Work-Related Operating Theatre Accidents Among Surgical Residents in Addis Ababa, Ethiopia.

Abebe Bekele[1], Berhanu Kotisso, Solomon Shiferaw[2]
[1]Assistant Professor of Surgery, [2]Assistant Professor of Public Health, Faculty of Medicine, Addis Ababa University.
Correspondence to: Dr.A.Bekele, Email: abebe1891@yahoo.com or abebe1891@telecom.net.et

Background: With the Human Immunodeficiency virus (HIV) epidemic and infections with hepatitis B, C and D, occupational exposures to these infections is a cause of concern to all health care workers, especially those working in the operating theatre in low income countries.
Methods: A cross-sectional study was conducted to investigate the prevalence and context of all work-related accidents that occurred as a result of contamination with blood and blood products, among surgical residents at the Black lion teaching specialized referral hospital, in Addis Ababa, Ethiopia. Data was collected from all 36 surgical residents who were at different stages of their specialty training in 2006/07.
Results: Thirty two (88.9%) of the residents were males; 17 (47.2%) in their 3rd and 4th year, and the rest 19 (52.8%) were in their first and second year of training. Of the 36 respondents, 28(77.8%) had sustained a needle-stick injury inside the operating theatre at least twice during their residency (Range=2-10 times). For 13(36.1%), the accidents involved a high risk patient at least once. Cut with a sharp object, contact of blood to an unprotected skin and splash of blood to the eyes and face were reported by 11(30.6%), 27(75%) and 27(75%) of the respondents respectively. Information concerning the most recent occupational injury inside the operating theatre revealed that 31(86.1%) of the residents sustained work-related accident in the 6 months preceding the survey, 8(25.8%) of which involved a high risk patient. All of the 8 (100%) of the recent high risk injuries and 22(95.6%) of the non-high risk injuries were not reported to the hospital's employee health service.

The most frequently cited reasons for not reporting include; "The occupational health service doesn't exist or I don't know if it exists in the hospital" for 15 (50%), among others.
Conclusions and Recommendations: Overall, the present study revealed that work-related accidents among surgical trainees constitute a substantial risk of acquiring and transmitting blood-borne infections which calls for well targeted educational and other preventive measures in the teaching hospital.

Introduction

With the Human Immunodeficiency virus (HIV) epidemic and infections with hepatitis B, C and D, occupational exposures to HIV infection is a cause of concern to all health care workers (HCWs), especially for those working in the operating theatre[1]. Among the HCWs, resident doctors under-training have the highest incidence of occupational exposure as compared to nurses, interns, technicians and house keeping staff[1,2]. Among the residents, it has been reported that surgery residents have a six-fold higher incidence of occupational exposure as compared to other residents[1,2,3].
By virtue of the nature of their daily activity, surgeons in training have the greatest risk of exposure to blood-borne pathogens, given their numerous encounters involving the use of sharp instruments on patients and the increased propensity for injury while learning new technical skill sets[3,4]. In surgery residents, the type of exposure is mainly due to needle stick injuries and cuts, during operative procedures[1,2].
An estimated 600,000 to 800,000 needlestick and other percutaneous injuries

are reported annually among U.S. health care workers[5]. The reporting of such injuries is a critical step in initiating early prophylaxis or treatment. Timely reporting of occupational exposures to an employee health service is required to ensure appropriate counselling, facilitate prophylaxis or early treatment[5,6].

There are limited reports from Ethiopia or the study area in relation to the rates of occupational exposure among HCWs. Information is critically lacking, especially among surgeons and surgical residents and the operating theatre staff in reference to work-related accidents and the events surrounding these accidents. Therefore, this study was conducted to investigate the prevalence and context of all work-related accidents that result in contamination with blood and blood products, including needlestick injuries, sharp object cut injuries and exposure to blood to unprotected skin and splash of blood to the face and eyes in the operating theatre among surgical residents at the Black lion teaching specialized referral hospital. It is believed that the results of this survey can serve as base-line information for further studies of similar nature, for formulations of preventive guidelines and setting up of a well-organized employee health unit in the hospital.

