

Needle stick and sharp injuries among residents practicing surgical intervention.

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A research to be submitted to department of surgery,
St. Paul's Hospital Millennium Medical College

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Abstract

Background & objective: Needle stick and sharp injury is a common occupational hazard among surgical residents and this is a concerning issue for it can affect once wellbeing. The study aims in assessing the pattern and the circumstance under which needle stick & sharp injuries occur and the trend of reporting of injuries among surgical residents.

Methodology: A cross sectional study was conducted using self-administered structured questionnaire which is distributed to representative sample of surgical residents training in SPHMMC who are recruited by using a stratified random sampling technique. Data was analyzed by calculating descriptive statistics, tabulation of responses and using Kruskal-wallis test.

Result: 68.9% of residents have sustained at least one NSSI over the past one academic year. High rate of injury was found in orthopedics (100%), maxillofacial (100%), and General Surgery residents (77.5%). The differences among surgical specialty is statistically significant ($p=0.000$) and also the mean ranks of NSSI per a resident are significantly different among the different surgical specialty ($X^2=27.150$, 6 d.f., $p=0.000$). The OR setup, the use of solid needle and suturing are the common circumstance under which most injuries occurred. Residents attribute their injury mostly to “the feeling of being rushed” and “not using appropriate equipment”. Only 14.3% of the recent injuries were reported. Besides “the source patient is not of high risk” the frequently cited reasons for not reporting are “I don’t know if the unit of reporting existed” and “the process takes too much time.”

Conclusion & Recommendation: This study established that NSSI is common among surgical residents, yet the reporting is inadequate. Therefore, the reporting system should be upgraded in a way it is encouraging for the users and tremendous amount of work focusing on needle stick and sharp injury prevention method is needed.

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Acronyms

AIDS-	Acquired immunodeficiency syndrome.
ART-	Anti retroviral therapy
CDC-	Center for disease control and prevention
HBV-	Hepatitis B virus
HCV-	Hepatitis C virus
HCW-	Healthcare workers
HIV-	Human immunodeficiency virus
ICU-	Intensive care unit
IV-	Intravenous
NSI-	Needle stick injury
NSSI-	Needle stick and sharp injuries
OR-	Operation room
ObGyn-	Obstetrics and Gynecology
PGY-	Post graduate year
SPHMMC-	St Paul's hospital millennium medical college
TASH-	Tikur Anbessa teaching specialized hospital
WHO-	World health organization

CHAPTER ONE (Introduction)

1.1 BACKGROUND

Occupational exposure is defined as the contact to possibly harmful agents/hazards as a result of one's job. Health care workers face different forms of occupational exposure to health hazards. These are

- **Biological hazards:** exposure to blood, body fluids or tissue specimens probably leading to blood-borne diseases.
- **Chemical hazards:** chemical compounds causing health problems like
 - Skin irritation and dermatoses because of frequent use of soaps, detergents, disinfectants or allergy caused by the powder placed into the surgical gloves or by contact to natural latex gloves,
 - Irritation of the eyes, nose, and throat because of exposure to aerosols containing droplets of washing liquids. Formaldehyde exposure is associated nasopharyngeal tumors etc.
- **Physical hazards:** such as intra operative radiation exposure while using fluoroscope or laser based instruments etc.
- **Ergonomic hazards:** like back pain & musculoskeletal pain because of standing for long hours.
- **Psychological hazards:** such as stress, work induced weak family relations, burnout due to overtime work etc.
- **Fire, explosion & electrical hazards:** which occurs while using oxygen, alcohol etc.¹

Needle stick and sharp injuries (NSSIs) are one of the common biological occupational hazards among healthcare workers. NSSIs brings a risk of occupational acquisition of acute and chronic infections caused by HBV, HCV, & HIV/AIDS and also it has a risk for different forms of psychological consequences to the one who sustained it and to his/her loved ones.

Residents practicing surgical interventions are susceptible to sustaining needle stick and sharp injuries due to the nature of their jobs. Although NSSIs is the common occupational hazard that they face, the magnitude of the problem is not well understood.

1.2 STATEMENT OF THE PROBLEM

One of the likely hazards to occur to health care workers is needle stick and sharp object injuries. Several studies from around the world show that there is high prevalence of NSSI among HCW. Data from Ethiopia also proves the high prevalence of NSSIs among HCW. Of all HCW, Surgeons and residents training to be surgeons are at an increased risk of sustaining NSSIs.^{2,3} The rate of injury can

reach as high as above 6 NSI per year for a typical surgeon.⁴ The presumed reason for this is, they frequently use sharps & needles to treat patients and on top of that surgery residents, have the increased propensity for injury for they are on the process of learning new technical skills.⁵ NSSIs raises concern for it is has risk of transmission of more than 20 types of blood borne pathogens.⁶ Some of the infection can be chronic and fatal like HBV, HCV, HIV. NSSI is not only a risk for acquisition of chronic infection, but it also predisposes the injured one to different psychological disorders that vary in severity.

