



St. Paul hospital millennium medical college

Graduate study program

**The Incidence of surgical site infection in St.paul's Hospital Millennium
Medical Colleges from May 19- August 19,2022.**

by

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ADDIS ABABA ETHIOPIA

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St. Paul Hospital Millennium Medical College Graduate Study Program
The Incidence of surgical site infection in St. Paul's Hospital Millennium Medical
Colleges from May 19- August 19, 2022.

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Abstract

Back ground : Surgical site infections (SSIs) are infections that develop within 30days after an operation or surveillance of surgical wound infection implementation within 1year after surgery when an implant is placed. As many as 5% of patients undergoing surgery develop surgical site infections (SSIs), which may lead to revision surgery, delayed wound healing, increased use of antibiotics, and increased length of hospital stay, all of which have a significant impact on patients and the cost of health care.

Objective : The objective of this study is to assess The incidence of surgical site infection in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia. from May 19- August 19,2022.

Methods : A prospective cross sectional descriptive study design has been used to evaluate The incidence of surgical site infection from May 19- August 19,2022 in St. Paul's Hospital Millennium Medical College (SPHMMC). The study subjects has been all patients operated in the study period. The data has been collected based on face to face interview using structured questionnaires and physical examination (observation). Statistical software, Epi data version 3.1 and SPSS version 23 has been used to analyze the data.

Result: The incidence of SSI among patients who underwent surgery in SPHMMC from May 19- August 19, 2022 according to this prospective study was 9.2 %. This study shows that 31.5% of patients with SSI had comorbid illnesses and 25.9 % has history of substance use and these numbers are considered higher than normal population. Among patients who developed SSI, most or 54.7 % had post-operative hospital stay of more than 3 days. On the other hand, this study identified that most patients who developed SSI had clean-contaminated wound class (n=99, 43.4 %).

Conclusion: The overall incidence of SSIs was 9.2% which was lower compared with report from some developing countries and higher compared to reports from developed countries. This study demonstrates comprehensively that prolonged operative time, associated comorbidity and prolonged hospital stay can increase the likelihood of developing SSI across a broad array of surgical procedures and surgical specialties.

Keywords: Surgical site infection , Surgical wound infections , Antibiotic prophylaxis , Infection control , Postoperative complication , associated factors.

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Acronyms and Abbreviations

CD: Compacted Disc

CDC: Centers for Disease Control

GA: General Anesthesia

IAES: Intra_operative adverse events

NNIS: The National Nosocomial Infections Surveillance System

OR: Odds ratio

RR: Relative risk

SSI: Surgical site infection

SPHMMC: St.paul's Hospital Millennium Medical College

Research project summary

Name of investigator	Dr.Abraham Asfaw, 4 th Year General Surgery Resident
Full title of the research project	The incidence of surgical site infection in St.paul's Hospital Millennium Medical Colleges from May 19- August 19,2022.
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1, Introduction

1.1,Background

surgical site infection is defined as an infection that occurs at or near a surgical incision within 30 days of the procedure or within one year if an implant is left in place(1). SSIs were the most common nosocomial infection, accounting for 38% of all such infections. Of these SSIs, two thirds were confined to the incision, and one third involved organs or spaces accessed during the operation. When surgical patients with nosocomial SSI died, 77% of the deaths were reported to be related to the infection, and the majority (93%) were serious infections involving organs or spaces accessed during the operation(2).

SSIs have been responsible for the increasing cost; morbidity and mortality related to surgical operations and continue to be a major problem worldwide. Globally, SSI rates have been found to be from 2.5% to 41.9%(3). In Western countries, 2 to 5% of patients undergoing clean surgery and up to 20% of patients undergoing intra-abdominal surgery will develop SSIs(4). In Africa, surgical site infections were the leading infections in hospitals (pooled cumulative incidence of 5.6 per 100 surgical procedures), strikingly higher than proportions recorded in developed countries(5). Another study done in Africa indicated cumulative incidence of SSIs ranged from 2.5 to 30.9%(6). In Ethiopia, incidence rate of SSIs ranges from 11.1% to 75%(7,8)

The incidence of SSIs can vary across surgical procedures, specialties, and conditions, with a range of 0.1% to 50.4% reported in a systematic review by Korol et al, Although there are global variations around the definition of an SSI, an SSI is defined typically as infections occurring within 30 days after surgery and affecting either the incision, organs, or body spaces at the site of the operation . (9)

Another institution-based cross-sectional study was conducted in Shire Suhul Hospital showed The incidence of SSI was 11.1% and A hospital stay for more than a week, a history of alcohol consumption, use of local anesthesia, and dirty incision classification were associated independently with a higher risk of SSI, and also a hospital based cross sectional study done in SPHMMC showed ,The incidence of surgical site infection was found to be 24.6% of whom 10% develop deep site, 9.2% organ spaced and the remaining 5.2% develop superficial space

surgical site infection. The incidence was high in patients who had undergone orthopedics (54.3%) and abdominal (30%) surgeries. Educational status, pre-morbid illness, duration of pre-operative and post-operative hospital stay, ASA score, and type of the wound were significantly associated with SSI at p-value of ≤ 0.05 . However, no association was found with BMI and location of the wound.(10,11)

