

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
Volume XIII Issue III Version I YearTadese Ejigu¹, Zeleke Yimechew² and Girmay tsegay³¹ Bahir Dar University*Received: 9 December 2012 Accepted: 3 January 2013 Published: 15 January 2013*

Abstract

Introduction: Occupational exposure to blood and body fluid is a serious concern for health care workers. The problem is more devastating in developing countries like Ethiopia with poor infrastructure and health setup. This study tried to assess the magnitudes of occupational exposure and its associated factors among HCWs and medical students to BBFs in University of Gondar Hospital. Methods: A cross sectional survey was conducted from September 6 to October 2, 2012, in University of Gondar hospital. Two hundred eighty five participants (including health professionals, janitors and medical students) were participated in the study. Stratified simple random sampling technique was used to select the participants. Data was collected through Self-administered questionnaire and interview using structured questionnaire. Result: The overall lifetime and one year prevalence's of occupational exposure to BBF during the study period were 177(70.2

Index terms— occupational exposure, health care workers, blood and body fluid.

1 Introduction

lood and body fluid (BBF) exposure to health care workers and the infectious complications associated with it, is a global issue (1,2,3). Each day thousands of healthcare workers (HCWs), around the world, suffer accidental occupational exposures during the course of their role of caring for patients. These injuries can result in a variety of serious and distressing consequences ranging from extreme anxiety to chronic illness and premature death for the individual involved (4,5).

HCWs in developing countries are at serious risk of infection from blood-borne pathogens particularly hepatitis B virus (HBV), hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV) because of the high prevalence of such pathogens in many poorer regions of the world, especially they are endemic in sub-Saharan Africa (3,6).

In May 2007, the World Health Assembly endorsed the Global Plan of Action on Workers Health (GPA) for the period 2008-2017 with the aim to move from strategy to action and to provide new impetus for action by Member States. It calls on all countries to develop national plans and strategies for its implementation. There have been made countless interventions by employers and workers to attempt to make workplaces healthier, in many countries and many diverse settings (7,8).

Ethiopia's Federal ministry of health (FMOH) has been leading reform in Hospitals throughout the country using EHRIG and IP is one of thematic area for the reform with aim of stopping the transmission of infectious agents is the only way to reduce the occurrence of Health care acquires infections (HCAIs) to ensure the safety of employees, patients and visitors (9).

Occupational hazards faced by healthcare personnel in University of Gondar hospital have received increasing attention but existing surveillance systems and HCWs responsiveness for Safety Precautions are inadequate to describe the scope and magnitude of occupational exposures to infectious agents that HCWs experience, the outcomes of these exposures and injuries, and the impact of preventive measures (10).

2 a) Study Setting

The study was conducted in University of Gondar Hospital; Gondar was one of the metropolitan cities of Ethiopia, founded in 1636 by Emperor Fasilades, 748 kms northwest from Addis Ababa.

3 (D D D D) C c) Study Population

Sampled health professionals, janitors and medical students Health Care Workers that are assigned for clinical services, academic staffs that had regular program for patient care and graduate batch interns were included in the study.

Health Care Workers who were on leave (maternity, annual, sick, fieldwork) during the study period as well as HCWs who had not worked at least six months within the last one year , were excluded in this study.

4 d) Sample size and sampling technique

Sample size was calculated using a single population proportion. Considering 20.2% of one-year prevalence of at least one BBFs exposure in previous study in Ethiopia (13), a sample size of 285 was required with sampling error 5%, at a 5% c confidence level.

A stratified sampling technique was used to select the participants using lists of monthly payroll as a sampling framework and the number of participants selected from each stratum was determined by proportional to size.

5 e) Study V ariables

Dependent:-Exposures of HCWs and medical students to blood and body fluids.

Independent:-Age, gender, marital status, religion, occupation, work experience in the area, uses of Personal Protective equipments, Infection Prevention trainings, educational status and working shift.

6 f) Data collection procedures and quality assurance

The data collection was done via selfadministered questionnaire and interview using structured questionnaire. Self-administered questionnaire was used for Health professionals and interns, and data from janitors was collected by interview using the structured questionnaire.

