve as a stepping stone towards identifying factors associated with occupational exposure among healthcare workers and could be useful for the development of the occupational reporting system.

METHODS

Study setting

This study was conducted in Bale zone hospitals. Bale zone is one of the Oromia Regional State zones that has twenty-one woreda (districts) (18 rural and 3 town administrations). Bale zone is found in the southeast part of Ethiopia. In Bale zone there are about 84 health centers and five hospitals, namely Goba referral hospital (276 HCWs), Ginner general hospital (158 HCWs), Robe general hospital (151 HCWs), Dello-Mena general hospital (112 HCWs) and Madda Walabu primary hospital (62 HCWs);the catchment population for each hospital was 940,672, 752,530, 650,619, 350,000 and 127,680 respectively.

Study design

A hospital-based cross-sectional study was conducted from February 1 to March 10, 2018, in five hospitals of the Bale zone. All HCWs (including physicians, health officers, midwives, nurses, dental technicians, laboratory technicians, cataract surgeons, anesthetists and waste handlers) working in those hospitals were involved in the study. However, those on annual or maternity leave during data collection time were not included.

Sample size determination

The sample size was estimated using a single population proportion formula using Epi Info version 7.1.1.14 software (CDC, 2013) with the assumptions of a 95% confidence level, 5% precision was used. Evidence from previous studies reporting 19.1% as a one-year prevalence of needle-stick injury (15) and 60.2% prevalence of one year blood and body fluid splash from north Ethiopia (21) were taken. The largest of these two sample size estimates was then taken as the sample size for the current study with a 10% non-response rate, resulting in 404. This final sample size was allocated to different hospitals proportion to the size of HCWs working in each hospital. Finally, the allocated numbers of health workers to each hospital were recruited into the study using the lottery method. Within each hospital list of health professionals was used as a sampling frame.

Data collection procedure

The data collection tool was developed by reviewing relevant literature (15,24,25). The tool was developed first in English and translated to local languages by using an expert of both ‘Amharic' and ‘Afaan Oromo' languages and then back to English to look for consistency of the questions. It consists of socio-demographic information, lifetime and last one-year needlestick injuries and lifetime and last one year blood and/or body fluid splash of health care workers items adapted from previous studies. Data were collected using a pre-tested structured questionnaire. Five trained (for one day) nurses were recruited for data collection and two environmental health officers were assigned to supervise the data collection process.

Operational definitions

Needlestick injury was defined as any cut or prick to HCWs by a needle previously used on a patient. It is work-related and sustained within the hospital premises. Blood or body fluid splash was defined as any blood or body fluids splash to the eye, mouth or mucous membranes of HCWs within the hospital premises.

Data analysis

Data were entered into Epi data 3.1 and exported to SPSS version 20.0 statistical software for analysis. Descriptive statistics were computed to present the prevalence of needlestick injury and blood and body fluid splash exposure. Bivariate and multivariable logistic regression analyses were used to identify associated factors associated with the odds of observing the outcome of interest. Multivariable logistic regression analysis was used and the model fitness was checked by the Hosmer and Lemeshow method and results of 0.534 and 0.985 was found for the final model of needlestick injury and blood and body fluid splash, respectively, confirming the validity of the model. Odds ratio with 95% confidence intervals were used to determine the strength of association and p-value < 0.05 was used as a cut-off point for all statistically significant tests.

Ethical considerations

Ethical clearance was obtained from the Ethical Review Committee of Madda Walabu University and written consent was obtained from each HCW.

RESULTS

A total of 394 HCWs were interviewed with a response rate of 97.5%. Of these, 241 (61.1%) were nurses and midwives, and 56 (14.2%) were physicians and health officers. In this study 202 (51.3%) and 192 (48.7%) of respondents were male and female healthcare workers respectively. The age of study participants ranged from 18 to 43 years with a mean age of 28.8 years (standard deviation ± 5.2).

116 (29.44%) of the participants had less than two years of service, 114 (28.93%) from two to five years, 125 (31.73%) from five to ten years, and 39 (9.89%) with greater than ten years of service.

