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Occupational Exposure to Blood and Body Fluids among Health Care Workers in Wolaita Zone, Southern Ethiopia

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Abstract

Background: Occupational exposure to blood and body fluids is a major public health concern; the problem is more severe in poor economic setting. This study examines magnitude of occupational exposure to blood and body fluids and its associated factors among health care workers in Wolaita Zone, Southern Ethiopia.**Methods:** Institution based cross sectional study was conducted in February 2016. Health care workers (n=760) of various occupations were the study population. A cluster sampling technique was used. Self-administered questionnaire was used to collect the data. Data was entered into EPI info version 3.5.4 and exported into SPSS version 20.0 for analysis. Binary logistic regression model was used to identify factors associated with outcome variable, and finally multivariate logistic regression model was used to identify independent predictors of outcome, with statistical significance set at $p<0.050$ at 95% CI.**Results:** sixty six percent of health care workers studied were exposed to blood and body fluids in past one year. Out of total health care workers studied 62% (386) and 53.6% (334) exposed to blood and body fluids and injured by needle stick in the past six months respectively. Occupation (AOR: 1.86; 95%CI: 1.02-3.38), department of work (AOR: 3.92; 95%CI: 1.17-13.11), lack of training on prevention of occupational infection (AOR: 2.02; 95%CI: 1.34-3.04), absence of safety signs in health care institutions (AOR: 1.82; 95%CI: 1.21-2.75) and inadequate hand washing facilities in department/ward (AOR: 1.82; 95%CI: 1.25-2.64) respectively were factors associated with occupational exposure to blood and body fluids.**Conclusion:** the level of exposure to blood and body fluids among health care workers was high. All relevant stake holders in health need to provide training on prevention of occupational infection to health care workers and ensure enough hand washing facility. Moreover, promote the use of safety signs in health care institutions.

Background

Occupational exposure to blood and body fluids is a serious public health problem that health workers face and it constitutes a major risk for the transmission of infections such as human immune-deficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) [1-3]. Taking this into account, the U.S. Centres for Disease Control and Prevention (CDC) proposed stepwise standard operating procedures for preventing occupational exposures, and handling potentially infectious materials such as blood and body fluids [4, 5]. These procedures are used as a guideline for health care workers to practice regular personal hygiene; use protective gloves and wear gown whenever they come in contact with mucous membranes, blood and body fluids of patients, proper disposal of sharps and clinical wastes [6].

The World Health Organization (WHO) estimates that, from a total of 35 million health care workers globally, about 3 million are exposed to blood borne viruses each year of which 2 million to Hepatitis B virus (HBV), 900,000 to Hepatitis C virus (HCV), and 300,000 to Human Immune deficiency virus (HIV), and 90% of the infections that result from these exposures borne by developing countries [7].

Work related blood borne pathogens are more prevalent in low-income settings of the world, specifically more common in sub Saharan African countries [8, 9]. Different studies from developed and developing countries have indicated that there is a gap in compliance to universal precautions (UPs) by HCWs [10-12]. For instance, 64.0% of health care workers in India adhere to standard precautions [13], in Malaysia 75% [14], and in Nigeria only 38.8% of HCWs had a good knowledge of the practice of universal precautions [15]. About 80.8% of HCWs in eastern Ethiopia reported that they regularly follow universal precautions [16].

In developing countries, the risk of injuries at work place is higher than that of developed countries [17]. For instance only 58% of nurses from a study in Australia reported using gloves when handling 'blood or blood equipment' [18]. Nearly 50% of HCWs from southern Ethiopia recapped needles [12], 25% of HCWs from a study in Nigeria reported to always recap [13], while 40% from a study in India recapped at least sometimes and only 32% wore eye protection [14]. HCV and HBV infections are generally considered endemic in sub-Saharan Africa [19]. In Ethiopia there is unavailability of national data of these blood born infections. However, studies conducted in different parts of the country indicate the estimates for HBV range from 4.7% to 14.4% [20-24] and prevalence of HCV to be 0.9–5.8% [20, 25].