Quality of data was assured through intensive training for data collectors and supervisors, pre-testing the questionnaire on similar setting that was not included in the study, close supervision and assistance of data collectors, checking filled questionnaires on daily basis for completeness, clarity and accuracy of data. In addition data cleaning was also made before commencement of the analysis.

7 II.

8 Data Processing and Analysis

Data was coded and entered into the SPSS version 20. Descriptive statistics was made using frequencies, tables, and figures and narrative explanations. Associations were examined using binary and multiple logistic regressions. P-value less than 0.05 was taken as a cut-off point to say significant at 95% confidence level.

9 a) Ethical Considerations

Ethical approval was obtained from the Research and Ethics Review Committee at Bahir Dar University. Written consent was also obtained from Amhara-regional health Bureau and University of Gondar hospital to conduct the study. All the study participants were informed about the purpose of the study and finally verbal consent was obtained before data collection. The respondents had the right to refuse participation or terminate their involvement at any point during the study. Information provided by each respondent was kept confidential. Furthermore, report writing did not refer a specific respondent with identifiers.

10 III.

11 Result

Out of the 285 selected HCWs and graduate batch interns, 252 responded giving response rate of 88.4%. Twelve incomplete questionnaires were discarded. Among the respondents, 127 (50.4%) were males. From the total participants 158 (62.7%) were health professionals, (24.6%) were housekeeping staffs, and 32 (12.7%) were graduated interns. Respondents age range from 19 to 54 years with a mean age of 29 years. Among participants in this study 113(44.5%) had less than two years of work experiences. HCWs who hand experiences two to four years were 62(24.6%) and only 45(17.7%) were five years and more experienced in their current position. Other demographic information is presented in Table 1.

The overall prevalence of lifetime and one-year prevalence of one occupational exposure to BBF at least once during the study period were 177(70.2%) and 1587 (62.3%) respectively (Table 2). The exposure rate of BBFs in the last-one year was highest among interns 29(90.6%), followed by HP 100(63.3%) and least among housekeeping

94 staffs 28(45.2%). Among exposed for NSI in the last twelve months, 50(61.0%) of them encountered once and 32
95 (39.0%) of faced two and more times.

96 Of those NSI exposed, 25 (30.5%) of respondents reported that the needle or sharp objects that cause the recent
97 injury were visibly contaminated with blood prior to causing the injury, where as 38(46.3%) and 19(23.2%) were
98 not contaminated and not sure respectively. Majority of the recent NSI, 58(70.7%) of were moderately penetrated
99 skin while superficial skin scratch and deep punctures or wounds were 18 ?? Overall, performing procedure for
100 patients 78(52.2%) was the most hazardous procedure particularly among interns and staff health professionals.
101 Disassembling, processing and cleaning used equipments 30(19.1%), phlebotomy, collecting and transporting
102 blood sample 21 (13.4%) and assisting delivery 16(10.2%) were other hazardous procedures exposing the HCWs
103 to potential infectious material in order of frequency. Major causes for occurrences BBFs exposure are presented
104 in Figure 1.

105 12 IV.

106 13 Discussion

107 Exposure to blood and potentially infectious body fluids has been recognized as a potential health hazard in
108 HCWs (1,4). In this study, 62.3% of the respondents were exposed to blood and contaminated body fluids at
109 least once in the preceding year through NSI and splash .This was similar with studies in South Africa (62%)
110 (11). There was a 32.5% of one year prevalence of needle sticks and sharps injuries identified in this study ,which
111 was the same with previous study in Hawassa City(30.9%), but different from Harari Regional State and Dire
112 Dawa Administrative Council (17.5%) and Addis Ababa (19%) (12)(13)(14). Although needle stick injuries are
113 most common means of exposure for health care workers, blood borne pathogens can also be transmitted through
114 contact with eyes, nose, and mouth or through broken skin (15, ??6). The prevalence of one year splash exposure
115 of BBFs was 53.2%, which was also different from Harari Regional State and Dire Dawa Administrative Council
116 (20.2%) (12). This high prevalence of NSI and splash exposure in this study might be due to inclusion of medical
117 students and housekeeping staffs which were not targeted in previous studies and might also be due to high work
118 load on few professionals in the study area.

