

Predictors of occupational exposure to HIV infection among healthcare workers in southern Ethiopia

Tadewos Beyene¹, Sebsibe Tadesse²

1. Southern Nations Nationalities and People's Regional State Health Bureau, Hawassa, Ethiopia
2. Institute of Public Health, the University of Gondar, Gondar, Ethiopia

doi: 10.3396/IJIC.v10i3.020.14

Abstract

Occupational risk of HIV transmission is a major concern for healthcare workers worldwide. However, there is a paucity of studies clarifying the situation in most of Sub-Saharan African countries like Ethiopia. The objectives of this study were to determine the prevalence of occupational exposure to HIV infection, and to identify the associated factors among healthcare workers at governmental health institutions in Hawassa Town, southern Ethiopia.

An institution-based cross-sectional study was conducted at two hospitals and six health centres run by the Government in Hawassa Town, southern Ethiopia from June to September 2013. A total of 532 healthcare workers were recruited into the study. Data was collected by using a pre-tested and structured interview questionnaire. Data was analyzed using SPSS for windows version 16.0. Multivariable analyses were employed to see the effect of explanatory variables on dependent variable.

A total of 276 (51.9%) healthcare workers experienced occupational exposure to HIV infection within the previous year. Recapping of needles [AOR: 3.1, 95%CI: (2.1, 4.6)], lack of training on infection prevention and patient safety [AOR: 3.3, 95%CI: (1.6, 5.8)], and night workshift [AOR: 3.4, 95%CI: (1.1, 6.9)] were found to be the independent predictors of occupational exposure to HIV infection.

This study revealed that the prevalence of occupational exposure to HIV infection among HCWs in governmental health institutions was high. So, effective HIV prevention measures should target on areas, such as proper design and use of needles, provision of adequate training on infection prevention and patient safety, and monitoring of shift work schedules.

Keywords: Medical staff, hospital; Nursing staff, hospital; HIV infection; Exposure, occupational

Corresponding author

Sebsibe Tadesse

Institute of Public Health, the University of Gondar, Gondar, Ethiopia

Email: sbsbtadesse90@gmail.com

Introduction

Healthcare workers (HCWs) are at high risk of contracting Human Immunodeficiency Virus (HIV) infection through a percutaneous, mucous membrane or non-intact skin exposure to blood, body fluids, sharps, or needles that occurs during the course of their work.^{1,2} Developing countries, especially those in Sub-Saharan Africa, account for the highest prevalence of HIV-infected patients and more than 90% of occupational exposure occurs in these countries.³⁻⁸

Ethiopia is one of the countries hit hardest by HIV/AIDS epidemic.⁹ Due to diversified clinical activities together with high patient flows, short staffing and less developed technologies, occupational exposure to HIV infection is a concern for HCWs in Ethiopia.^{5,9} However, there is a dearth of studies clarifying about state of occupational exposure to HIV infection among HCWs in most of Sub-Saharan African countries like Ethiopia.¹⁰ Therefore, the objectives of this study were to determine prevalence of occupational exposure to HIV infection, and to identify the associated factors among HCWs at governmental health institutions in Hawassa Town, southern Ethiopia. The study will fill a critical gap in understanding risk of HIV acquisition among HCWs in Ethiopia and contribute to the growing HIV research in low-income countries. Such studies may also help in developing evidence-based interventions to improve HCWs infection safety.

Methods and materials

Study design, area and period

An institution-based cross-sectional study was conducted at two hospitals and six health centres run by the Government in Hawassa Town, southern Ethiopia from June to September 2013.

Participants and data collection

All health professionals and auxiliary staff who had close contact with patients, sharps, needles, and blood and body fluids were included in the study. Workers who were not available at the time of data collection period were excluded from the study. A pre-tested and structured interview questionnaire was used to collect data from the study participants. The questionnaire contained detailed information on socio-demographic, behavioural, and environmental factors which were believed to affect workers' occupational exposure to HIV infection.

