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RESEARCH ARTICLE

Occupational Exposure to Blood and Body Fluids among Health Care Workers at Hospitals of Aksum Town, Tigray, Ethiopia: A Cross-Sectional Study

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Abstract

Background: Health care workers face a daily risk of occupational exposure to blood and body fluids that makes susceptible them for pathogens at working areas. The most common pathogens are related with viruses like Hepatitis B, C and Human Immuno-deficiency Virus and bacteria's that are causing infections with chronic problems to even disabilities and deaths.

Purpose: The aim of this study is to assess the occupational exposure to blood and other body fluids and their associated factors among health care workers working in hospitals of Aksum town.

Methods: Facility based cross-sectional study was conducted from April 21 to May 21, 2019. A total of 219 participants were selected for the study using simple random sampling technique. To collect the data, a structured questionnaire was used. Then collected data was entered in to SPSS version 23 software packages for analyzing the data on the bivariable and multivariable logistic regression model. The degree of association between dependent and independent variables were assessed using the odds ratio and 95% confidence interval, and variables with a p-value < 0.05 was considered as significant.

Results: The study revealed that 53.88% of health care workers had experienced occupational exposure to blood and other body fluids. Those health care workers who had more work experience had a more chance of exposure (AOR 4.74 (1.99-9.87)). Nurses are more than fivefold to be exposed than physicians. Those health care workers, who didn't wear gloves during procedure, had 2.02 times more exposure to blood and other body fluids than those who wore gloves during procedures (AOR 2.02, 95% (CI 1.02-3.31)).

Conclusion: Magnitude of occupational exposure was high among healthcare workers. These exposures of health care workers to blood and body fluids were determined by the availability of personal protective equipment in the health facilities, training on infection prevention, infection prevention methods with in the hospital and compliance with guidelines.

Keywords

Body fluid, Blood, Health professionals, Occupational exposure, Ethiopia

List of Abbreviations

AKUCSH: Aksum University Comprehensive Specialized Hospital; BBFs: Blood and Body Fluids; HCWs: Health Care Workers; HIV: Human Immunodeficiency Virus; PPEs: Personal Protective Equipment; SPs: Standard Precautions; UP: Universal Precaution

Introduction

Occupational exposure to blood and other body fluids (BFFs) is a daily risk faced by health care workers (HCWs'). They are the most commonly exposed groups to pathogens that can transmitted by bacteria and viruses like Hepatitis B, Hepatitis C and Human Immuno-Deficiency Virus [1]. The exposure to blood and body fluids affects the safety and wellbeing of health care workers and compromise the overall quality of the health care delivery system as well. Health care workers also face significant level of fear, emotional distress, and anxiety that may result in critical changes in occupational behavior [2].

Exposure to blood and other body fluids (BFFs) is significantly reduced by universal precaution (UP)

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measures but, there is still a high prevalence of injuries to needle stick, cuts and splashes of patients' body fluids among health care workers. These exposures cause them susceptible to infections including HIV and other pathogens. Those who work in the operating, delivery, emergency, laboratory and intensive care units have an increased risk for the exposures [3,4].

Worldwide, occupational exposure of health care workers to blood and body fluids posing a major health care problem. A study revealed that from 35 million HCWs, more than 8% of them are exposed to blood-borne pathogens [4]. In another reviewed article, more than half of study participants had occupational exposure to BBFs [5].

The magnitude of occupational exposure to BBFs in developing countries ranges from 1.8% to 5.8%. Factors associated with this exposures were related with prolonged working hours, work experience, lack of education and training programs, lack of personal protective equipment's (PPEs) and suboptimal compliance to universal precautions (UPs) [6,7].

In Ethiopia, there is paucity of data regarding the national burden of health care workers exposure to blood and body fluids. In some studies that are done in the country, there is low self-reporting of HCWs' toward exposure. But, the number of HCWs having had sharps injury and BBFs exposure was still high [8,9]. Despite the international and national burden of the problem, there is no previous study was conducted in our study settings. Therefore, the aim of this study was to assess the occupational exposure of health workers to blood and body fluids and their associated factors among health care workers in hospitals of Aksum city.