119 It has been reported that medical students experience the majority of needle-stick injuries in the world (3,5).
120 The results of this study showed that highest prevalence of percutaneous (68.8%) and mucosal (75%) exposure
121 among medical students, which was almost comparable with other studies in South Africa (62%) and Uganda
122 that reveal interns suffered more NSI than any occupational groups (17,18).

123 Eighty two percents of respondents had work experiences of less than five years. There was significant
124 correlation between work experiences and the rate occupational exposure to BBFs. HCWs whose experience was
125 two-four years were more exposed than HCWs who had experiences above four years (AOR=3.2,95% CI=1.4-7.5).
126 Studies done in Iran showed that about 54% of the personnel with less than five years of working experience were
127 exposed at least once during the previous year; however, this was 30.6% among the personnel with more than
128 ten years of experience (19). Study in India identified that as experience was increasing, incidence of injury was
129 decreasing (21). Moreover, HCWs in University of Gondar hospital have to deal with a high load of patients,
130 this fact combined with urgency of some interventions and unavailability of PPEs might contributed to this high
131 prevalence of BBFs among studied groups.

132 Healthcare workers have increased chance of acquiring blood borne pathogens through occupational exposure
133 in developing countries due to a combination of increased risk and fewer safety precautions (3,22). Most exposures
134 are caused by a departure from standard precautions (23). One of the factors for occurrences of BBFs exposure in
135 this finding was lacks of use of PPEs (39.5%), non-consistent use of PPEs was found to be associated with chance
136 of sustaining NSI previous studies in Ethiopia (12,13,14,24). Wearing gloves may reduce (>50%) the volume of
137 blood introduced through an injury (23). A major reason for not using all PPEs was inadequate supply (59.7%).
138 Previous study of Ethiopia showed that Seventy-nine percent of HCWs reported that they did not wear any of
139 the PPEs because of unavailability (24). Exacerbating the risk to health care workers in developing countries is
140 a lack of gloves, gowns, masks, and goggles to protect them from contact with blood(3).

141 Needle-stick injuries to providers are usually attributable to the abrupt movement of patients during the
142 procedure (25). Unexpected movement of patients during care was second major factor for BBFs exposures
143 (23%); this was similar with report from West Africa (23%) (27). In previous studies in Ethiopia and abroad,
144 needle recapping was major causes of NSI Regarding the overall situation in which the recent exposures occurred,
145 49(31.2%) were occurred in the morning shift, while 40(25.5%) and 31 (19.7) occurred in the afternoon and in
146 the night shifts respectively; but 37(23.6%) of them did not remember the shift that the exposure was happened.
147 (5,(12)(13)(14)19), promisingly, it was of interest that needle recapping was not listed as a cause for accidental
148 exposure in this study, suggesting adherence to the hospital's protocol and guidelines (9).

149 The risk of acquiring blood borne infections (BBI) from occupational exposures is dependent on the
150 concentration of infectious virus in the implicated body fluid, the volume of infected material transferred,
151 frequency of percutaneous, per mucosal exposure to blood or body fluid, device visibly contaminated with the
152 source patient's blood, depth of injury, procedures involving a needle placed directly in the patient's vein or
153 artery and type of needle involved (hollow needles contain more blood therefore there will be a higher risk of
154 transmission) (3,26). In this survey, Hollow needles contributed to 55% of the needle-stick injuries which was the

155 same with prior studies in Ethiopia and overseas ??5, 6, 12-14, 19, 20, 24). Suture needles contributed to 28%
156 of the percutaneous exposures, which was the same as South Africa (17).

157 Of the mucosal exposures within the last 12 months, blood and bloody products were involved in 64% of
158 exposure. NaSH showed that blood and blood product involved in almost 79% of all reported splash exposures
159 and it was 86% study in Iran (19,20).

160 Study in India explored that exposure was inversely related to training, a sizeable number of those trained were
161 subsequently exposed (21). In this study satisfactory training, but not training by itself, was highly associated
162 with preventions of BBFs exposures. HCWs who was satisfied with trainings given was less likely exposed for
163 BBFs than none trained and unsatisfied one (AOR=0.501, 95% CI=0.23-0.91).