Data quality assurance

The interview questionnaire was translated into Amharic, the official language, and back to English to maintain the consistency of the questions. The training of data collectors and supervisors emphasized issues such as data collection instruments, field methods, inclusion/exclusion criteria, and record keeping. The principal investigator and supervisors coordinated the interviewing process, made spot-checks and reviewed the completed questionnaires on daily basis.

Sample size calculation

A single population proportion formula was used to determine the sample size of the study. The total sample size was determined to be 594 by taking 95% level of significance, 31% expected prevalence of occupational exposure to HIV infection,¹¹ 5% margin of error, design effect of 2, 5% non-response rate, and 80% power.

Sampling Technique

Hawassa Town has two hospitals, one district and one referral, and six health centres run by the Government. Both hospitals were included in the study and for the health centres, three of them were included by lottery method. The individual respondents were reached through their respective heads of the departments.

Data management and statistical analyses

Data entry and cleaning were carried out using Epi Info 2000 version 3.5.1 and analyzed using SPSS software package version 16.0. Frequency distribution, mean and percentages were employed for most variables. Forward stepwise binary logistic regression analysis was done to assess the relative importance of the explanatory variables on the dependent variable. Odds ratio (OR) with 95% confidence interval (CI) was used to test for the statistical significance of variables.

Operational definitions

Healthcare workers: Refers to all paid and unpaid persons working in healthcare settings who have the potential for exposure to infectious materials.

Occupational exposure to HIV infection: Refers to a percutaneous, mucous membrane or non-intact skin exposure to blood, body fluids, sharps, or needles that occurs during the course of an individual's work.

Ethical considerations

The study protocol was reviewed and approved by the Institutional Ethical Review Board of University of Gondar. Government officials at various levels were consulted and permission was obtained prior to data collection. Study participants were interviewed after informed written consent was obtained. Confidentiality was maintained for information collected from each study participant.

Results

Sociodemographic characteristics

A total of 532 HCWs were involved in the study which makes the response rate 89.6%. Majority, 322 (60.5%), of the study participants were females. The mean age of the respondents was 29 ± 7.12 years.

Nearly three-fourths, 387 (72.7%), had diploma and above. Most, 477 (89.7%), had a total work experience of less than ten years. On average most, 434 (81.6%), worked for greater or equal to 40 hours per week. About 436 (82.0%) were assigned to work in the nightshift, holidays, and/or weekends (Table I).

Perception towards risk of HIV acquisition

Five hundred and eight (95.5%) of the HCWs perceived that they were at risk of HIV acquisition. Out of these, about 433 (81.4%) of them reported that the workplace where they were working is the most risky place for contracting HIV infection. Twenty five (4.7%) of them did not know whether the place where they were working is risky or not. The majority, 319 (60.0%), of the HCWs levelled themselves as at high risk of acquiring HIV infection.

Table I. Sociodemographic characteristics of the HCWs at Hawassa Town government health institutions, southern Ethiopia, 2013

Variables	Number	Percent
Sex		
Male	210	39.5
Female	322	60.5
Age		
<24	93	17.5
25-34	339	63.7
35-44	71	13.3
≥45	29	5.4
Educational status		
Cannot read and write	12	2.3
Grade 1-8	49	9.2
Grade 9-12	84	15.8
Diploma	279	52.4
Degree and above	108	20.3
Work experience		
<10 years	477	89.7
≥10 years	55	10.3
Average work hours per week		
<40 hours	98	18.4
≥40 hours	434	81.6
Assigned to work in nightshift, weekends, holidays		
Yes	436	82.0
No	96	18.0