Methods and Materials

Study area and period

A facility based cross-sectional quantitative study design was conducted on health care workers in Aksum University Comprehensive Specialized Hospital (AKUCSH) and St. Mary Hospitals of Aksum Town, Tigray Regional State, North Ethiopia from April 21 to May 21/2019.

Participants

All fulltime health care workers, from hospital units and with at least 6-month experience in their current hospital were included in the study. Proportional allocation of the sample size for the hospitals was done to select 219 participants. Then simple random sampling technique was conducted to each hospital by using the list of professionals as a sampling frame.

Data collection procedures

Six trained data facilitators, two supervisors and principal investigator were participated for the successful completion of the study. They had a minimum of BSc degree in the field of health sciences. The self-administered questionnaires were distributed for the study participants.

The data collection tool has three parts that contains questions on socio-demographic information, questions on awareness about training on infection prevention and utilization personal protective equipment's (PPE) and questions on occupational exposure to blood and body fluids.

Data analysis procedures

The data was entered into EpiData version 3.1 and analyzed using statistical software package for social science students SPSS V. 23.0. Descriptive statistics was used to describe the sociodemographic characteristics of participants, training on infection prevention and utilization personal protective equipment's and occupational exposure to blood and body fluids. Bivariable logistic regression analysis were used to determine level of association between independent and outcome variable and those variables with P value < 0.25 were entered to multivariable logistic regression analysis to identify association and control confounding variable. Variables with P-value of < 0.05 at 95% CI were considered as statistically significant. Then finally the data was displayed by using texts, and tables.

Data quality management

Training was given for supervisors and data collectors on the objectives of the study, the contents of the questionnaire, issues related with keeping confidentiality of the responses and the rights of respondents to proceed or to refuse. Pre-test was done at Suhul Hospitals (nearby hospital) and necessary modifications were made. During data collection period, follow up and supervision was conducted by the investigators and continuous support was given to participant at the time of difficulty. Principal investigator and data collectors checked collected data every day at the end of each data collection day.

Ethical consideration

Primarily, ethical clearance was obtained from Aksum university health science college and comprehensive specialized hospital department of nursing (with approval number: AKUCHS/RSH/0121/19). Official letters of cooperation were obtained from the university to the hospital and brief explanation about the purpose of the study was given to the hospital administration. After getting permission from hospital administration, participants consent was obtained after a brief explanation of why they were taking part in the research before conducting the study. To maintain confidentiality, name of the participants was not disclosed and the data was collected by filling self-administration questioners. Anyone not willing to take part in the study was given full right to withdrawn from the study.

Table 1: Socio-demographic characteristics of HCWs in hospitals of Aksum town, Aksum, Tigray, Ethiopia, 2019.

Variables		Frequency (%)
Age (years)	< 25	20 (10)
	25-30	142 (71)
	31-35	27 (13.5)
	36-40	8 (4)
	41-45	1 (0.5)
	> 45	2 (1)
Sex	Male	140 (63.93)
	Female	79 (36.07)
Marital status	Married	109 (49.77)
	Single	110 (50.23)
Religion	Orthodox	179 (81.74)
	Muslim	28 (12.79)
	Protestant	12 (5.48)
Job category	Nurse	140 (63.93)
	Midwife	30 (13.70)
	Lab tech.	12 (5.48)
	Anesthesia	4 (1.83)
	Physician	33 (15.07)
Educational Qualification	Diploma	14 (6.39)
	BSc	163 (74.43)
	MSc	9 (4.11)
	GP	25 (11.42)
	Specialist	8 (3.65)
Work experience	≤ 1year	34 (15.52)
	2-5 years	154 (70.31)
	≥ 6 years	31 (14.15)

Results

Socio-demographic characteristics

A total of 219 health care workers were participated in the study from both AKUCSH and St. Merry hospitals. From them, 140 (63.93%) were males, 155 (70.78%) of the study participants were fall in range between 25-30 years, 164 (74.89%) of participants were BSc degree holders, 25 (11.42%) were general practitioners. Regarding with job category of the HCWs, 137 (62.56%) were nurses, 32 (14.61%) physicians and 34 (15.53%) were midwifes. 70.31% of health care workers have a 2-5 years of work experience (Table 1).