Methods

The study was a cross sectional survey. All surgical residents in training at the residency programs in General Surgery at the Addis Ababa University, Faculty of Medicine, Department of Surgery were the study population. The study hospital is the Black Lion hospital specialized referral and teaching university hospital. The hospital has more than 350 beds dedicated for adult surgical cases. The hospital has set up its first occupational health unit since 6 months before the study time that primarily deals with occupational exposure to blood and the dispensing of prophylactic drugs against HIV.

During the time of the survey, there were 40 residents in training at the department. Since four residents were on vacation during the period of data collection and couldn't be reached, the remaining thirty-six residents participated in the study. Data were collected using a structured questionnaire that included survey questions about the postgraduate year of residency, the sex of the respondent, the number of past needlestick injuries, cut by sharp instruments, contact with blood to the unprotected skin and splash to the face and eyes that occurred during their residency training programme and that occurred in the operating theatre. It asked how many of the above accidents involved a high risk case. Respondents were also asked recent injuries involving a high risk patient.

For the purpose of the study, a high-risk patient was defined as a confirmed or suspected case of HIV infection. The questions about the most recent needlestick injury included whether it involved a high-risk patient, the perceived causes and circumstances of injury, whether it was reported, reasons for not reporting it if applicable, and whether anyone else knew of the injury. Data entry, cleaning and analyses was performed by a statistical software EP-INFO-VER-2002.

Results

A total of 36 respondents completed and returned the survey forms, making the response rate 90%. As shown in Table 1, 32 (88.9%) were males, 17 (47.2%) were senior surgical residents in their 3rd and final year (4th year) of training, 13 (36.1%) were 1st year, while 6 (16.7%) were 2nd year. Of the 36 respondents, 28(77.8%) had sustained a needlestick injury inside the operating theatre at least twice during their residency (Range=2-10 times). For 13(36.1%), the accidents involved a high risk patient at least once. Cut with a sharp object, contact of blood to an unprotected skin and splash of blood to the eyes and face were reported by 11(30.6%), 27(75%) and 27(75%) of the respondents respectively.

The likelihood of having needle stick injuries, blood contact to unprotected skin

and splash to the face and eyes increased as the number of postgraduate years of training increased.

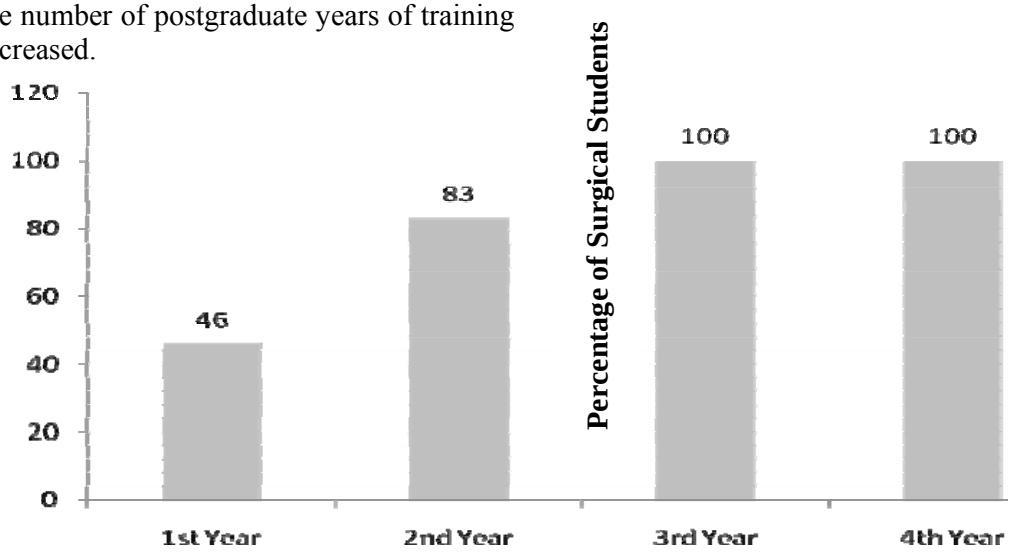

Table 1. Profile of Surgical Residents in Black Lion Hospital, Addis Ababa, Ethiopia - 2007.