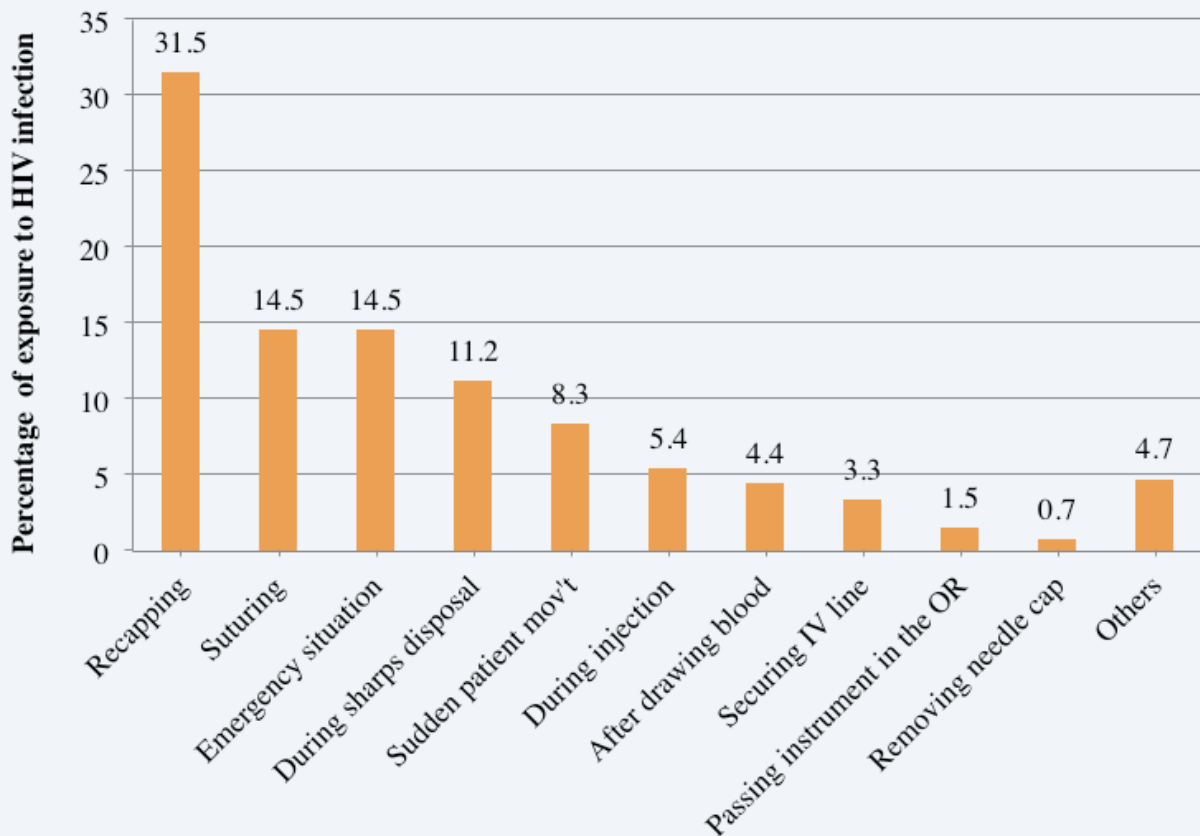


Figure 1. Reasons for exposure to HIV infection among HCWs

Training on infection prevention and patient safety (IPPS) and availability of IPPS guidelines at workplace

Nearly two-thirds, 326 (61.3%), of the HCWs had never taken any training on IPPS. Two hundred and six (38.7%) had taken training on IPPS. The majority, 459 (86.3%), of the respondents had not taken training within the last twelve months. Only one hundred nineteen (22.4%) of the respondents reported that IPPS guidelines were available in the health facility where they were working.

The practice of needle recapping

Half, 272 (51.1%), of the HCWs practiced the recapping of needles. Of whom, 63 (23.2%), 102 (37.5%) and 107 (39.3%) perform recapping all the time, most of the time and sometimes, respectively.

