

## Levels and Trends of Occupational Hazards among Surgical Residents at Tikur Anbessa Hospital, Addis Ababa Ethiopia

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**Background:** A previous study conducted four years ago among surgeons-in-training at the Addis Ababa University revealed that work-related accidents among surgical trainees were enormous, and there was huge under reporting to the occupational health unit (OHU) of the hospital. The aim of this study was to evaluate the impact of the strengthened OHU of the hospital and what the current status of work-related accidents is like at the same hospital three years later.

**Methods:** A cross-sectional study was conducted to investigate the prevalence and context of all work-related accidents that resulted in contamination with blood and blood products inside the operating theatre, among surgical residents at the Tikur Anbessa teaching specialized referral hospital, in Addis Ababa University, Ethiopia. Data was collected from all 76 surgical residents who were at different stages of their specialty training in 2011.

**Results:** Seventy-two (94.7%) of the residents were males and 26 (34.2%) were in their 3<sup>rd</sup> and 4<sup>th</sup> year of training. Of the 76 respondents, 53 (69.8%) had sustained a needle-stick injury inside the operating theatre at least once during their residency (Range=1-15 times). For 20 (26.3%), 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 9 (11.7%), 39(51.3%) and 28(36.9%) of the respondents respectively. Information concerning the most recent injuries inside the operating theatre revealed that 46(69.7%) of the residents sustained accidents in the 6 months preceding the survey, 7(9.2%) of which involved a high risk patient. All of the 7 (100%) of the recent high risk injuries and 10(27.7%) of the low-risk injuries were reported to the OHU and all the high risk injury victims were commenced on HIV prophylaxis.

**Conclusions and Recommendations:** Overall, the study revealed that work-related accidents among surgical trainees are still unacceptably high, even though there is a decline in the number of sharp object cut, and blood splash accidents. However, there is a positive trend towards reporting of injuries, particularly those which are high risk. More is expected from the hospital to create a safe working environment and to encourage reporting of all form of injuries.

### Introduction

By virtue of their profession, surgeons and surgical residents 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<sup>1, 2</sup>. In surgery residents, the type of exposures are mainly needle stick injuries and cuts, and they tend to occur during operative procedures<sup>1, 2, 3</sup>.

A previous study conducted in 2007 among surgeons-in-training at the Addis Ababa University, department of surgery had revealed that work-related accidents, (needle sticks, blood splash to the face, contact of blood to the skin and mucus membranes) among surgical trainees were enormous, and there was huge under reporting to the occupational health unit (OHU) of the hospital<sup>4</sup>. The study also identified a number of existing problems that predisposed the residents to such accidents. The authors further recommended that every possible effort has to be done to popularize the already existing OHU in the hospital unit, the OHU must be placed in a more accessible site and there should be a standard reporting protocol.

After the study was published, the hospital, already engaged in major restructuring of the OHU, undertook some vital measures to strengthen the existing unit. Measures taken included the provision of a free 24 hours testing, counselling and prophylaxis medication provision service, the OHU space was expanded and placed at a more accessible site, focal contact person was identified in the operating

theatre and 24 hours contact was established, many awareness creation actions were undertaken such as posters all over the hospital and fliers circulated. In this study, we wanted to assess the impact of the newly strengthened OHU with regards to the occurrence of the work related accidents and the observed change in reporting behaviour in similar study subjects.

## Methods

All surgical residents in General Surgery (N=76) were included in the study. Data were collected using a structured questionnaire that included questions about the postgraduate year of residency, the sex of the respondents and the total number of needle sticks, cut by sharp instruments, contact with blood to the unprotected skin and splash to the face and eyes that occurred during their residency training in the operating theatre with emphasis on how many of the above accidents involved a high risk case.

Respondents were also asked about the most recent injuries involving a high risk patient. For the purpose of the study, a high-risk patient was defined as a confirmed or strongly suspected case of HIV infection. The questions about the most recent needle stick 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 using SPSS version 14. P-values (less than 0.05) and 95 % confidence levels were used to assess the statistical significance of the observed changes on selected indicators between the previous and present study.