Studies have shown that there is increased risk of occurrence of NSSIs for factors like certain activities of HCW (suturing, manipulating a needle in a patient, recapping a needle etc.) and few types of equipment like solid needle, hypodermic needles attached to syringe etc. And for residents practicing surgical interventions some studies have shown that there is association between NSSIs and type of surgical specialty they are training in and the year of residency or postgraduate year.^{7, 8}

Global statistics have demonstrated that there is significant underreporting of NSSIs injuries among healthcare workers and the underreporting is higher in surgeons and surgical residents. This underreporting behavior leads to incorrect interpretation of the low reporting as low injury rate which underestimates the magnitude of the existing problem.

With the rising population prevalence of blood borne viruses compounded with the high prevalence of NSSI among residents practicing surgical interventions, there is a noteworthy chance of occupational acquisition of potentially fatal infections and alteration of psychological well-being of the surgical trainee sustaining the injury.

This study is to address the extent of occurrence and context of NSSIs among residents practicing surgical intervention.

1.3 SIGNIFICANCE OF THE STUDY

A resident practicing surgical intervention face NSSIs often, but the prevalence of NSSIs among the residents is not well known for it is often under reported and for there are limited studies on this topic.

This study will survey to obtain the prevalence of NSSIs among residents practicing surgical intervention and who are on training in SPHMMC and also the context of NSSIs and the behavior associated in reporting them; thereby providing information for designing scientifically sound prevention method and contribute its share in the effort of making the hospital a safe environment for the residents as well as the patients. This study will also give a way for further studies by providing baseline information and identifying the existing gaps.

1.4 OBJECTIVES OF THE STUDY

1.4.1 GENERAL OBJECTIVES

To assess occurrence & situations surrounding NSSI and the behavior associated with the reporting of injuries among residents practicing surgical intervention.

1.4.2 SPECIFIC OBJECTIVES

- To assess patterns of NSSI among residents on training in SPHMMC and practicing surgical intervention.
- To assess circumstances under which NSSI occurs.
- To assess trends of reporting behavior of NSSI among residents practicing surgical intervention in SPHMMC.

CHAPTER TWO (Literature review)

Health care workers face a wide range of hazard on their job. Needle stick injury is common cause of biological occupational hazard among HCW.⁹ NSSI is associated with a number of different health hazards. The most significant of which is the risk of acquisition of possibly fatal infection such as hepatitis B & C virus and HIV. The risk of acquisition of HBV from a single needle sticking ranges from 6%-30% while the risk is lower for HIV/AIDS, which is an average rate of 0.3% per injury. And the incidence of HCV is an average of 1.8% per injury.¹⁰ Occupational acquisition of estimated 16,000 HCV, 66,000 HBV and 1000 HIV infections may have occurred among HCW throughout the world in the year 2000.¹¹

Sustaining NSSIs is also associated with psychiatric consequences like anxiety, depression; hypochondriasis (health anxiety) etc. ¹²The psychological effect of a needle stick injury can be severe and long lasting, even when no infection is transmitted. This impact is prominent when the source patient has HIV. A study which followed HIV exposed 20 HCW, showed that 11 reported acute severe distress, 7 reported persistent moderate distress, and 6 quit their jobs because of their injury.¹⁰

2.1 Occurrences of needle stick and sharp object injuries

An estimated 600,000-800,000 needle stick & other percutaneous injuries reported annually among health care workers in United States .¹³ The Botswana public health sector reported the lifelong prevalence of needle stick injuries was 48.9%.¹⁴ In Ethiopia, different researches showed that there is high prevalence of NSSI among health care workers. A study done in 4 hospitals in bale zone showed that the prevalence of life time NSSIs among HCW was 37.1% to 42.5%. And the figure in this study is lower than earlier studies in Ethiopia where the life time proportion was 66.6% in TASH and 59% in Bahirdar hospital.^{15, 16, 17}

All health care workers who use sharp instruments are at risk for injury. However the OR settings present the highest risk. H.Babcok & Victoria Fraser studied differences in patterns of percutaneous injuries in nine different hospital, by revising all percutaneous injuries occurring from 1997-2001, and reported an increased proportion of injuries occurred in operating room (32%) followed by emergency department (13.7%) & ICU (11.4%).¹⁸ Observation of earlier studies shows, among operating stuffs needle stick injury is common in surgeons and surgeons on trainees. Tokars JI et al in 1990 undergone a prospective study on percutaneous injury on operating personnel in 5 surgical specialties in four US teaching hospitals and reported that 89% of injuries were sustained by residents or attending surgeons.¹⁹

Studies show that NSSIs tend to occur commonly in some specialty than the others. And also some studies have shown patterns with post graduate level of the surgical trainee. Ben Ouyang et al conducted a cross sectional study on the incidence & distribution of needle stick injury among different medical trainees and found that surgical trainees were three times more likely to sustain injuries than non-surgical trainees and orthopedic surgery trainees had the highest likelihood of sustaining injuries.²