Prevalence of occupational exposure to HIV infection

More than half, 276 (51.9%), of the HCWs experienced occupational exposure to HIV infection within the previous year. Of these, 113 (40.9%) experienced once, 104 (37.7%) twice and 59 (21.4%) more than

twice. Nearly one-third, 87 (31.5%), of occupational exposure to HIV infection among the HCWs occurred during recapping of needles (see Figure 1).

Practice of reporting occupational exposure HIV infection

About 203 (73.6%) of those who had had occupational exposure to HIV infection, reported the recent exposure to Infection Prevention and Control Offices. Those that reported the recent exposure were 98 (48.3%) nurses, 38 (18.7%) physicians, 32 (15.8%) cleaners, and 35 (17.2%) others.

Measures taken after occupational exposure to HIV infection

One hundred thirty-nine (50.4%) of the HCWs who encountered occupational exposure to HIV infection washed the lesion with soap and water, and 95 (34.4%) washed with antiseptic solutions like alcohol and bleach. Sixty six (23.9%) of them visited for voluntary counselling and testing while 79 (28.6%) took post-exposure prophylaxis (Table II).

Table II. Measures taken by HCWs after occupational exposure to HIV infection at Hawassa Town government health institutions, southern Ethiopia, 2013

Measures taken	Number	Percent
Washed with water or normal saline	139	50.4
Washed with antiseptics	95	34.4
Applied pressure to stop bleeding	42	15.2
Allowed bleeding	37	13.4
Visited for voluntary counselling and testing	66	23.9
Took post-exposure prophylaxis	79	28.6
Did nothing	14	5.1

Utilization of personal protective equipment at workplace

One hundred and sixty-three (30.6%) of the HCWs used personal protective equipment all the time, whereas 222 (41.7%) and 121 (22.7%) used it most of the times and sometimes, respectively. More than two-thirds, 369 (69.4%), of the HCWs stated as reasons for not using personal protective equipment all the time: 182 (49.3%) scarcity of protective equipment, 122 (33.1%) not necessary to use the equipment, and 48 (13.0%) equipment unfit for work.

Factors associated with occupational exposure to HIV infection

Table III presents factors which remained statistically significant in the bivariate and multivariate logistic regression analyses. In this study, the independent predictors of occupational exposure to HIV infection on the multivariate analysis include recapping of needles [AOR: 3.1, 95%CI: (2.1, 4.6)], lack of training on IPPS [AOR: 3.3, 95%CI: (1.6, 5.8)], and nightshift work [AOR: 3.4, 95%CI: (1.1, 6.9)].

Table III. Factors associated with occupational exposure to HIV infection among HCWs at Hawassa Town government health institutions, southern Ethiopia, 2013

Variables	COR (95% CI)	AOR (95% CI)
Recapping of needles		
Yes	3.0 (2.1, 4.2)	3.1 (2.1, 4.6)
No	1.0	1.0
Training on IPPS in the last one year		
Yes	1.0	1.0
No	1.8 (1.1, 3.0)	3.3 (1.6, 5.8)
Assigned to work in night		
Yes	1.8 (1.1, 3.0)	3.4 (1.1, 6.9)
No	1.0	1.0

Discussion

Occupational risk of HIV transmission is a major concern for HCWs worldwide.^{5,10} In this study, more than half of the HCWs experienced occupational exposure to HIV infection in the previous year. This finding is nearly similar to reports from Tanzania and Iran.^{12,13} However, this finding is by far higher than that of studies conducted in eastern Ethiopia,⁵ Kenya,⁸ Nigeria,¹⁴ and West African countries.¹⁵ The difference could be due to variations in inclusion/exclusion criteria, sample sizes, study design, and definitions of occupational exposure to HIV infection.

This study identified important factors that could affect the experience of HCWs occupational exposure to HIV infection. Among these, recapping of needles was the one that was independently associated with occupational exposure to HIV infection among HCWs. This is true according to several other studies.¹⁶⁻¹⁹ In this study, nearly one-third of exposure to HIV infection occurred during recapping. Therefore, all training programs should emphasize that recapping of needles after use is not to be done and advocating use of safer needle devices that sheath or retract after use. There is a need for safety training to be a regular activity with periodic bolstering. And also, information, education and communication material should be displayed prominently at the places of work, emphasizing the point about no recapping.