The lifetime and previous year needle stick injuries of HCWs were 61.2% (95% CI: 56.1-66.0%) and 38.3% (95% CI: 33.8-43.1%), respectively. Health care worker's lifetime exposure of blood and body fluids was 60.2% (95% CI: 55.2-64.7%), while previous year prevalence of splash of blood or body fluids was 44.9% (95% CI: 39.8-50.0%) (Table1).

HCWs having less than five-year work experience were 44% less likely to have needle stick injury as compared to HCWs who had five and above years of work experience (AOR=0.56; 95% CI:0.33-0.96). HCWs who recapped used needles were 2.25 times more likely to had needle stick injury as compared to their counterparts (AOR= 2.25; 95% CI:1.26-4.03) (Table 2).

HCWs working in referral and general hospital were 87% and 61% less likely to have blood and body fluids splash exposure as compared to primary hospitals (AOR= 0.13; 95% CI:0.05-0.35) and (AOR= 0.39; 95% CI:0.17-0.90), respectively. HCWs working in surgical and medical wards were 1.85 more likely to have blood and body fluids splash exposure as compared to those working in OPD and laboratories (AOR=1.85; 95%CI: 1.06 -3.21) (Table 3).

Table 1: Healthcare workers lifetime and last one-year occupational exposure and other related variables in Bale zone hospitals, Southeast Ethiopia February to March 2018 (n=394).

Variable	Number (%) reported "Yes"	95% CI
Have you ever had a needle stick injury?	241 (61.2)	56.1-66.0
Have you had needle stick injury in the previous year?	151 (38.3)	33.8-43.1
Have you ever had splashing of blood or body fluids to your mouth or eyes?	237 (60.2)	55.6-64.7
Have you had splashing of blood or body fluids to your mouth or eyes in the last one year?	177 (44.9)	39.8-50.0
Do you recap used needles? (n=333)	92 (27.6)	22.8-32.7
Have you received HBV vaccination?	251 (63.7)	59.1-68.3
Do you always wear goggle when blood/body fluid splash is likely?	191 (48.5)	43.7-53.3
Have you had all the necessary personal protective equipment in your workplace?	262 (66.5)	61.7-71.6
Do you have awareness of Post Exposure Prophylaxis (PEP) service?	259 (65.7)	61.2-70.6
The PEP should be considered after potential blood/body fluid exposure?	251 (63.7)	58.6-68.5

Table 2: Association of HCW's risk of needlestick injury and characteristics of HCWs in hospitals of Bale Zone, Southeast Ethiopia.

Variables	Experienced needle stick injury		Crude OR (95% CI)	Adjusted OR (95% CI)
	Number saying Yes	Number saying No		
Sex				
Male	74	128	0.86 (0.58-1.29)	
Female	77	115	1	
Age				
< 25	43	68	1.14 (0.67-1.96)	
25-30	67	101	1.19 (0.73-1.95)	
>30	41	74	1	
Service years				
< 5 years	82	148	0.76 (0.51-1.15)	0.56 (0.33-0.96)**
≥ 5 years	69	95	1	1
Hospital				
Referral	39	105	0.33 (0.15-0.72)*	0.46(0.16-1.34)
General	95	123	0.68 (0.32-1.43)	1.22(0.43-3.42)
Primary	17	15	1	1
Current working department				
Surgical and Medical ward	57	63	1.62 (0.96-2.76)	1.59 (0.86-2.94)
Pediatrics ward	12	41	0.53 (0.25-1.12)	0.51 (0.21-1.24)
Gynecology and Obstetrics ward	43	69	1.12 (0.65-1.93)	1.19 (0.63-2.26)
OPD, Laboratory, and others	39	70	1	1
Profession				
Nurses and midwives	101	140	1.17 (0.64-2.13)	
Physicians and HO	18	38	0.77 (0.51-1.67)	
Laboratory technicians, technologist, and others	11	31	0.58 (0.24-1.38)	
Cleaners	21	34	1	
Educational status				
First degree and above	83	136	0.95 (0.53-1.72)	
Diploma	43	72	0.91 (0.48-1.74)	
Below diploma	23	35	1	
Awareness of PEP service				
Yes	94	165	0.78 (0.51-1.19)	
No	57	78	1	
Presence of the IP committee				
Yes	107	145	1.64 (1.04-2.54)*	1.86 (1.07-3.23)**
No	44	98	1	1
Presence of IP guideline				
Yes	94	131	1.41 (0.93-2.13)	
No	57	112	1	
Received IP training in the past 12 months				
Yes	19	33	0.92 (0.50-1.68)	
No	132	210	1	
Do you recap used needles (n=333)				
Yes	43	49	1.64 (1.01-2.67)*	2.25 (1.26-4.03)***
No	84	157	1	1