According to the 2014 HIV estimates, the national HIV prevalence in Ethiopia is 1.14% [26].

There is no sufficient information in Ethiopia that describes the magnitude of occupational exposure to blood and body fluids and associated factors. Convincing fining is more important in designing policies and implementation of infection prevention practices. Therefore, the aim of this study was to determine the magnitude of occupational exposure to BBFs and associated factors among HCWs in Wolaita Zone, Southern Ethiopia.

Methods

Study area and setting

An institution based cross sectional study, was conducted in Wolaita Zone, Southern Ethiopia, located in Southern Nation Nationalities and Peoples Region (SNNPR), which is 327 KM from Addis Ababa, the capital of Ethiopia. Wolaita Zone has of 417 health facilities consisting of 1487 health care workers. According to Zonal health department report of Wolaita zone, there is no available data on the prevalence of occupational exposure to BBFs among HCWs [27]. All health care workers in the study area were included in the study. Health care workers who are on official leave were excluded from the study.

Sample size and sampling procedure

The sample size was determined by using a formula for estimation of single population proportion with the assumption of 95% confidence level, the margin of error of 5% and the prevalence of occupational exposure to BBFs (66%) – taken from a previous study conducted in Bahir Dar town, Northwest Ethiopia [28]. After considering 10% non-response rate and multiplying by the design effect of 2 the total sample size was estimated to be 760.

A cluster sampling technique was used. A total of 417 health care institutions were clustered into hospitals, primary health care units, health centers, and clinics. Of these 350 health care institutions were randomly selected for this study. For each health care institution, probability proportional allocation to sample size was made according to the total number of health care institutions consisting of health care workers. Sampling frame of health care facilities with health care workers was known based on the health care workers registration in the Wolaita zone health office. Finally, systematic random sampling method was used to select 760 health care workers.

Data collection

The data was collected by a pretested self-administered questionnaire, adopted from the previous study conducted in Bahir Dar town, Northwest Ethiopia [28]; which was translated to Amharic language. Eight data collectors, based on their previous experience, were recruited and trained for data collection, and two trained public health officers supervised collection of the data. Before the data collection all of the study subjects were oriented and well informed about the purpose of the study, and their right to accept, or refuse to participate in the interview. A pilot study was done on 21 health care facilities which are found in the same district that were not included in the study.

Data quality management and entry

Before the actual data collection, the questionnaire was pre-tested on similar setting outside the study area. The data collectors and supervisors were trained for two days on principles, ethical considerations, procedures, and details of the questionnaire. The principal investigator closely monitored the data collection process. Completed questionnaires were checked for their consistency and completeness every day, and then entered into EPi-Info version 3.5.4 statistical software, and finally the data was exported to software package version SPSS 20.0 for further cleaning and analysis. Statistical significance was set at $p<0.050$ and 95% confidence interval.

Operational definition

Health care workers considered to be exposed to blood and body fluids if they are injured by needle stick or encountered blood or body fluids in the past one year career.

Ethical Consideration

Ethical clearance was obtained from Research and Ethical Committee of Wolaita Sodo University, School of Public Health. Informed verbal consent was obtained from each study subject prior to data collection, and the purpose of the study was explained to the respondents in advance. Confidentiality of the information and privacy of the respondents was maintained. During the data collection, each of study participants was communicated that their participation would be voluntary, and also they were told that as they can quit any time when even after the interview has started.

Results

A total of six hundred and twenty three health care workers participated in the study; yielding a response rate of 82%. Sixty one percent of HCWs are in the age range of (30-40), while nearly fifty seven percent of HCWs attained educational level of college degree. 32.1% (200) of HCWs were nurses by occupation, while 18.3% (114) works in injection and dressing room, 44.3% (276) have a working experience of six up to nine years, and over forty four percent of the health care institutions were public health centers [Table 1].