Characteristics	Frequency	Percentage
Year of Training		
1st	13	36.1
2nd	6	16.7
3rd	9	25
4th	8	22.2
Sex		
Male	32	88.9
Female	4	11.1

Table 2. Characteristics of the Most Recent Injuries among Surgical Residents, Addis Ababa, Ethiopia: 2007.

Characteristics	Number	Percentage
Source of Injury		
Self-inflicted	27	87.1
By someone else	4	12.9
Needle type		
Solid suturing needle	26	83.8
Knife/Blade cut	4	12.9
Hollow needle	1	3.2
Event during injury		
Suturing	26	83.8
Cutting	4	12.9
Recapping	1	3.2
Perceived cause of injury		
Lack of appropriate operating materials	14	45.1
Felling of being "rushed"	12	38.7
Fatigue/Hunger	5	16.1
Negligence	3	9.6
Lack of assistance	2	6.4

Table 3. Perceived reasons for not reporting the most recent occupational injury among surgical residents, Addis Ababa, Ethiopia, 2007.

Characteristics	No (N=31)	%
Reasons for not reporting the accident		
I don't know whether occupational health service exists in the hospital	12	38.7
The occupational heath service doesn't exist in the hospital		
It takes a lot of time	3	9.6
Negligence	6	19.3
It has no use	3	9.6
I don't want to take prophylactic drugs	3	9.6
I don't want to know the results	2	6.4
	2	6.4
Other people informed about the recent accident		
A Resident colleague		
The scrub nurse		
No one	20	64.5
A close friend	5	16.1
	5	16.1
	1	3.2

By final year of training, 100% had had a needle stick injury and contact to unprotected skin and 75% had splash to their face or eyes while needle stick injury, contact to the unprotected skin and splash to face was reported by 46.1%, 53.8% and 69.2% of the 1st year residents (Figure 1)**.** Likelihood of Having A Needle-Stick Injury as The Years of Training Increases Among Surgical Residents at the Black Lion Hospital, Addis Ababa, Ethiopia, 2007. Similarly, the percentage of residents who had a needle stick injury involving a high-risk patient increased according to the year of training where 62.5% of all the final year residents reported having sustained high risk accident in the 3 months preceding the survey as compared to 7.6% of the 1st year residents. Twenty-three (63.9%) of the all study participants knew about a colleague resident who had sustained work-related accident.

Information concerning the most recent occupational injury inside the operating theatre revealed that 31(86.1%) of the residents sustained work-related accident in the 6 months preceding the survey, 8(25.8%) of which involved a high risk patient. Of these injuries, 27(89.8%) of the respondents reported that the injury was self-inflicted, 26(83.8%) by a solid needle and 26(83.8%) during suturing (Table 2). The residents were 1st assistants when they sustained the injury during 13(41.9%) of the surgeries and they were the operating surgeons in 11(35.4%) of the cases.

Twenty-four (77.4%) of the respondents identified a single cause for the injury, while 7(22.6%) cited two or more additional reasons. Lack of proper operating material and a feeling of being "rushed" was identified by 14 (45.1%) and 12 (38.7%) of the respondents as major causes of the injury. Twenty-eight (90.3%) believed that the injury was preventable. (Table 2)

All of the 8(100%) of the recent high risk injuries and 22(95.6%) of the non-high risk injuries were not reported to the hospital's employee health service. The most frequently cited reasons for not reporting include; "The occupational health service doesn't exist or I don't know if it exists in the hospital for 15(50%) of the non–reporters, it takes a long time for 6(20%), and negligence for 3 (10%). (Table 3).