* p< 0.05 crude; ** p< 0.05 adjusted ; *** p<0.01 adjusted; OR=Odds Ratio; CI=Confidence Interval

Table 3: Association of HCWs exposure to blood and body fluids splash with different factors in hospitals of Bale Zone, Southeast Ethiopia.

Variables	Splash of blood and body fluids		COR (95% CI)	AOR (95% CI)
	Number saying Yes	Number saying No		
Sex				
Male	96	106	1.24 (0.84-1.85)	
Female	81	111	1	
Age				
< 25	49	62	1.43 (0.84-2.44)	0.58 (0.30-1.14)
25-30	87	81	1.94 (1.19-3.16)*	1.22 (0.71-2.11)
>30	41	74	1	1
Service years				
< 5 years	102	128	0.95 (0.63-1.41)	
≥ 5 years	75	89	1	
Hospital				
Referral	43	105	0.22 (0.09-0.50)*	0.13 (0.05-0.35) ***
General	113	101	0.56 (0.26-1.23)	0.39 (0.17-0.90) **
Primary	21	11	1	1
Current working department				
Surgical and medical ward	65	55	1.68 (0.99-2.84)	1.85 (1.06-3.21) **
Pediatrics ward	14	39	0.51(0.25-1.05)	0.56 (0.26-1.19)
Gynecology and Obstetrics ward	53	59	1.28 (0.75-2.18)	1.43 (0.82-2.49)
OPD, Laboratory, and others	45	64	1	1
Profession				
Nurses and midwives	123	118	1.68 (0.93-3.07)	
Physicians and health officers	21	35	0.97 (0.45-2.09)	
Laboratory technicians, technologist, and others	12	30	0.65 (0.27-1.53)	
Cleaners	21	34	1	
Educational status				
First degree and above	105	116	1.38 (0.77-2.48)	
Diploma	49	66	1.13 (0.59-2.15)	
Below diploma	23	35	1	
Awareness of PEP service				
Yes	105	154	0.59 (0.39-0.91)*	
No	72	63	1	
Presence of IP guideline				
Yes	104	121	1.13 (0.76-1.69)	
No	73	96	1	
Received IP training in the past 12 months				
Yes	23	29	0.97 (0.54-1.74)	
No	154	188	1	

* p< 0.05 crude;; *** p<0.05 adjusted; OR=Odds Ratio; CI=Confidence Interval

DISCUSSION

Occupational exposure to blood-borne and body fluid pathogens may occur following accidental needle-stick injury and splashes of blood or body fluids to mucous membranes (26). It is a recognized potential threat to HCWs. The finding of this study suggested that the lifetime and previous year needle stick injury was 61.2% and 38.3%, respectively. There was also a high prevalence of lifetime (60.2%) and previous year (44.9%) exposures to blood and body fluids. Needle recapping practice and working in surgical and medical wards were significantly associated with increased odds of needle-stick injury and exposure to body fluid splashes, respectively.

The present study detected a high prevalence of needle stick injury which is twofold higher compared to the previously conducted study (15). This difference may be due to a time gap, study setting differences, and HCWs' work experience. In the previous study seven out of ten HCWs had five or less years of work experience. The current finding is also higher compared to a study report from the east and north Ethiopia (14,21). High prevalence of needle stick injury was also reported in India, 79.5% of HCWs reported having had one or more needlestick injuries in their career (27).

In the current study, there was also a high prevalence of lifetime (60.2 %) and previous year (44.9 %) blood and body fluid exposure. Of this prevalence, 69.5% and 68.4% of blood and body fluid exposures occurred among nurses and midwives for the previous year and lifetime, respectively. For all blood and body fluid exposures, laboratory technologists had a significantly lower risk of previous year and lifetime exposure, 6.8% and 7.2%, respectively. Overall, the proportion of blood and body fluid exposure was higher among nurses and midwives followed by physicians and health officers and the least exposed group were laboratory technologists but there was no statistically significant difference in the prevalence by professional category. The highest share of blood and body fluid exposure among nurses and midwives may due to their job activities and frequent exposure to multiple procedures that can predispose them to many blood and body fluid exposures within the healthcare facility.