Table 1: Socio-demographic characteristics of health care workers in Wolaita Zone, Southern Ethiopia; February 2016

Variables	Result	Frequency (#)	Percent (%)
Sex	Male	465	74.6
	Female	158	25.4
HCPs' age in years	<30	140	22.5
	30 - 40	382	61.3
	>40	101	16.2
	Certificate	17	2.7
Educational qualifications	Diploma	172	27.6
	Degree	365	58.6
	Specialist	69	11.1
Job category	Nurse	200	32.1
	Laboratory technologist	78	12.5
	Health officer	187	30.0
	Medical doctor	84	13.5
	Midwife	56	9.0
	Other	18	2.9
Department of work	Outpatient department	101	16.2
	Injection and dressing room	114	18.3
	Surgical ward	112	18.0
	Paediatrics ward	77	12.4
	Gynaecology ward	97	15.6
	Medical ward	41	6.6
	Laboratory	63	10.1
	Other	18	2.9
Work experience	≤2	92	4.3
	3 - 5	159	25.5
	6 - 9	276	44.3
	≥10	161	25.8
Type of institution	Private clinic	72	11.6
	Private hospital	89	14.3
	Public health center	276	44.3
	Public hospital	186	29.9

Nearly seventy four and sixty four percent of health care workers were exposed to blood and body fluids and encountered a needle stick injury in their life time respectively. Among the HCWs studied 65.7% (409) and 55.1% (343) had splashes of body fluids and injured by needle stick in the past one year, and sixty two and fifty four percent of study participants had exposure to BBFs and encountered needle stick injury in the last six months respectively [Table 2].

Table 2: Occupational exposure to blood and body fluids among health care workers in Wolaita Zone, Southern Ethiopia; February 2016

Variables	Result	Frequency N (%)
Occupational exposure to blood and body fluids in your life time	Yes	460(73.8)
	No	163(26.2)
Needle stick injury in your life time	Yes	396(63.6)
	No	227(36.4)
Occupational exposure to blood and body fluids in the past one year	Yes	409(65.7)
	No	214(34.3)
Needle stick injury in the past one year	Yes	343(55.1)
	No	280(44.9)
Occupational exposure to blood and body fluids in the past six months	Yes	386(62.0)
	No	237(38.0)
Needle stick injury in the past six months	Yes	334(53.6)
	No	289(46.4)
Occupational exposure to BBFs' among health care workers in the past one year		214(34.3)
Non exposed (<1 items)		409(65.7)
Exposed (>1 items)		

Table 3: Factors associated with occupational exposure to blood and body fluids among health care workers, Woliata Zone, Southern Ethiopia; February 2016

Variables	Result	Frequency N (%)
Wearing of gloves during the last health care procedures	Yes	357(57.3)
	No	266(42.7)
Training on prevention of occupational infection	Yes	281(45.1)
	No	342(54.9)
Availability of PPE throughout the year	Yes	309(49.6)
	No	314(50.4)
Presence of safety signs in health care institution	Yes	309(49.6)
	No	314(50.4)
Presence of enough hand washing facilities in department or ward	Yes	284(45.6)
	No	339(54.4)
Washing of hands before and after any health care procedure or handling	Yes	275(44.1)
	No	348(55.9)
Presence of an infection prevention committee in health care institution	Yes	299(48.0)
	No	324(52.0)
Compliance with universal precautions	Yes	262(42.1)
	No	361(57.9)

Socio-demographic characteristics have been found to show statistically significant association with occupational exposure to BBFs among HCWs. Among them, HCWs who are health officer's by occupation, with (AOR = 1.86; 95%CI: 1.02-3.38), and health care workers that works in Gynaecology ward, with (AOR = 3.92; 95%CI: 1.17-13.11) were found to be significantly associated in multivariate analysis [Table 4].

Regarding the individual and institutional factors associated with occupational exposure to BBFs, public health center with (AOR = 0.38(0.20-0.72), lack of training on prevention of occupational infection with (AOR = 2.02; 95%CI: 1.34-3.04), absence of safety signs in health care institutions with (AOR = 1.82; 95%CI: 1.21-2.75) and inadequate hand washing facilities in department/ward with (AOR = 1.82; 95%CI: 1.25-2.64) were factors associated with occupational exposure to blood and body fluids [Table 4].