Training on infection prevention and the use of personal protective equipment (PPE)

In this study more than fifty percent of the study participants had reported as there is enough PPEs throughout the year and 208 (94.98%) were aware of and concerned about exposures and injuries following exposures. 119 (54.34%) use consistently PPE while 113 (51.60%) had taken training on occupational infection prevention. 52.97% participants were reported that there are enough infection prevention protocols in the hospital they work in. Almost 74.43% of the study participants reported the presence of enough hand washing materials at their working department and 68.86% washed their hands between procedures (Table 2).

Table 2: Infection Preventions (IPs) and use of personal protective equipment (PPE) at hospitals of Aksum town, Aksum, Tigray, Ethiopia, 2019.

Variables		Frequency (%)
Availability of personal protective equipment throughout the year	Yes	123 (56.16)
	No	96 (43.84)
Awareness about exposure and the impact of the resulting injuries	Yes	208 (94.98)
	No	11 (5.02)
Training on infection preventions and standard precautions	Yes	113 (51.60)
	No	106 (48.40)
Use of personal protective equipment's	Yes	119 (54.34)
	No	100 (45.66)
Availability of hand washing basins in the department/unit	Yes	163 (74.43)
	No	56 (25.57)
Hand washing practice before and after doing any procedure	Yes	111 (68.86)
	No	52 (31.14)
Infection prevention methods in the hospital	Yes	116 (52.97)
	No	103 (47.03)

Exposure to blood and body fluids

In this study, 118 (53.88%) of respondents have occupationally exposed to either blood splash or fluid splash on their body and 19.49% of those exposures occurred before one year and 20.34% of exposures occurred before 3 years. A total of 77 (35.16%) and 53 (24.20%) of respondents had been exposed to blood splashes and fluid splashes respectively. From exposed to fluid splash, 15.01% were exposed to urine, faces, penile/vaginal discharge and 8.68% exposed to amniotic fluid (Table 3).

Factors associated with occupational exposure to blood and body fluids

Those variables shown significant association on bivariate analysis were entered into multivariate logistic regressions model. Health care works' experiences, type of occupation, not donning gloves during procedures and failure to complying with standard producers, were variables which showed significant association with occupational exposure to BBFs. Those health care workers who had work experience of more than six years had more exposed than those who had less than two years of work experience (AOR, 4.74 (1.99-9.87)). Nurses are more than fivefold to be exposed than physicians. Those health care workers who didn't wear gloves during procedure had 2.02 times more exposed to blood and other body fluids than those who wore gloves during procedures (AOR 2.02 (1.02-3.31)) (Table 4).

Table 3: Prevalence of occupational exposure to blood and other body fluids among HCWs at hospitals of Aksum town, Tigray, Ethiopia, 2019.

Variables		Frequency (%)
Exposure to BBFs while doing or assisting procedures	Yes	118 (53.88)
	No	101 (46.12)
Frequency of exposure	≤ 1 time	23 (19.49)
	2-3 time	71 (60.17)
	4-5 time	20 (16.95)
	≥ 6 time	4 (3.39)
Type of exposure	Fluid splashing	53 (24.20)
	Blood splashing	77 (35.16)
	Needle stick injury	33 (15.07)
	Cut (surgical blade)	24 (10.96)
Type of fluid exposed	Amniotic fluid	19 (8.69)
	Pleural fluid	3 (1.37)
	Peritoneal fluid	4 (1.83)
	Urine, faces, penile/vaginal discharge	33 (15.01)
Working area where exposure occurs	Medical ward	28 (12.79)
	Surgical ward	43 (19.63)
	Pediatric ward	20 (9.13)
	Operation room	12 (5.48)
	Emergency room	16 (7.31)
	OPD	3 (1.37)
	Gynecological ward	22 (10.05)
	Laboratory room	4 (1.83)

Table 4: Factors associated with occupational exposure to blood and body fluids among HCWs at hospitals of Aksum town, Tigray, Ethiopia, 2019.