164 14 a) Strength and Limitations of the Study

165 Including both health professionals and non health professionals like janitors/cleaners to asses occupational
166 exposure to BBF could be taken as the strength of the study but not screening of viral infections like HIV and
167 hepatitis for exposed HCWs and since the study was based on self report about previous one year and life time
168 occupational exposure to BBF the result might be affected by recall bias.

169 Injuries from sharp objects and BBFs splash exposure among HCWs were a widespread occupational hazard
170 in University of Gondar hospital and higher previous studies in Ethiopia. Occupation, work experience and
171 satisfactory training were factors for occurrences occupational exposure. This study showed that medical students
172 were more exposed to BBFs than health professionals and housekeeping staffs.

173 This loss of a wage-earning health care worker can be devastating to the financial security of the worker's
174 family. The loss of HCWs can also have a disproportionate effect on the fragile health care infrastructure of
175 Ethiopia, where trained health professionals are scarce in relation to the overall populations they serve. VI.

176 15 Recommendations

177 1. Initial effort is supposed to be focused on altering the behavior of HCWs to follow standard operating
178 procedures during patient care and consistent availability of PPEs.

179 2. The ways of infection prevention training supposed to be revised and participant centered because the
180 results of this study showed that satisfactory training, but not training by itself, has impacts on prevention of
181 blood and body fluid exposures to healthcare workers.

182 3. Attending physicians and senior HCP must be made responsible for ensuring that students are capable of
183 performing procedures safely before expecting them to do so without supervision. It is responsibility of medical
184 educators to provide a safe learning environment for students before they face the risks of direct patient care.

185 16 VII. cknowledgements

186 We sincerely thank the study participants for their participation in the study.

187 17 Volume XIII Issue III Version I

188 1 2

¹© 2013 Global Journals Inc. (US)

²Occupational Exposures to Blood and Body Fluids (BBFS) among Health Care Workers and Medical Students
in University of Gondar Hospital, Northwest of Ethiopia



1

Figure 1: Figure 1 :

Body fluids and other body products like tissue accounts 32(23.9%) and 16(11.9%) respectively. Mucosal exposures to amniotic and vaginal fluid 28(43.1%), pleural and other organ fluid 19(29.2%), urine, saliva/sputum and stool 18 (27.7%) and were contributing factors to accidental exposure to body fluids. Of Mucosal exposed HCWs, 62(46.3%) faced small (<5cc) and 12(9.0) moderate (6-50cc) but 013 60(44.8%) did not know the amounts of BBF they faced. The most common exposed body parts were hand and 2 finger 82(52.2%), followed by face, eye and mouth 43 (27.4%). Other less frequent sites were any two body parts at a time (e.g. hand and face) 19(12.1%) and leg and foot 13 (8.3%).

Volume
XIII
Is-
sue
III
Ver-
sion
I
()

22.0%) and 6(2.7%) respectively. Hollow needles contributed to 45(54.9%) of the recent needle-stick injuries. Suture needles and other solid sharps contributed to 23 (28.0%) and glass and non-sharp safety devices causes 14 (17.1%) of the percutaneous exposures.

Of mucosal membranous exposure for blood and other body fluids in the last one-year, 46(34.3%) of

Figure 2: C

2

	NSI	BBF splash N (%)	Total Exposure rate N (%)
Exposure	N (%)		
Life time			
Health prof.	66(41)	108(68)	117(74)
Intern	22(69)	25(78)	29(91)
Housekeep	14(23)	23(37)	31(50)
Total	104(41)	156(62)	177(70)
Last 12 months			
Health prof.	49(31)	89(56)	100(63)
Intern	22(69)	25(78)	29(91)
Housekeep.	11(18)	21(34)	28(45)
Total	82(33)	134(53)	157(62)

Figure 4: Table 2 :