Table 4: Factors associated with occupational exposure to blood and body fluids among health care workers in Wolaita Zone, Southern Ethiopia; February 2016

Variables	Result	Exposure to BBF		COR(95%CI)	AOR(95%CI)
		Exposed	Non exposed		
Educational qualifications	Certificate	12	5	1	1
	Diploma	105	67	0.65(0.22-1.93)	0.98(0.17-5.62)
	Degree	228	137	0.69(0.23-2.01)	0.74(0.13-4.09)
	Specialist	64	5	5.33(1.33-21.29)*	7.14(0.94-54.19)
Occupations	Nurse	114	86	1	1
	Lab technologist	46	32	1.08(0.63-1.84)	0.69(0.26-1.80)
	Health officer	125	62	1.52(1.00-2.30)	1.86(1.02-3.38)**
	Medical doctor	71	13	4.12(2.14-7.92)*	0.91(0.33-2.50)
	Midwife	40	16	1.88(0.99-3.59)	0.46(0.12-1.72)
	Other	13	5	1.96(0.67-5.71)	0.42(0.04-3.86)
Department of work	Outpatient department	62	39	1	1
	Injection & dressing	69	45	0.96(0.55-1.67)	0.99(0.48-2.03)
	Surgical ward	69	43	1.00(0.58-1.75)	1.09(0.56-2.10)
	Paediatrics ward	57	20	1.79(0.93-3.42)	0.96(0.42-2.20)
	Gynaecology ward	77	20	2.42(1.28-4.56)*	3.92(1.17-13.11)**
	Medical ward	21	20	0.66(0.31-1.37)	0.60(0.25-1.39)
	Laboratory	41	22	1.17(0.60-2.25)	2.10(0.78-5.66)
	Other	13	5	1.63(0.54-4.94)	3.09(0.49-19.23)
Work experience	≤2	13	14	1	1
	3-5	96	63	1.64(0.72-3.72)	2.00(0.77-5.18)
	6-9	178	98	1.95(0.88-4.32)	1.93(0.77-4.87)
	≥10	122	39	3.36(1.45-7.77)*	2.58(0.98-6.80)
Type of institutions	Private clinic	55	17	1	1
	Private hospital	69	20	1.06(0.51-2.22)	0.64(0.28-1.49)
	Public health center	152	124	0.37(0.20-0.68)*	0.38(0.20-0.72)**
	Public hospital	133	53	0.77(0.41-1.45)	0.52(0.25-1.07)
Training on prevention of occupational Infection					
Yes		152	129	1	1
No		257	85	2.56(1.82-3.60)*	2.02(1.34-3.04)**
Presence of safety signs in health care institution					
Yes		171	138	1	1
No		238	76	2.52(1.79-3.55)*	1.82(1.21-2.75)**
Presence of enough hand washing facilities in department or ward					
Yes		161	123	1	1
No		248	91	2.08(1.48-2.19)*	1.82(1.25-2.64)**
Washing of hands before and after any health care procedure or handling					
Yes		152	123	1	1
No		257	91	2.28(1.63-3.20)*	1.23(0.78-1.96)
Compliance with standard precautions					
Yes		151	111	1	1
No		258	103	1.84(1.31-2.57)*	0.79(0.49-1.28)

** Statistical significance

Discussion

This study has shown that seventy four percent of health care workers were exposed to blood and body fluids in their life time, which is comparable with findings from Bahir Dar and Iran; 74% [28, 29]. This study indicates higher percentage of HCWs exposed to blood and body fluids compared with the study conducted in Northwest Ethiopia and Serbia; in which life time exposure of HCWs to BBFs constitute 70.2% and 66% respectively [30, 31]. However, this study is much higher than a study in Eastern Ethiopia and Kenya [16, 332].