Healed AE, et al undergone a retrospective survey to assess the frequency and causes of needle stick injury in medical & surgical house staff in urban university teaching hospital and found the average frequency of needle stick injury among non-surgical resident was 0.63 per resident year and 3.8 per resident year among surgical residents. The study also showed that NSIs are highest during first postgraduate year. but other surveys have not found a pattern of NSIs by year of residency.^{13, 20} A study done aiming in investigating whether NSIs differed by postgraduate year and assessing patterns of NSIs among house staff, reviewed the NSIs reported to infection control departments by residents and found that out highest rate of injury occurred during the 1st year of residency, and the rate decreased as the year of residency increased. And when NSIs were studied by department, the highest rates were found in dental residents 30.6% followed by Obstetrics and gynecology residents' 28.9% and surgery residents 18.5%. Lower incidence rates of NSI were found among internal medicine 12.7% transitional medicine 3.3% and family medicine 2.7%.⁸

2.2 Factors attributed to needle stick and sharp injuries

Literatures show that only a few types of needles and some sharp equipment are attributed to the majority of injuries. A survey of nearly 5000 percutaneous injuries reported by hospitals participating in National Surveillance System for hospital Health Care Workers in US between June 1995 and July 1999, found that 62% of injuries were associated with hollow-bore needles primarily hypodermic needles attached to disposable syringes (29%), and the common activity that was being performed during injuries was when manipulating needle in patient (27%), disposal-related causes(12%), cleaning up(11%), while handling/passing device during or after use (10%) while recapping a used needle(5%), when attempting to transfer blood or other body fluids from a syringe to a specimen container (5%), IV line-related causes (8%), collision with health care worker or sharp(8%), Improperly disposed sharps (10%), other (4%).¹⁰ But when it comes to the OR setup, the common instrument attributed to injury is solid/suturing needle and the common activity is suturing. The Massachusetts department of public health analyzed injuries from OR and reported that 51% of injuries were caused by suture needles, 13% by hypodermic needles and 13% by scalpel blades. The top two categories of injury based on how the injury occurred include suturing (25%), and collision with a sharp or coworker (25%).²¹ on top of these, lack of experience & performing a procedure being exhausted increases the risk.⁷

2.3 Reporting trend of injuries

Timely reporting of occupational exposures to an employee health (in our set up to the incidence office and ART clinic) is essential to ensure appropriate counseling, prophylaxis or early treatment and in some countries the data achieved from this units are used to establish legal prerequisites for worker compensations.¹³ underreporting of sharp injuries by employees is documented in different literatures. This underreporting is higher among surgeons and surgical residents. In one study who surveyed surgeons showed 74% of surgeons never reported or reported only some of the injuries and the common reasons for not reporting were source patient being low risk 22.5%, lack of concern 30%.²² A study which surveyed surgical residents at TASH, in Addis Ababa University, Ethiopia, showed the most frequently cited reasons for not reporting were not knowing if the occupational health unit exists in the hospital 22.2% and the fact that the process takes a long time 38.8% ²³Underreporting results in significant underestimation of the magnitude of the problem and impedes interventions that could benefit the injured one.

CHAPTER THREE (Methodology)

3.1 STUDY AREA

The study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC). It is located in the northern part of Addis Ababa, Ethiopia. It is the second largest referral hospital in the nation and is under the Ethiopian federal ministry of health (FMOH). Its main service includes the provision of medical care, teaching and research. The medical college conducts different undergraduate & postgraduate programs. Currently there are 448 residents in the 16 residency programs provided by the college. These are general surgery, orthopedic & traumatology surgery, neurosurgery, ophthalmic surgery, maxillofacial surgery, urology, gynecology/obstetrics, ENT, emergency medicine, anesthesiology, internal medicine, pediatrics and childhood care, radiology, pathology, forensic medicine and psychiatry.

3.2 STUDY PERIOD

The study was conducted from February 1st, 2018 till March 30th, 2018.

3.3 STUDY DESIGN

Cross-sectional study was employed.

3.4 STUDY POPULATION

All residents practicing surgical intervention and training in SPHMMC, who are at different postgraduate level of their specialty program, are the study population. These include General surgery, Gynecology & Obstetric, Orthopedics & Traumatology, Ophthalmology, maxillofacial surgery, ENT & Emergency medicine residents.

3.4.1 Inclusion criteria

All residents training in SPHMMC and practicing surgical intervention.