3

Variable	Exposed (n=157)	Not Exposed (n=95)	AOR (95% CI)	P- Value
Occupation				
Intern	29(19)	3(3)	9.4(1.8-49.9)*	0.009
Health Prof.	100(64)	58(61)	1.2(0.37-3.69)	0.799
Housekeep.	28(18)	34(36)	1	
Experience in years				
< two years	86(55)	59(62)	0.94(0.5-2)	0.863
2-4years	47(30)	15(16)	3.2(1.4-7.5)*	0.008
Above four years	24(15)	21(22)	1	
IP training				
Satisfactory	49(31)	42(44)	0.5(0.3-0.9)*	0.023
Not satisfactory	108(69)	53(56)	1	

Figure 5: Table 3 :

189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243

[Ilo and Joint (2005)] , Who Ilo , Ilo Joint . *Anonymous* 2005. Jan.2012. p. . (AIDS. Last available at ISBN 92-2-117554-5 (web pdf)

[Fdre ()] , Moh Fdre . 2010. 1 p. .

[Alemayehu (2008)] ‘Assessment of Health Care Workers Occupational Exposure to HIV and Post-Exposure Prophylaxis (PEP) in Health Centers and Hospitals of Addis Ababa’. Alemayehu . <http://etd.aau.edu.et/dspace/bitstream/123456789/2546/1/209> Last referred Dec, July. 2008. 2013. 22 p. . (Unpublished MPH thesis)

[Hutin et al. (2003)] ‘Best Infection Control Practices for Intradermal, Subcutaneous, and Intramuscular Needle Injections’. Y Hutin , L Chiarello , Catlin M Stilwell , B Ghebrehiwet , T Garner , J . <http://www.who.int/bulletin/volumes/81/7/Hutin0703.pdf> WHO Bulletin 2003. Jan.22/2013. 81 p. . (Last referred)

[Blood borne pathogen and needle stick prevention. U .S. Department of Labor, Occupational Safety Health Administration Blood borne pathogen and needle stick prevention. U .S. Department of Labor, Occupational Safety & Health Administration]. [//www.osha.gov/SLTC/bloodbornepathogens/recognition.html](http://www.osha.gov/SLTC/bloodbornepathogens/recognition.html) *Blood borne pathogens: Questions and Answers about Occupational Exposure Oregon OSHA2008*, (Washington DC) Jan.22/2013. 2010. p. . (Last referred)

[Mathieu (2012)] *Body Fluid Exposures*, N Mathieu . <http://emedicine.medscape.com/article/782611-overview> Updated Aug.22. 2012. Jan.22/2013. University of New York Downstate Medical Center

[Burton (2010)] J Burton . http://www.who.int/occupational_health/healthy_workplace_framework.pdf WHO Healthy Workplace Framework and Model: Background and Supporting Literature and Practices; WHO Headquarters, (Geneva, Switzerland) February 2010. p. . (Last available December 30/2012 at)

[Tadesse and Tadesse ()] *Epidemiology of needle sticks injuries among health-care workers in Awassa City*, M Tadesse , T Tadesse . 2010. Southern Ethiopia. 40 p. .

[Ethiopian hospital reform implementation guideline] *Ethiopian hospital reform implementation guideline*,

[Abere (April 20012)] *Focal person of OHS*, G Abere . April 20012. University of Gondar hospital

[Aide-Memoire ()] *for a strategy to protect health workers from infection with blood borne viruses*, Aide-Memoire . WHO/BCT/03.11:1.LastavailableDec.8/2011atwww.injectionsafety.org 2005. Geneva, Switzerland. WHO

[Gohnet (2009)] ‘Interventions for Healthy Environments’. Wilburn S Gohnet . [atwww.who.int/entity/occupational_health/gohnet_17_finalrevised.pdf](http://www.who.int/entity/occupational_health/gohnet_17_finalrevised.pdf) WHO Geneva 2009. December 30/2012. 17 p. .

[Last referred Dec ()] <http://www.cdc.gov/nhsn/PDFs/NaSH/NaSH-Report-6-2011.pdf> Last referred Dec, 2013. 47 p. .