Variables		Occupational Exposure		Crude OR (95% CI)	Adjusted OR (95% CI)
		Yes	No		
Sex	Male	102	38	0.80 (0.76-1.99)	
	Female	45	34	1.00	
Age group	< 25	11	6	3.11 (0.34-5.16)	
	25-30	106	36	0.55 (0.21-1.01)	
	31-35	22	15	0.83 (0.75-2.11)	
	> 35	11	9	1.00	
Working experience (years)	≤ 2 year	21	13	1.00	1.00
	2-5 years	97	57	1.22 (0.47-1.88)	
	≥ 6 years	18	13	5.26 (2.43-8.64)	4.74 (1.99-9.87)*
Occupation (profession)	Nurse	110	30	5.03 (1.34-20.99)*	11.3 (1.48-90.0)*
	Midwife	21	9	2.01 (0.42-1.33)	
	Lab tech.	10	2	1.04 (0.22-1.34)	
	Physician	14	19	1.00	1.00
	Anesthesia	1	3	0.53 (0.16-1.87)	
Work department	Medical ward	20	8	1.00	
	Surgical ward	64	29	0.64 (0.42-2.61)	
	Pediatric ward	11	9	0.88 (0.35-1.72)	
	Operation room	5	7	1.11 (0.34-1.79)	
	Emergency room	35	31	1.30 (0.12-5.03)	

Shortage of PPE	Yes	104	19	1.75 (1.09-2.79)	
	No	56	40	1.00	
Presence of hand washing facilities	Yes	107	16	1.00	
	No	78	18	1.80 (1.22-2.85)*	
Gloving during last procedure	Yes	59	16	1.00	1.00
	No	107	37	2.01 (1.31-3.03)*	2.02 (1.02-3.31)*
Compliance with guidelines	Yes	98	15	1.00	1.00
	No	67	39	2.03 (1.11-3.04)*	2.04 (1.06-3.41)*
Work place safety for IPs	Yes	89	27	1.00	
	No	76	27	2.05 (0.87-2.76)	

*$p < 0.0$

Discussion

In this study, 53.88% of HCWs had occupational exposure to blood and body fluids in their prior work experiences, which is nearly similar with a study conducted in the northern Ethiopia among six hospitals of (56.3%) [8]. However, this prevalence is higher than the studies done in Kenya rift valley provincial hospital (25%) and in Egypt (32.75%) [10,11]. And lower than the survey conducted in China (66.3%) [12]. This difference in prevalence may be due to socio-demographic variations among study participants, work experience of HCWs, the setting of health care system, PPE availability and access, and in-service trainings about occupational exposures [7].

A total of 35.16% and 24.20% of HCWs in this study reported that they had had blood splashes and fluid splashes respectively, this prevalence is lower than results from China (66.3%) [12]. But this prevalence is higher than that of a study done in Kenya [10]. In this study needle stick injuries prevalence is comparable with the study conducted in the northern Ethiopia (17.2%) and lower than the study conducted in eastern Ethiopia (30.5%) and Nepal (70.2%). Also cut (surgical blade) exposure is high in this study than conducted in Nepal (5%). However, in this study the majority of occupational exposure to BBFs occurred at surgical wards 45 (19.63%) and medical wards 28 (12.79%) [8,13,14].

Conclusion

The prevalence of occupational exposure to BBFs among health care workers in our study was high that more than half of the participants were exposed. Nurses were the most susceptible groups with a blood splash. The most procedures that predispose the occurrence were intravenous line securing and drawing of blood samples. Health care workers' experience, occupation types, failure to wear gloves during procedures, and failure to complying with standard precautions were the reasons for health care workers occupational exposure to blood and body fluids.

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