3.4.2 Exclusion criteria

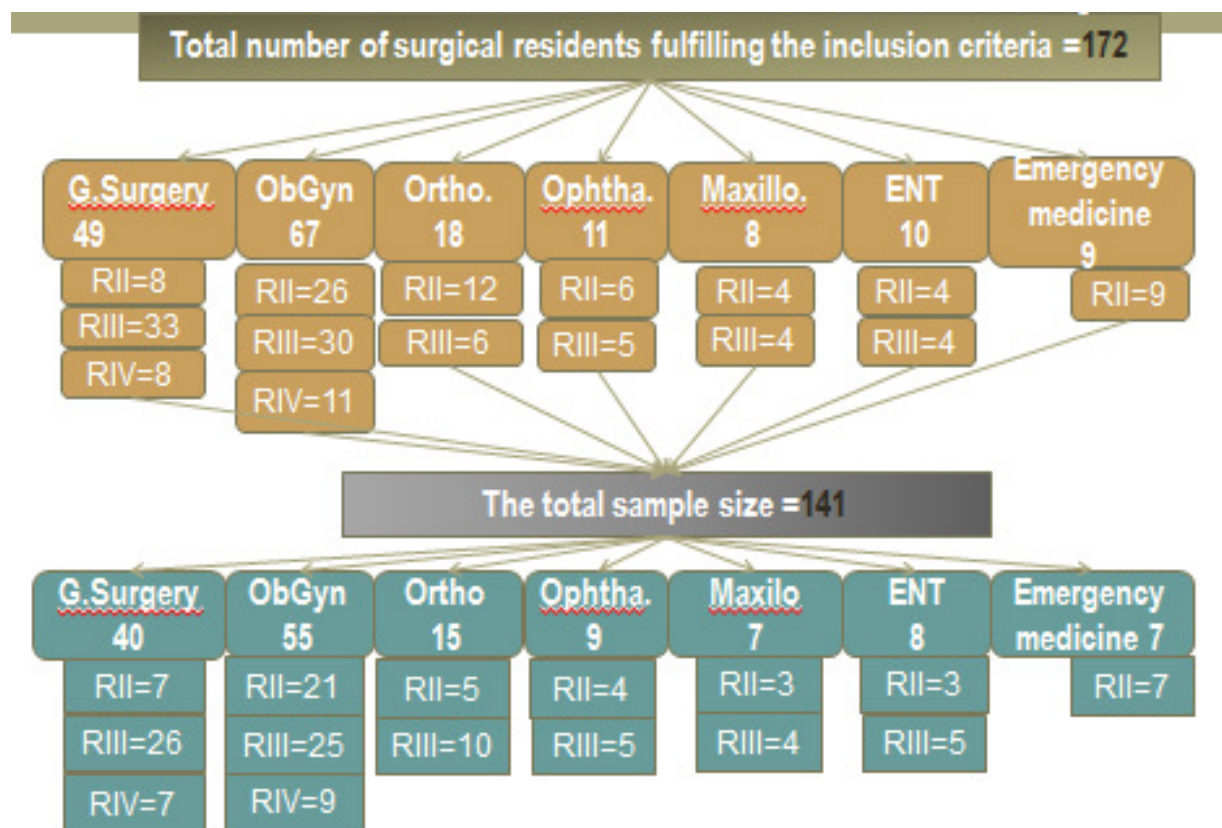
- Current year one residents for they started their residency program only 2month prior to data collection period.
- Residents who are not willing to participate in the study.

3.5 DATA SAMPLING TECHNIQUE AND PROCEDURE

The sampling technique that was employed is stratified random sampling, probability type of sampling method. First from registrar office, the list of residents practicing surgical intervention was obtained and the residents were categorized into groups based on the surgical specialty they are training in, then residents in each specialty were further grouped based on their year of residency. Study participants who fulfill the inclusion criteria were selected by simple random sampling technique using the list of residents obtained from registrar and proportionate allocation to size was made for each year of residency in each specialty to share the total sample size.

3.6 SAMPLE SIZE DETERMINATION

The sample size was calculated for each objectives using single proportion formula ($n = [Z \alpha/2]^2 P (1-p)/d^2$) at 95% confidence interval, where, $Z \alpha/2 = 1.96$, $d=5\%$ of marginal error, The value of P is taken from research done in TASH, 8 years back²³ i.e. proportion of prevalence of NSSI, proportion of factors characterizing all work-related accidents, proportion of non-reported injuries. The item that gives the maximum sample size (i.e. $P=0.43$) is used and the total sample size was determined to be 377 and correction formula was used $n_o = n_i / (1+n_i/N)$ where n_i = uncorrected sample size, and N = total number of all the source population (172) and taking 12% non-respondent rate, finally the sample size is **141**



3.7 DATA COLLECTING INSTRUMENT

Data was collected using self-administered structured questionnaire. The survey questionnaire was adopted by reviewing different literatures of similar topic. It contains questions about socio demographic data (age, sex), current level of training, and the number of NSSIs during the immediate past one academic year, NSSIs involving a high risk patient and a set of questions about the recent needle stick or sharp injury event that happened within the previous one academic year.

3.8 DATA COLLECTING PERSONNEL

Five residents were recruited and information was given to them on the objective, relevance of the study, confidentiality, respondent's right, and informed consent.

3.9 DATA QUALITY CONTROL AND MANAGEMENT

Data quality was assured by training data collectors. The questionnaire was pretested on similar settings (5% of the study population) and the feedbacks were incorporated.

3.10 VARIABLES

- **Independent variables**

Gender, Age, the type of specialty they are training in, Level of residency, Location where the injury occurred, the equipment implicated in the injury, the activity being performed at the time of injury, status of source patient, opinion of the surgical trainee on the presumed cause of the injury.

- **Dependent variable**

Occurrence of needle stick or sharp injuries over the past one academic year.

3.12 ETHICAL CONSIDERATION

The proposal was submitted to institutional review board and approved accordingly. Confidentiality, accountability and neutrality were kept throughout the study.

3.13 DISSIMINATION AND UTILIZATION OF RESULT

The results of the study will be disseminated to SPHMMC department of general surgery and other bodies who need the research accordingly.