## Results

A total of 76 respondents were included in the study. As shown in Table 1, 72 (94.7%) were males and 50 (65.8%) were senior surgical residents in their 3rd and final year (4th year) of training. Seventy-Two (94.7%) claimed to put on double gloves during most of major operations while only 4 (5.3%) were vaccinated against hepatitis.

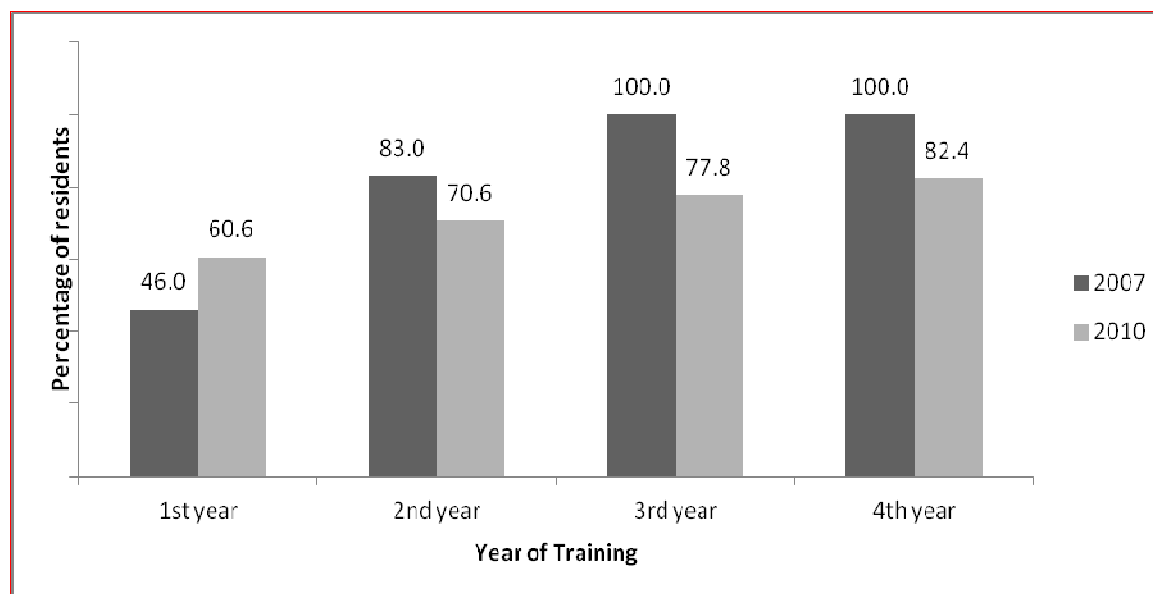
Of the 76 respondents, 53 (69.7%) had sustained a needle stick inside the operating theatre at least once during their residency (Range=1-10 times) compared to 77.8% 3 years ago. For 20(26.3%: 95% CI: 16.1, 35.9), the accidents involved a high risk patient at least once showing a decline, though insignificantly, from the previous study of 36.1 percent (95% CI: 20.3, 51.7). Cut with a sharp object, contact of blood to an unprotected skin and splash of blood to the eyes and face were reported by 9(11.7%), 37(48.7%) and 28(36.9%) of the respondents respectively. In agreement with the previous study, the likelihood of having needle stick increased as the number of postgraduate years of training increased (Figure 1).