About sixty four percent of study subjects were injured by needle stick in their life as indicated by this study, which is higher than a study in Bahir Dar town (50%) [27]; and comparable with a finding in India (63%) [28]. this is difference could possibly be due to the difference in the study areas and the experience of HCWs to adhere to standard precautions. Lifetime exposure to blood and body fluids means that the HCWs are at increased risk of acquiring occupational infection unless effective measures are implemented.

In this study, 65.7% (409) of health care workers were exposed to BBFs in the past one year which is comparable with a study conducted in Bahir Dar town [27] , while 55.1% (343) of the study units were injured by needle stick in the past one year which is much higher than a finding from Bale Zone (19.%) [32].

From the total of health care workers, 32.1% (200) were nurses by occupation, which is lower than a report from Bale Zone [33] and it is much lower than a report from Eastern Ethiopia [16]. Occupational exposure to blood and body fluids shows a statistically significant association with the occupation of the health care workers, which is different from studies in Eastern and Northwest Ethiopia [16, 27]. In this study, health officers were 1.86 times more likely to be exposed to blood and body fluids than their counterparts. This could be due to

the majority of health officers have higher contact hour to patients. Health care workers working in gynaecology ward were 3.92 times more likely to be exposed to BBFs as compared to those who work in outpatient department. This might be due to the fact that health care providers working in gynaecology ward have increased chance of coming in contact to blood and body fluids from patients admitted in ward for delivery and postpartum care. While health care workers working in public health center were 0.72 times more likely to be exposed to BBFs as compared to their counterparts who work in private clinic. This could be due to lack of personal protective equipment in public health center.

In this study, sixty two percent of study units had exposure to blood and body fluids in the past six months which is higher than a study in Northern Ethiopia [34]. This difference may be due to the presence of safety signs in health care institutions and on job training delivered to HCWs. In this study, fifty five percent of study participants did not attended on-job training on infection prevention, which is lower than studies in Eastern and North West Ethiopia [16, 27]. While about 43% (266) of health care workers reported inconsistent use of gloves during the last health care procedure which is higher than the finding from Dire Dawa [16]. Over fifty percent of HCWs reported unavailability of personal protective equipment throughout the year which is higher than a study conducted in Eastern Ethiopia [16]. Health care workers who did not take on-job training on prevention of occupational infection were 2.02 times more likely to be exposed to blood and body fluids in the past one year than their counterparts. This could be due to the reduced concern from health authorities in the study area.

In this study, higher percentage of health care workers reported lack of hand washing facilities in department or ward as compared to a study conducted in Northwest, Ethiopia. Health care workers who had no hand washing facilities in their department or ward were 1.82 times more likely to be exposed to blood and body fluids in the past one year than their counterparts. This discrepancy could be due to inadequate supervision and follow up to infrastructure development in health care facilities by health administrators in the study setting.

In this study, more than half of study subjects reported absence of safety signs in health care institutions; which is lower than a report from Bahir Dar town [27]. Health care workers working in health care institutions that had no safety sings in corridor were 1.82 times more likely to be exposed to blood and body fluids than their counterparts.

Conclusion

This study identified higher percentage of occupational exposure to blood and body fluids among health care workers in the study setting. Lack of on-job training on prevention of occupational infection, absence of safety signs in health care institutions, and inadequate hand washing facilities in department or ward were found to be independent predictors of occupational exposure to BBFs among HCWs.

All relevant stake holders in health need to provide training on prevention of occupational infection to HCWs and ensure the presence of enough hand washing facility in department or ward. Moreover, promote the use of safety signs in health care institutions.

Limitation of the study: A recall bias is likely to occur as the information on exposure was obtained from the past one year.

Strength of the study: Pre-testing of the questionnaire before actual data collection, training and supervision to control quality of the data

Competing interests

The authors declare that this study is free of any competing financial and non-financial interests.

Authors' contributions

MT; was involved in principal role in the conception of ideas, developing methodologies and writing the article, MM guided in the conception and design was also involved in the analysis and interpretation of findings. ATB participated in the analysis, interpretation and writing. All authors read and approved the final version of the manuscript.

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