In this and other studies, HCWs who did not attend any training on IPPS in the last one year were more likely to be exposed to HIV infection due to their occupational contact with a carrier than those who did so.^{11,19,20} Cognizant of this fact, training programs designed to prevent HCWs from occupational exposure to HIV infection should consider all segments of persons working in healthcare settings who have the potential for exposure to infectious materials.

This study found that the odds of occupational exposure to HIV infection among HCWs who were assigned to work at nightshift were about three times higher than those who were not. Researchers theorize that nightshift work exerts adverse effects by disturbing circadian rhythms, sleep, and family and social life.^{21,22} Disturbances in circadian rhythms may lead to reductions in the length and quality of sleep

and may increase fatigue and sleepiness, as well as gastrointestinal, psychological, and cardiovascular symptoms. In addition, working at nightshift may make it difficult to interact with family and maintain other social contacts. Furthermore, access to appropriate training is also more difficult for nightshift workers. These all together divert the attention of HCWs not to strictly follow safety rules and expose them to a high risk of acquiring HIV infection. In response, it could be recommended that assignment of HCWs to nightshift should take into account their health conditions, and family and social circumstances of the worker besides providing regular safety training.

Social desirability bias is a potential limitation in self-reported studies like this one, in that HCWs might report more socially acceptable responses than their actual day to day practice. As this is a cross-sectional study, the limitations that come with this type of design need to be taken into consideration when interpreting the findings. And also, the study findings could not be interpreted for private healthcare institutions since they were excluded from the study.

Conclusion

This study revealed that the prevalence of occupational exposure to HIV infection among HCWs in government health institutions was high. So, effective HIV prevention measures should target on areas, such as proper design and use of needles, provision of adequate training on IPPS, and monitoring of shift work schedules.

Acknowledgments

The authors wish to thank Hawassa Town Health Bureau for logistic and administrative support, and data collectors for their support

References

1. Pettit LL, Gee SQ, Begue RE. Epidemiology of sharp object injuries in a children's hospital. *The Pediatric Infectious Disease Journal* 1997; **16(11)**: 1019-1023. <http://dx.doi.org/10.1097/00006454-199711000-00003>
2. Nagao M, Iinuma Y, Igawa J, et al. Accidental exposures to blood and body fluid in the operation room and the issue of underreporting. *American Journal of Infection Control* 2009; **37(7)**: 541-544. <http://dx.doi.org/10.1016/j.ajic.2009.01.009>
3. Morino G, Baldan M, Onofrio E, Melotto AD, Bertolaccin L. Aids and Surgery. *East and Central African Journal of Surgery* 2004; **9(2)**: 9-11.