3.14 OPERATIONAL DEFINITION

- **Needle stick injury** is defined as accidental skin punctures that occurred over the past one academic year and which resulted from contact with ***solid needles*** (suturing needles) or ***hollow bore needles*** like hypodermic syringe needles, IV cannula stylets, needles used to connect parts of IV delivery system and needles used for drawing blood or administering parenteral injections.

- **Sharp injury:** is defined as accidental skin cut or punctures over the past one academic year and caused by instruments like scalpels, lancets, scissors, metal wire, retractors, clamps, pins, staples, cutters, broken glass.
- **High risk patients:** defined as patients with confirmed HIV, HBV & HCV infections.
- **Recent NSSI:** the last NSSI the resident sustained over the past one year.

3.15 DATA ANALYSIS

The collected data were checked for completeness and consistency and the completed questionnaires were given codes and entered into Statistical Package for Social Sciences (SPSS) version 20.0. 20% of the entered questionnaires were double checked for comparing entered data with the actual questionnaire. Descriptive analysis was performed with the use of frequencies, percentages and means and results were presented in the form of texts, tables and graphs. Tabulation of the dependent variable with the independent variables done and data were analyzed using chi-square test with a significance level of 0.05. Kruskal-Wallis a nonparametric test was used to compare frequency of needle stick injuries per resident according to surgical specialty type.

CHAPTER FOUR: RESULT

A total of 122 residents practicing surgical intervention has participated in the study (response rate = 86.5%). Of 122 respondents 40 (32.8%) were general surgery residents, 15(12.3%) residents were from orthopedics & traumatology surgery, 8(6.6%) from ENT, 36(29.5%) from Obstetrics and gynecology, 7(5.7%) from maxillofacial surgery, 9(7.4%) from ophthalmology and 7(5.7%) from emergency medicine department. And these residents are on different level of their residency program i.e.; 44.3 % (54) in 2nd year, 50 % (61) 3rd year and 5.7 % (7) in 4th year. Of those 99(81.1%) were male and 23(18.9%) were female.

4.1 Occurrence of NSSI

Of the 122 respondents, 84(68.9%) residents sustained at least one NSSI over the past one academic year of their residency program. (Range 1-10, mean=1.62). Of the 84 injuries, 18(14.8%) of them involved high risk patients.

4.1.1 Distribution of injury among residents

The highest rate of injury at 100% was found in orthopedics and maxillofacial surgery residents (15/15 and 7/7 respectively), followed by General surgery residents 77.5% (31 of 40 residents), ObGyn residents 63.9% (23/36), emergency medicine residents 57.1% (4/7), ENT residents 25%(2/8) and ophthalmology residents 22.2% (2/9). The differences are statistically significant ($p=0.000$). (**Figure 1**) The frequency of NSSIs per a resident per year (i.e. the question; how many NSSIs have you encountered over the past one academic year) was analyzed within each surgical specialty with the use of Kruskal-Wallis test; the results showed that the mean ranks of NSSI per a resident are significantly different among the different surgical specialty. ($X^2=27.150$, 6 d.f., $p=0.000$). The highest being in orthopedics and maxillofacial surgery residents with a mean number of injuries over one year is 3 and 2.71 respectively. (**Table 1**)

When NSSI was examined by PGY level; out of 84 NSSI that occurred over the immediate past one academic year, 38(45.2%) of the injury was to residents on their 1st year of residency, 41(48.8%) injuries to residents on their 2nd year, and 5(6%) injuries to residents on their 3rd year of training program. No significant association was found between occurrence of NSSI and level of residency ($p=0.925$).