Information concerning the most recent occupational injury inside the operating theatre revealed that 46 (60.5%) of the residents sustained work-related accident in the 6 months preceding the survey, 7(15.2%) of which involved a high risk patient. Of these injuries, 31(67.3%) of the respondents reported that the injury was self-inflicted, 27(58.6%) by a solid needle and 32 (83.8%) during suturing. The residents were 1<sup>st</sup> assistants when they sustained the injury during 28(60.8%) of the surgeries and they were the operating surgeons in 4(8.7%). Lack of/improper use of operating material and a feeling of being "rushed" was identified by 40 (86.9 %) and 30 (65.2%) of the respondents as major contributing cause of the injury. 40 (88.2%) believed that the injury was preventable. (Table 2)

From the 46 recent accidents, 10 (21.7) were reported to the OHU showing some improvement compared to no reporting of recent injuries in the previous survey. All the 7 high risk injuries were reported to the occupational health unit and the injured residents were started with HIV prophylaxis medication. However, only 3(7.6 %) of the non-high risk injuries were reported in the year 2010, compared to one individual with non-high risk injury reported in the year 2007. The most frequently cited reasons for not reporting were not knowing if the unit exists in the hospital 8 (22.2%) versus 15

(50%) in 2007 and the fact that the process takes a long time 14 (38.8 %) versus 6 (20%) in 2007 (Table 3).

Of these most recent injuries that were not reported (N=36), 34 (94.4%) were known to others while a colleague resident was aware in 20 (55.5%). When asked whether they will report if they sustain injury in the future, 27(73.7%) of all the participants said yes. As shown in Table 4, there has been a relative declining trend of occupational injuries, except for contact of blood to an unprotected skin, among surgeon-in-training over the preceding three years. Similarly, the percentage of residents who reported the accidents (particularly high risk injuries) to the Occupational Health Unit increased between the two surveys.



**Figure 1.** Percentage of residents who sustained needle stick according to their year of training, TAH 2011 as compared to a similar study in 2007.

**Table 1.** Profiles of Surgical Residents at the Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 2011 as compared to the a similar study in 2007

Characteristics	2007		2010	
	N (36)	%	N (76)	%
<b>Year of study</b>				
1	13	36.1	33	43.4
2	6	16.7	17	22.4
3	9	25.0	9	11.8
4	8	22.2	17	22.4
<b>Sex</b>				
Male	32	88.9	72	94.7
Female	4	11.1	4	5.3

**Table 2.** Trends in the Characteristics of the Most Recent needle stick among Surgical Residents, Tikur Anbessa Hospital, Addis Ababa, Ethiopia 2011 as compared to the a similar study in 2007.

Variable	2007		2010	
	No=31	%	No=46	%
Characteristics of injury				
Self induced	27	87.1	31	67.3
Inflicted by someone else	4	12.9	15	22.7
Nature of injury				
Solid needle	26	83.8	27	58.6
Hollow needle	1	3.2	7	15.2
Sharp instrument	4	12.9	1	2.1
Unclear	-	-	11	23.9
Type of procedure				
Suturing	26	83.8	32	69.5
Cutting	4	12.9	1	2.1
Instrument exchange	-	-	6	13.0
Unclear	-	-	7	15.2
Cause of recent injury *				
Lack of assistance	2	6.4	14	30.4
Lack of required skills	-	-	6	13.0
Lack of appropriate operating equipments	14	45.1	40	86.9
Fatigue/hunger	5	16.1	7	15.2
The feeling of being rushed	12	38.1	30	65.2
Accident avoidable?				
Yes	28	90.3	40	88.2
No	8	9.7	6	7.9
During the most recent injury, you were the:				
Surgeon	11	41.9	4	8.7
1st assistant	13	35.4	28	60.8
2nd assistant	-	-	14	30.4

Key: \*: More than one response was possible.

**Table 3.** Characteristics of the Most Recent Injury among Surgical Residents, Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 2011 as Compared to a Similar Study in 2007.