Moreover, the one year blood and body fluid exposure in the current study is lower than the previous report in north Ethiopia (60.2%) (21) and Tigray Region of Ethiopia (56.3%) (25). This can be explained by differences in study settings, the type of healthcare facility and a difference in HCWs' experience.

However, the current study finding was higher than a study report in eastern Ethiopia, which reported 20.2% (14). The possible explanation for this discrepancy may be due to a difference in study setting (the study includes 20 health centers) and standard precaution practice (where 80.8% of HCWs reported that they regularly follow standard precautions).

In the current study, exposure of blood splash or body fluids was 60.2%. This finding was almost twofold higher compared to a study report from eastern Ethiopia 28.8% (14), Addis Ababa (Ethiopia) 39.8% (16) and West Arsi (Southeast Ethiopia) 39.0% (17). This could be due to differences in study setting; the previous studies included health centers together with infection prevention training, whereas in the current study the majority of HCWs did not receive any such training. The safe injection practice recommendations of the Federal Ministry of Health (FMoH) include statements such as: "do not recap, bend or break needles prior disposable, single-use needles and syringes after giving injections" (2).

However, in the current study a significant number of HCWs reported recapping needles after use. Respondents who practiced needle recapping were 2.25 times more likely to experience needlestick injury than those who did not recap needles after use. This finding is consistent with the previously conducted study (15). Likewise, other similar studies from other countries (India, Cameron) reported recapping needles after use was associated with a higher risk of needle-stick injury (28,29). A study conducted by Berhanu on prevalence and determinant factors for sharp injuries among Addis Ababa hospitals reported similar findings: those health professionals who never recap used needles were protected from sharp injuries in 61.6% of the cases (30). In another recent study in the same area similarly found a high prevalence of lifetime and one-year prevalence of blood and body fluid exposures 42.6% (95% CI: 36.8-48.4) and 29.2% (95% CI: 23.8-34.7), respectively (31).

In the present study, HCWs that had less than five-years of work experience were 44% less likely to have needle stick injury as compared to HCWs who had five or more years of experience. HCW's total years of service increased the possibility of contracting needle-stick injury. However, this may not always be true since a study from Bihar Dar (north Ethiopia) report dissimilar findings.

In their assessment, the prevalence of needle-stick injury was higher among HCWs with work experience of less than 5 years, and among those working in dressing rooms and involved with injections, though such observations did not reach statistical significance (P> 0.05) (24).

Blood and body fluids splash exposure was significantly associated with type of hospital. HCWs working in referral and general hospitals were87% and 61% less likely to had blood and body fluids splash exposure as compared to primary hospitals. The possible reasons might be differences in awareness of body fluids splash risks, personal protective equipment supply, and variation in experience. Also, the current study observed that HCWs from surgical and medical wards were almost two times more likely to have blood and body fluids splash exposure as compared to those in OPD and laboratory facilities. This could be due to a difference in the job activities of healthcare workers and the type of healthcare activity.

Strength and limitations of this study

Strength

All hospitals in the Bale zone were included in the study and an adequate sample size was used.

Limitations of the study

This study has several limitations. Due to the cross-sectional nature of the study design, temporal relationships could not be established between the explanatory and dependent variables.

In this study, social desirability bias and recall bias are potential limitations of these self-reported needle-stick injuries and blood and body fluid exposure results. Also, there may be a chance of over-reporting and under-reporting occupational exposure prevalence. As participants were only chosen from hospital settings, the generalization of this study is limited to hospitals of Bale Zone, not to smaller healthcare facilities found in the Bale zone.

CONCLUSIONS

There was a high level of occupational exposures of both needle stick injury and body fluid exposure among HCWs. Health authorities as well as healthcare facilities need to formulate urgent strategies to promote safe practice and occupational safety protocols along with strict adherence to infection prevention principles. Moreover, the provision of job training and the establishment of a strong reporting system should be recommended.

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Conflict of Interest:

Authors have no conflict of interest to declare.

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