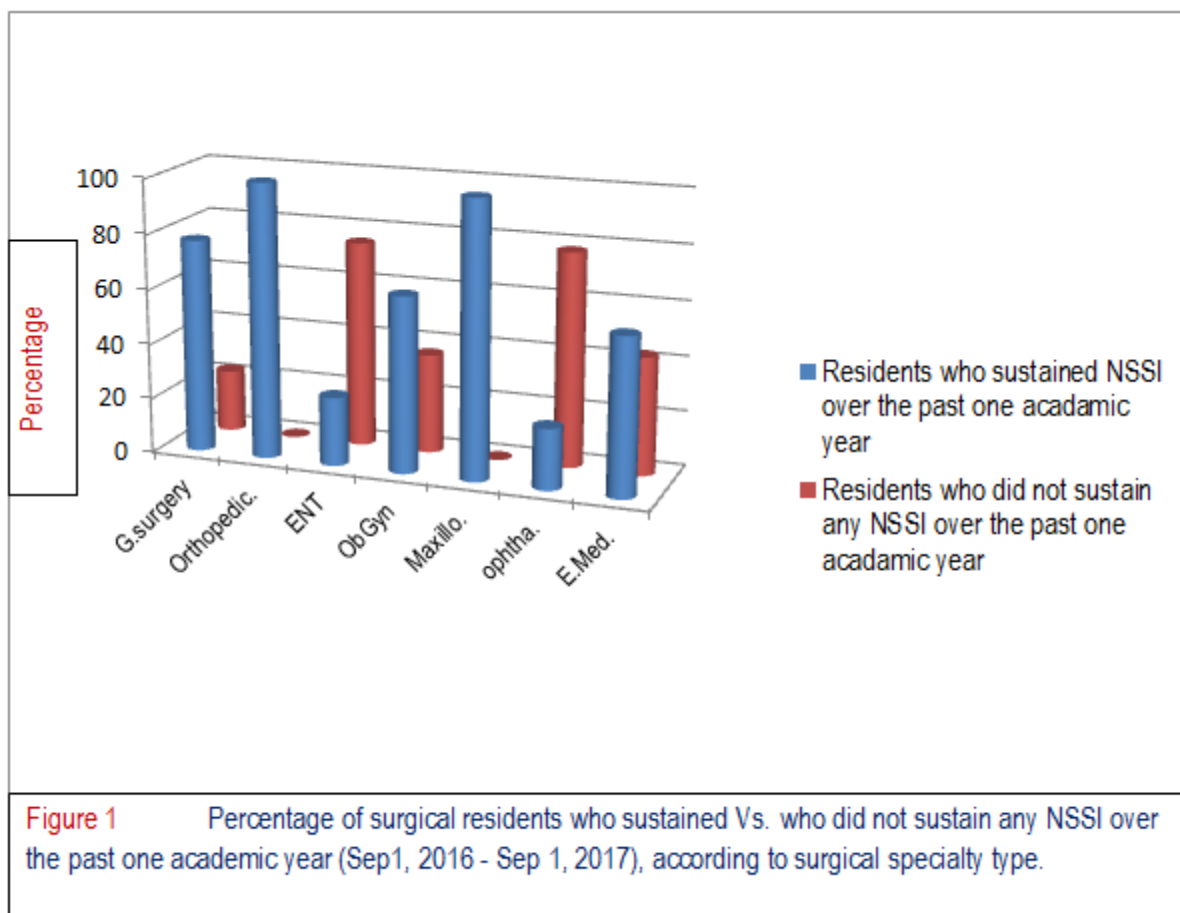


Table 1 NSSI according to surgical specialty type			
Surgical specialty	No. of Residents	Residents with NSSI	Mean No. of NSSI per resident
All surgical specialty	122	84	1.62
General surgery	40	31	1.85
Orthopedic & traumatology surgery	15	15	3.00
ENT	8	2	0.63
Obstetrics and Gynecology	36	23	1.33
Maxillofacial surgery	7	7	2.71
Ophthalmologic surgery	9	2	0.63
Emergency medicine	7	4	0.57

4.2. Details of the most recent injury/ risk factors for NSSI

Of the 84 injuries, 67(54.9%) is self-induced. Highest number of injury occurred in the OR; 69(82.1%), followed by ER; 11(13.1%), 2 (2.4%) at the bedside (wards & ICU) and 2(2.4%) in the OPD. There is association between place where the injury happened and occurrence of NSSI ($p=0.000$).

The activities or procedures carrying a high risk of injury were suturing 59(70.2%) and manipulating a needle or sharps in a patient 9(10.7%). Other tasks include; cutting 5(6%), exchanging instruments 3(3.6%), recapping a needle 2(2.4%), cleaning up 2(2.4%) and other tasks accounted for 4(4.8%) of the injuries. The result was statistically significant ($p=0.000$).

On analyzing instruments causing injury; solid needle accounted for 77.4% (65), sharp instruments 14.3% (12) and hollow bore needle 8.3% (7). There is an association between occurrence of NSSI and the instrument being used. ($p=0.000$).

When residents were asked to give their opinion on what triggered the injury; 37(44%) identified a feeling of being rushed as the cause of the injury, 21(25%) answered not using appropriate equipment resulted the injury, 10(11.9%) replied being fatigued/hungry while performing the task or procedure as a reason for the injury, 6(7.1%) acknowledged negligence in following the principle of prevention method has brought the injury, 9(10.7%) answered lack of assistance and 1 (1.2%) responded lack of skill set required as the cause of the injury. (**Table 2**)

Table 2 Characteristics of the most recent needle stick injury

characteristics	Frequency	Percentage
Source of the injury		
Self-induced	69	82.1%
By someone else	15	17.9%
Location of injury		
In the OR	69	82.1%
In the ER	11	13.1%
At the bedside(wards, ICU)	2	2.4%
OPD	2	2.4%
Task performed during injury		
Exchanging instruments	3	3.6%
Suturing	59	70.2%
Cutting	5	6%
Recapping a needle	2	2.4%
Manipulating a needle or a sharp in a patient	9	10.7%
Cleaning up	2	2.4%
others	4	4.8%
Type of equipment used		
Hollow-bore needle	7	8.3%
Solid needle	65	77.4%
Sharp instruments	12	14.3%
Perceived cause of injury		
Lack of assistance	9	10.7%
Not using appropriate equipment	21	25%
Lack of skill set required	1	1.2%
Fatigue/hungry	10	11.9%
Feeling of being rushed	37	44%
Negligence in following the principles of prevention method	6	7.1%

4.3. Reporting trend of injury

Out of 84 residents who sustained NSSI over the past one academic year only 12(14.3%) reported their recent injury to incidence office or ART clinic. It was noted that all injuries involving non high risk patients (45/45, 100%) were not reported and only one (1/21, 4.8%) injury involving unknown status of source patient was reported. Of the 18 recent injuries involving high risk patients 11(61.1%, 11/18) reported and 9(38.9%, 9/18) were not reported.