Characteristic	2007		2010	
	(N=36)	%	(N=36)	%
<b>The main reasons for not reporting to OHU</b>				
Don't know whether it exists or not	12	50.0	8	22.2
Process takes a lot of time	6	20.0	14	38.8
Don't want to take the prophylactic drugs	2	6.4	6	16.6
No use in reporting it	3	9.6	6	16.6
Don't want to know result	2	6.4	2	5.5
<b>Who knew about recent injury</b>				
No one	5	16.1	2	5.5
Colleague resident	20	64.5	20	55.5
A consultant	-	-	8	22.2
Significant others	1	3.2	3	8.3
Other Theatre staff e.g. Anaesthetist	5	16.1	3	8.3
<b>Will report in the future</b>				
Yes	25	69.4	27	73.7
No	11	30.6	9	23.7

**Table 4.** Trends in the Prevalence of Work-related Injuries, Tikur Anbessa Hospital, Addis Ababa, Ethiopia, 2011 as Compared to a Similar study in 2007

Characteristic*	2007		2010	
	N	%	N	%
Needle stick injury	28	77.8	53	69.7
Cut by sharp instrument	11	30.6	9	11.8
Contact of blood to an unprotected skin	27	75.0	60	78.9
Splash of blood to the eyes and face	27	75.0	48	63.2
Reported total recent injuries to the OHU	-	-	10	21.7
Reported recent high risk injuries	1	4.4	7	100

\* - None of the observed changes between 2007 and 2010 were statistically significant apparently because of the small number of residents in each subcategory

## Discussion

This study tried to re-focus at assessing the level and trend of occupational injuries among residents in Tikur Anbessa hospital with the ultimate aim of identifying modifiable exposure risk factors and behaviours that need to be addressed. It was encouraging to note that there is crude but not statistically significant decline in the prevalence of important forms of injuries such as needle stick injury (from 78 to 70 percent), sharp injuries (from 31% to 12%), and splash of blood to the eyes and face (from 75 to 63 percent) following the re-organization of the OHU. Such a positive trend is encouraging and needs to be strengthened.

The residents also mentioned their perceived reasons of injury such as lack of appropriate operating equipments, lack of proper assistance during surgery and lack of the required surgical skills to conduct a safe procedure. It was also interesting to note that similar reasons were mentioned in the previous study with a similar frequency. If a significant decline in the occurrence of occupational injuries is expected, the medical school and the department of surgery in particular should pay attention to this and due emphasis should be put in the training and set up of the operating procedures. Responsible hospital and school administrators should again look into this and find ways of improving the working environment.

Interestingly, the pattern and nature of injuries remains the same between the two surveys. The prevalence of injury increases as the risk of exposure increases with each year of training. Likewise, self induced needle injuries which were often encountered while suturing are the predominant forms of injuries in both rounds of surveys pointing to the need to specifically target such procedures for preventive interventions. It is also interesting to note that most residents believe that they are suffering from injuries which are completely avoidable

The study also revealed that only 5.3% of the residents were vaccinated against Hepatitis B. Such a low prevalence of vaccination is also reported from other developing countries such as Nigeria<sup>5</sup> and India<sup>6</sup>, and developed countries like Japan<sup>7</sup>. Though this is not the main objective of this study, we believe this is unacceptable by all standards and deserves mention. Review of the literature shows that among healthcare workers, sero-prevalence for hepatitis B is two to four times higher than that of the general population<sup>6,7</sup>.

Other studies have also shown that among physicians and dentists, those in specialties with more frequent blood or needle-stick exposures (e.g., surgeons, obstetrician-gynaecologists, anaesthesiologists) have a significantly elevated risk compared to those in specialties such as paediatrics or psychiatry<sup>8</sup>. An additional risk factor for acquisition of HBV infection is the underlying prevalence of HBV infection in the population, which is very high in the developing countries<sup>9</sup>. We believe such a low vaccination rate among our surgical residents may be due to various reasons including awareness, risk assessment, lack of opportunity and low priority given by the health managements of hospitals.

Worth mentioning is the fact that residents have made some progress as far as reporting the injury to the Occupational Health Unit is concerned, although it is still insufficient. Finally, although the present study showed commendable progress in the incidence as well as reporting of occupational injuries in the operating theatre, most of the findings were not statistically significant perhaps as a result of the small number of study participants in both surveys. Drawing a strong conclusion about the cause effect relationship between the institution of the OHU and the improvements subsequently seen is also limited by the fact that there was no control population to account for secular changes that may have occurred between the two surveys.

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