Of the most recent needlestick injuries that were not reported, 26(83.8%) were known to others: a colleague resident was aware in 20(76.9%) of these events whereas a spouse or "significant other" was aware in none of the cases. When asked whether they will report if they sustain injury in the future, 25(69.4%) of all the participants said yes.

Discussion

The present study revealed that work-related accidents during surgery constitute a substantial problem particularly among surgical trainees in a teaching hospital setting. This fact is evidenced by the fact that almost all surgical residents had sustained one form of injury in the operation theatre by their final year of training. Furthermore, nearly two-third (62.5%) of all the final year residents sustained high accident in the 3 months preceding the survey. A similar survey from Nigeria reported that almost half (53%) of surgeons sustained a needlestick injury within 3 months preceding the study[7].

A study done elsewhere involving 550 medical students and residents during the 1989–1990 training year has reported a high prevalence of needlestick injuries (71%), and a higher frequency of injury (by a factor of 6) among surgical residents than among medical residents[3,8]. In our study, we have also observed that needlestick injuries are the commonest type of work-related accidents to occur in surgical trainees. A majority of the injuries were self-inflicted and occurred during suturing. A similar conclusion was reached by other authors[1,3,9]. This can be explained by the fact that by virtue of the nature of their daily activity, surgeons in training have the greatest risk of exposure to blood-borne pathogens, given their numerous encounters involving the use of sharp instruments on patients and the increased propensity for injury while learning new technical skill sets [3,4]. The workload imposed on surgeons on training is also tremendous.

It is worthwhile to note that all recent high risk injuries and the overwhelming majority of the non-high risk injuries (95.6%) were not reported to the hospital's employee health service. The tendency to under or non-report was present among various health professional groups, with the rates of under reporting being 30-60% for nurses 92% for laboratory personnel and 70-95% for physicians[3,10,11,12,13]. The underreporting or non-reporting of occupational accidents may result in a substantial underestimation of the magnitude of the problem. Exposure to HIV, HBV, and HCV infections has implications for personal relationships, future employment, and psychosocial well-being of the injured party. It also enables timely counselling regarding the risk of exposure and prevention of secondary transmission. It also allows medical evaluation, including testing and, if warranted, antiretroviral prophylaxis and therapy or administration of the HBV vaccine containing hepatitis B immune globulin. Antiretroviral therapy administered within 24 to 36 hours after exposure has been associated with an 81% reduction in HIV infection[14,15].

There are no logical arguments to support this behavior among surgeons. However, it is believed that part of the surgical culture has been maintaining the patient first at all cost, and when an accident occurs in the operating room, the surgeon's first inclination is to continue with the operation. Surgeons might be reluctant to report accidents for fear of being barred from further practices[12].

Some authors have stated that one of the serious barriers to reporting include the time required to provide a medical history and blood sample to the employee health, to obtain informed consent from the patient and order the necessary tests, and to return for the recommended follow up visits. With an average of exposure of over six needle stick injuries a year for the typical surgeon, and skin contamination by blood in nearly 50% of surgical procedures, busy surgeons do not take the time to comply[9]. After such repeated events of injury, it is possible that surgeons may become desensitized. Personal experiences with many surgeons (Verbal communication) have also shown that a significant number of surgeons and residents do not want to use prophylactic drugs against HIV when exposed to high risk blood because of its disturbing side effects.

In this survey, we have found out that a significant number of the respondents are

not aware of the presence of the hospitals occupational health unit where employees are supposed to report such accidents and receive the appropriate care despite its establishment 6 months prior to the conduct of the study. The lack of information about such an important matter is something that should be critically looked at by the hospital and particularly the surgical department.