The most frequent reason for not reporting is the fact that the source patient being of no high risk (54.2%, 39/72,), followed by those who did not report for they don't know the unit for reporting injury existed (12.7%,10/72), and (11.2%, 8/72) didn't report because the process takes too much time, (6.9%, 5/72) did not report because they don't want to take prophylaxis due to its side effects, (6.9%, 5/72) did not report because of negligence, (1.3%, 1/72) believed reporting has no significant use. (1.3%, 1/72) didn't report for other reason. (**Table 3**)

Table 3 Reporting behavior of NSSI among surgical residents		
<i>Reason for not reporting the most recent NSSI</i>	<i>frequency</i>	<i>percentage</i>
Number of residents who did not report their most recent NSSI	72	85.7%
The source patient was not of high risk	39	54.2%
I don't know if the unit exists	10	13.9%
The process takes too much time	8	11.2%
I don't want to take prophylactic drug	5	6.9%
Negligence	5	6.9%
It has no significant use	1	1.3%
Other	1	1.3%
Missing	3	4.2%

CHAPTER FIVE

5.1 DISCUSSION

NSSI among residents is a concerning occupational safety issue. Even though seroconversion following a single needle stick injury is rare, the lifetime risk of contracting infection is noteworthy. It is understandable that the chance of acquiring infection may even rise up if there is high incident of NSSI among residents and high population prevalence of blood borne pathogens. This study evaluated NSSI among surgery residents and revealed that more than 2/3rd of the residents (68.9%) have sustained NSSIs within the previous one academic year of their training program. This result is almost comparable to similar studies conducted in a university hospital in Saudi Arabia (58.9%) and to what was found on study done in Mulago Hospital, Uganda (60.7%)^{24, 25}.

Distribution of injury was also examined by level of residency and surgical specialty program and the finding is that there is no pattern of injury in relation to year of residency. Prior studies show conflicting results. Some of them suggest that there is a high rate of injury at the first year of residency training stating that experienced trainees are less likely to sustain injuries^{2, 8}. On the contrary one study show that first year residents face significantly lesser rate of incidence for they are not as such involved in tasks²⁵. And yet another study done in university of southern California medical center which enrolled 550 medical students and residents showed no relation existed between PGY and occurrence of NSI²⁶. As for the patterns according to specialty type, orthopedic & maxillofacial surgery trainees encounter NSSI more often than other surgical specialty. This finding is alike with a survey piloted in Nigeria, which indicated highest rate of exposure in orthopedic residents (75%) and ObGyn(70%) and the least rate of exposure in ophthalmology, accident and emergency and ENT residents²⁷. Orthopedic & maxillofacial residents are at increased risk for they use a wide range of sharp equipment and usually handle sharp bone edges. Moreover, Dental residents has the added risk, for they work in a dark oral cavity with challenging illumination and the process of learning mirrored image procedures puts them in a higher risk of incurring injuries^{8, 28}.

The use of solid needle and Suturing are the common circumstance under which the injury occurred in this study. This is expected result since it was mentioned in several literatures that solid needle & suturing place HCW working in the OR set up at increased risk of NSSIs^{10, 13, 21}. Based on this observation in some parts of the world different prevention methods were developed like safety protocols and modification of instruments i.e.; the use of non-sharp techniques which includes using blunt tipped needle instead of cutting ones, using electro-cautery for making skin incisions than using scalpel, using staples for skin closures etc... and this has shown some rewarding outcomes. Additionally; the residents have identified “the feeling of being rushed” (44%) and use of inappropriate instruments (25%) as the cause of injuries. This finding relate to the study done in TASH^{5, 23}.

The frequently mentioned claim of the under-reporting of injuries among surgery residents is also confirmed in this study. Of the participants, majority (54.2%) justified not reporting their injuries by stating that the patient is not of high risk. As a trend residents/HCW in SPHMMC report only the injuries involving high risk patient for the aim of getting prophylaxis. The second frequently cited reason for not reporting

(13.9%); “I don’t know the unit of reporting existed” is similar with the commonly identified cause of injury from study done in TASH (50%)⁵. Had the questionnaire included a question inquiring to specify the type of high risk source (i.e.; HIV, Hep B or Hep C), better descriptive result of the situation would have been obtained. Since reporting bureau for each source differs in our hospital. The reporting process consuming too much time is quoted as the other commonly identified barrier to reporting. Although the reporting process/policies differ from one country to other; it is in general considered cumbersome. But this fact should not undermine the potentially modifiable issues in our reporting system. Based on information obtained by verbal communication; a resident or any other HCW in SPHMMC may face different challenges in reporting an injury and getting prophylaxis timely. At times knowing the status of source patient, may be difficult because screening tools/kits are not adequately available. Every so often it is needed to transport sample from AaBET (affiliate of St. Paul’s hospital) to the main laboratory (located in St. Paul’s hospital compound) to screen/know the status of the source patient and if the result turned out to be positive a resident has to come to St Paul’s and start another process for getting prophylaxis which is time consuming and does not fit to the busy schedule of a resident.