4. World Health Organization and International Council of Nurses. Healthcare worker health and Safety: preventing needle stick injuries and occupational exposure to blood borne pathogens. Geneva, Switzerland: World Health Organization; 2012.
5. Reda AA, Fisseha S, Mengistie B, Vandeweerd JM. Standard precautions: occupational exposure and behavior of health care workers in Ethiopia. *PLoS One* 2010; **5(12)**: e14420. <http://dx.doi.org/10.1371/journal.pone.0014420>
6. Esin IA, Alabi S, Ojo E, Ajape AA. Knowledge of human immunodeficiency virus post-exposure prophylaxis among doctors in a Nigerian tertiary hospital. *Nigerian Journal of Clinical Practice* 2011; **14(4)**: 464-466. <http://dx.doi.org/10.4103/1119-3077.91757>
7. Kumakech E, Achora S, Berggren V, Bajunirwe F. Occupational exposure to HIV: a conflict situation for health workers. *International Nursing Review* 2011; **58(4)**: 454-462. <http://dx.doi.org/10.1111/j.1466-7657.2011.00887.x>
8. Mbaisi EM, Nganga Z, Wanzala P, Omolo J. Prevalence and factors associated with percutaneous injuries and splash exposures among health-care workers in a provincial hospital, Kenya. *The Pan African Medical Journal* 2013; **14**: 10. <http://dx.doi.org/10.11604/pamj.2013.14.10.1373>
9. Central Statistical Agency Addis Ababa: Ethiopia and ICF international Calverton, Maryland, USA. Ethiopia Demographic and Health Survey 2011; 2012: 69–79.
10. International Labor Organization and World Health Organization. Joint guidelines on health services and HIV/AIDS. Geneva, Switzerland: International Labor Office; 2005.
11. Tadesse M, Tadesse T. Epidemiology of needlestick injuries among healthcare workers in Awassa City, southern Ethiopia. *Tropical Doctor* 2010; **40(2)**: 111-113. <http://dx.doi.org/10.1258/td.2009.090191>
12. Mashoto KO, Mubyazi GM, Mohamed H, Malebo HM. Self-reported occupational exposure to HIV and factors influencing its management practice: a study of healthcare workers in Tumbi and Dodoma Hospitals, Tanzania. *BMC Health Services Research* 2013; **13**: 276. <http://dx.doi.org/10.1186/1472-6963-13-276>
13. Shokuhi S, Gachkar L, Darazam IA, Yuhanaee P, Sajadi M. Occupational exposure to blood and body fluids among health care workers in teaching hospitals in Tehran, Iran. *Iran Red Crescent Medical Journal* 2012; **14(7)**: 402-407.
14. Adegboye AA, Moss GB, Soyinka F, Kreiss JK. The epidemiology of needlestick and sharp instrument accidents in a Nigerian hospital. *Infection Control Hospital Epidemiology* 1994; **15(1)**: 27-31. <http://dx.doi.org/10.2307/30148382>
15. Tarantola A, Koumare A, Rachline A, et al. A descriptive, retrospective study of 567 accidental blood exposures in healthcare workers in three West African countries. *Journal of Hospital Infection* 2005; **60(3)**: 276-282. <http://dx.doi.org/10.1016/j.jhin.2004.11.025>
16. Ustun AP, Rapiti E, Hutin Y. Sharps injuries: Global burden of disease from sharps injuries to healthcare workers. Geneva, Switzerland: World Health Organization; 2003.
17. Kermode M, Jolley D, Langkham B, Thomas MS, Crofts N. Occupational exposure to blood and risk of bloodborne virus infection among health care workers in rural north Indian health care settings. *American Journal of Infection Control* 2005; **33**: 34–41. <http://dx.doi.org/10.1016/j.ajic.2004.07.015>
18. Ebrahimi H, Khosravi A. Needlestick injuries among nurses. *Journal of Respiratory Health Science* 2007; **7**: 56–62.
19. Nsubuga FM, Jaakkola MS. Needlestick injuries among nurses in Subsaharan Africa. *Tropical Medicine International Health* 2005; **10**: 773-781. <http://dx.doi.org/10.1111/j.1365-3156.2005.01453.x>
20. Tetali S, Choudhury PL. Occupational exposure to sharps and splash: Risk among health care providers in three tertiary care hospitals in South India. *Indian Journal of Occupational and Environmental Medicine* 2006; **10(1)**: 35-40. <http://dx.doi.org/10.4103/0019-5278.22894>
21. Barton J, Spelten E, Totterdell P, Smith L, Folkard S, Costa G. The standard shift work index—a battery of questionnaires for assessing shiftwork-related problems. *Work and Stress* 1995; **9**: 4–30. <http://dx.doi.org/10.1080/02678379508251582>
22. Monk TH. Shift work. In: Kupfer DJ, Roth T, Dement WC. Principles and practice of sleep medicine. Philadelphia: Saunders; 2000.