[Newson and Kiwanuka ()] ‘Needle Stick Injury in a Ugandan Teaching Hospital’. D H Newson , J P Kiwanuka . <http://cat.inist.fr/?aModele=afficheN&cpsidt=13802845> *Annals of Tropical Medicine and Parasitology* 2002. 96 p. . (Last available Dec8/2013 at)

[Gessesew and Kahsu ()] ‘Occupational exposure of health workers to blood and body fluids in six hospitals of Tigray region’. A Gessesew , A Kahsu . *Ethiop MedJ* 2009.

[Singru and Banerjee ()] ‘Occupational exposure to blood and body fluids among health care workers in a teaching hospital in Mumbai’. S A Singru , A Banerjee . <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2782223/> Last referred Dec, 2008. 2013. 33 p. .

[Karani and Rangiah (2011)] ‘Occupational exposure to blood-borne or body fluid pathogens among medical interns at Addington Hospital’. H Karani , S Rangiah . *Durban. SAfr Fam Pract* 2011. Dec.12, 2011. 53 (5) p. .

[Hadadi et al. ()] ‘Occupational exposure to body fluids among health care workers in Iran’. A Hadadi , S Afhami , M Karbakhsh , N Esmaipour . <http://www.ncbi.nlm.nih.gov/pubmed/18581025> Last referred Dec, (Singapore) *MedJ2008*. 2012. 49 p. .

[Morais and Cotton ()] ‘Occupational Exposure to HIV among Health Care Workers in South Africa’. B J Morais , M Cotton . *Int Conf AIDS* 2002. 14 p. .

[Telali ()] *Occupational exposure to sharps and splash:Risk among health care providers in three tertiary care hospitals in South India*, S Telali . <http://www.bioline.org.br/pdf?oe06008> 2006. 10 p. . (Last available at Dec 8/2012 at)

[Gold and Tomkins ()] *Occupational Post Exposure Prophylaxis for HIV: A discussion paper*, WHO/ILO, J Gold , M Tomkins . <http://www.uow.edu.au/content/groups/public/@web/@health/documents/doc/uow025491.pdf> 2005. Geneva.

- 244 [Lee ()] 'Occupational transmission of blood borne diseases to healthcare workers in developing countries:
245 meeting the challenges'. R Lee . [http://www.ccih.med.br/m/aluno/mod/biblioteca_virtual/
246 revistas_2009/jornal_of_hospital_infection/agosto/285.pdf](http://www.ccih.med.br/m/aluno/mod/biblioteca_virtual/revistas_2009/jornal_of_hospital_infection/agosto/285.pdf) *J Hosp Infect* 2009. p. . (Last
247 available April 18/2013 at)
- 248 [Wilburn (2004)] 'Preventing Needle sticks Injuries among Healthcare Workers: A WHO-ICN Collaboration'. S
249 Wilburn . *International Journal of Occupational and Environmental Health* 2004. December 12. 2011. 10 (4)
250 p. . (Last Available at [www.who.int/occupational_health/
activities/5prevent](http://www.who.int/occupational_health/activities/5prevent))
- 251 [Adelisa and Updated ()] 'Public Health Service Guidelines for the Management of Occupational Exposures to
252 HIV and Recommendations for PEP'. L Adelisa , U S Updated . [http://www.cdc.gov/mmwr/preview/
253 mmwrhtml/rr5409a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm) *CDC* 2005. 54 (RR09) p. . (Last available at Dec 8/2012 at)
- 254 [Sagoe-Moses et al. ()] 'Risks to health care workers in developing countries'. C Sagoe-Moses , R D Pearson , J
255 Perry , J Jagger . *Find this article online Last referred Dec, 2001. 2012. 345 p. .*
- 256 [Reda et al. ()] 'Standard Precautions: Occupational Exposure and Behavior of Health Care Workers in
257 Ethiopia'. A A Reda , S Fisseha , B Mengistie , J-M Vandeweerd . *PLoS ONE* 2010. 5 (12) p. .
- 258 [The United States National Surveillances System for Health care workers (NaSH), CDC (1995)] *The United*
259 *States National Surveillances System for Health care workers (NaSH), CDC, [http://www.cdc.gov/nhsn/
260 PDFs/NaSH/NaSH-Report-6-2011](http://www.cdc.gov/nhsn/PDFs/NaSH/NaSH-Report-6-2011) June 1995 through December 2007. December /2012. p. .*