5.2 CONCLUSION

This study established high occurrence of NSSI among surgery residents. Additionally, it revealed that orthopedics & maxillofacial residents are more likely & repeatedly exposed to injuries. General surgery & ObGyn residents have high rate of injuries as well. Despite the fact that there is abundant NSSI, the reporting rate is inadequate. The circumstances under which NSSI occurred are similar with several other studies and this is of great help for it sets goal when designing prevention methods or adopting one from other country.

5.3 RECOMMENDATION

- Residents should strictly abide by the common surgical safety principles to minimize NSSI.
- Reporting system should be upgraded in a way it is encouraging for the users.
- The institution should work on the
 - Provision of adequate screening tools and easy access to prophylaxis and
 - Provision of ample surgical instruments.
- Further studies aiming at identifying the barriers of reporting system in depth should be done.
- NSSI awareness trainings/lectures should be given frequently to surgery residents.
- The institution (SPHMMC) setup friendly NSSI prevention methods should be developed or adopted from other countries.

5.4 LIMITATION OF THE STUDY

Response bias was certain. Due to self-reporting issue residents tend to report what they think is acceptable number of injury for it is often stigmatized with poor skill. And also recall bias was challenging to minimize.

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Consent form

I. Participant's information sheet

Greeting: Good morning/afternoon

My name is _____ i am collecting this questionnaire on behalf of Dr. Luli Baissa, a general surgery resident working on impartial fulfillment of graduate studies. I would like to ask if you are volunteer to answer questions which takes around 15 munities about needle sticks and sharps injuries among residents practicing surgical intervention and training in SPHMMC. The participants of this study will not gain the participant any direct benefit from participating. Your genuine responses that you are going to give are very important to identify the magnitude of the problem and issues related to occupational injuries among surgery residents training in SPHMMC. You are selected randomly to be participant of this study. The study has no risk for the participants and interview will be private to make participants feel safer. You have full right to participate or not to participate and you can also stop participating in the study at any time. You can ask any question which is not clear for you at any time. Any information you will be forwarding will be kept confidential and your name will not be specified.

II. Informed consent

I have read this form. I comprehend and understand all conditions stated above. And I have decided

A. To participate in the study B. Not to participate in the study, thank you.

Name of principal investigator: Luli Baissa;

Address: Cell phone: +251963082552; E-mail: lulibaissa8@gmail.com

Name of institution: St. Paul's Hospital millennium medical college.

Address: Addis Ababa, Ethiopia

Result of interview: 1. Completed

2. Refused.

3. Partially completed

Needlestick and sharp injuries among surgery resident.

Questionnaire

1 Please indicate your

- Gender A. Male B. Female
- Age A. <25 B. 25-30 C. 31-35 D. >35

2 what is your current level of training

- A. 2nd year B. 3rd year C. 4th year

3 which specialty are you training in

- A. General surgery B. Orthopedic surgery C. ENT
D. Gynecology/obstetrics E. Maxillofacial surgery F. Ophthalmology
G. Emergency medicine

4 have you ever had a needle stick or sharp injury over the past one academic year

- A. Yes B. No

5 To the best of your ability, please indicate how many times you've experienced a needle stick or sharp injury on your last academic year _____

6. Have you ever had a needle stick or sharp injury involving a high risk patient?
("High risk" defined as patients with HIV, hepatitis B or C virus infection)

- A. Yes B. No C. may be I had. (I don't know)

Questions about your recent needle stick injury

8.1 The equipment implicated in the injury

A hollow bore needle: (*Hypodermic syringe needles, IV cannula stylets, needles used to connect parts of IV delivery system and needles used for drawing blood or administering parenteral injections*)

B solid needle: (suturing needles)

C sharp instrument: (*scalpels, lancets, scissors, metal wire, retractors, clamps, pins, staples, cutters, glasses*)

8.2 was your most recent needle stick

- A. Self-induced B. by someone else

8.3 Where did it occur?

- A. In the OR (major or minor) B. In emergency room
C. at the bedside (wards) D. OPD

8.4 What task were you performing during the injury?

- A** While exchanging instruments **B.** suturing **C.** Manipulating a needle/sharp in a
patient **D** recapping a needle **E** cutting **F** cleaning up **G** Others

8.5 In your opinion what was the cause of your recent needle stick or sharp injury?

- A** lack of assistance **B** Not using appropriate equipment
C lack of skill set required **D** fatigue/hungry
E the feeling of being rushed **F** Negligence in following the principles of prevention
method of injuries while using needle stick and sharp
objects.

8.6 was the source patient high risk

- A Yes B No C I don't know (patient was not screened)

8.7 was your most recent needle stick or sharp injury reported to incidence office or ART clinic.

- A Yes B No

8.8 If your answer to question no 8.6 is No what was the reason?

- A Process takes too much time B. The source patient was not high risk
C I don't know if the Unit exists D I don't want to take prophylactic drug
E It has no significant use F Negligence G other