Every possible effort has to be done to popularize the unit and institute a standard and regular reporting protocol. There is also a need to have working guidelines and policies that require employees to report any work-related injury timely. Bringing the occupational health unit to the operating theatres where they are easily accessible to all the operating theatre personnel might be one way of dealing with this problem. Lack of appropriate operating equipments is mentioned by some of the residents as contributory causes of injuries. In a developing country like Ethiopia where the health service is under intense economic constraint, the operating theatre is expected to be understaffed and under-equipped. These calls for a concerted effort from all major stakeholders including Ministry of Health and the hospital administration to improve to the working conditions of the operation theatre staff.

In conclusion, the evidence from this survey suggests that surgical residents are being trained in a setting where the risk of work-related injuries during surgery is unjustifiably high. Compounding the problem is the huge proportion of work-related accidents which are not reported to the employee health service unit. Overall, the research indicates the need for more targeted educational and preventive measures in the hospital as a matter of urgency.

While the study provides important base-line information concerning this important issue, it suffers from a small sample size, hence making calculations of some statistical tests difficult.

Acknowledgment

We would like to thank all the respondents in the study for their kind participation. Our appreciation also goes to the department of surgery for allowing us to do the survey and to Prof. O. Johnson for reviewing the final manuscript.

References

1. Rele M, Mathur M, Turbadkar D Risk of needle stick injuries in health care workers - A report. Indian Journal of Medical Microbiology Year : 2002 Volume : 20 Issue : 4 Page : 206-207.
2. O'Neill TM, Allan V, Radeeski A. Risk of needle sticks and occupational exposures among residents and medical students. Arch Intern Med 1992;152:1451-1456.
3. Martin A. Makary, Ali Al-Attar, Christine G. Holzmueller, J. Bryan Sexton, Dora Syin, et al. Needlestick Injuries among Surgeons in Training. NEJM, Volume 356:2693-2699 June 28, 2007 Number 26.
4. Jagger J, Bentley M, Tereskerz P. A study of patterns and prevention of blood exposures in OR personnel. AORN J 1998;67:979-81, 983.
5. NIOSH Alert: preventing needlestick injuries in health care settings. Washington, DC: National Institute for Occupational Safety and Health, 1999. (Publication no. 2000-108.)
6. Osborn EH, Papadakis MA, Gerberding JL. Occupational exposures to body fluids among medical students: a seven-year longitudinal study. Ann Intern Med 1999;130:45-51.
7. T.A Okeke. Occupational exposures to the high risk of HIV infection among surgeons at the university teaching of Enugu, Nigeria. Journal of College of Medicine 2003; 8:2.
8. O'Neill TM, Abbott AV, Radecki SE. Risk of needlesticks and occupational exposures among residents and medical students. Arch Intern Med 1992;152: 1451-1456.
9. Peter T Scardino. A hazard surgeons need to address. Nature clinical practice urology.2007; 4(7): 347

.

10. Office of Occupational health nursing. Safer devices: Protecting healthcare workers. Washington: Occupational safety and health administration, 1997, available from: http:// www.osha-slc.gov/SLTC/needlestick/
11. American health consultants. One third of needlesticks go underreported at hospital. Hospital infection control 1990;17: 107-109.
12. Kathrina JR Watson. Surgeons, test(and heal) thyself: Sharp injuries and hepatitis C risk. MJA 2003; 181: 366-367.
13. Doebbeling BN, Vaughn TE, McCoy KD, et al. Percutaneous injury, blood exposure, and adherence to standard precautions: are hospital-based health care providers still at risk? Clin Infect Dis 2003; 37:1006-1013.
14. CDC. Appendix C: basic and expanded HIV postexposure prophylaxis regimens. MMWR Recomm Rep 2001; 50:47-52
15. Cardo DM, Culver DH, Ciesielski CA, et al. A case-control study of HIV seroconversion in health care workers after percutaneous exposure. N Engl J Med 1997; 337:1485-1490