1.2 Statement of the problem

The impact of ssi is multifactorial, including prolonged hospital stays, long-term disabilities, increased resistance of microorganisms to antimicrobials, high health system costs, emotional stress for patients and their families, and substantial economic burdens for hospitals. SSIs and hospital stays can lead to pressure ulcers, hypoglycemia, additional economic burden, and death. Different studies have shown that the most common causes of SSIs relate to inadequate supplies of personal protective equipment, a lack of training on infection control measures, an absence of hospital policy on infection control, and inadequate hand washing practices. Infections might also be related to direct contact between a patient and an inanimate object without proper hand washing or using appropriate antisepsis .

In Sub-Saharan Africa (including Ethiopia), there are few studies regarding the incidence of SSI. Therefore, this study was created to assess the incidence of SSI at St. Paul's Hospital Millennium Medical College (SPHMMC)(12).

1.3. Rationale of the Study

Despite improvements in operating room practices, instrument sterilization methods, better surgical technique and the best efforts of infection prevention strategies, surgical site infections remain a major cause of hospital-acquired infections and rates are increasing globally even in hospitals with most modern facilities and standard protocols of preoperative preparation and antibiotic prophylaxis. Moreover, in developing countries where resources are limited, even basic life-saving operations, such as appendectomies and cesarean sections, are associated with high infection rates and mortality(13).

This study has been conducted to establish the incidence of surgical site infection in our local setting. Here we document multiple factors predicting SSI in SPHMMC. and also the study is important for using it as an input for policy makers to improve surgical care, used as an input for further researches on the topic and last but not least the study will be used in the working area for the college to improve its service.

2. Literature Review

The identification of SSI involves interpretation of clinical and laboratory findings, and it is crucial that a surveillance program use definitions that are consistent and standardized; otherwise, inaccurate or uninterpretable SSI incidence will be computed and reported. The CDC's NNIS system has developed standardized surveillance criteria for defining ssis . By these criteria, ssis are classified as being either incisional or organ/space. Incisional ssis are further divided into those involving only skin and subcutaneous tissue (superficial incisional SSI) and those involving deeper soft tissues of the incision (deep incisional SSI). Organ/space ssis involve any part of the anatomy (e.g., organ or space) other than incised body wall layers, that was opened or manipulated during an operation. lists site-specific classifications used to differentiate organ/space ssis. For example, in a patient who had an appendectomy and subsequently developed an intraabdominal abscess not draining through the incision, the infection would be reported as an organ/space SSI at the intra-abdominal site. Failure to use objective criteria to define ssis has been shown to substantially affect reported SSI incidence. The CDC NNIS definitions of ssis have been applied consistently by surveillance and surgical personnel in many settings and currently are a de facto national standard(2).

Surgical site infections are both common and morbid. Surgical site infections are now the most common and costly of all hospital-acquired infections, accounting for 20% of all hospital-acquired infections. Surgical site infections are associated with increased length of stay and a 2- to 11-fold increase in the risk of mortality. Although most patients recover from an SSI without long-term adverse sequelae, 77% of mortality in patients with an SSI can be attributed to the infection itself. The incidence of SSI is 2% to 5% in patients undergoing inpatient surgery. Estimated annual incidence varies widely, ranging from 160,000 to 300,000 in the US. These estimates are likely understated, given the surveillance challenges after discharge(4).

Based on the effects of Intraoperative Hypothermia on Surgical Site Infection, there are many articles published, some of the articles are, the articles published in the university of Chicago press, the articles published in Johns Hopkins Hospital press and the articles published in Cooper University Hospital, Camden(14–16) which shows intraoperative hypothermia as a cause for SSI for both elective and emergency laparotomy. So Intraoperative temperature regulation is an

increasingly important measure of surgical quality because of its association with surgical site infections(15).

Many studies have been explored SSI in relation to different risk factors. Institutional based, different prospective and retrospective studies are conducted in different countries in relation to the duration of surgical procedure which showed Prolonged Operative Duration Increases Risk of Surgical Site Infections.this researches are done in china, Norwegian and Canada(9,17,18). The likelihood of SSI increased with increasing time increments; for example, a 13%, 17%, and 37% increased likelihood for every 15 min, 30 min, and 60 min of surgery, respectively. On average, across various procedures, the mean operative time was approximately 30 min longer in patients with ssis compared with those patients without(9). It should be noted that it was likely difficult to modify these risk factors,(Open fracture, prolonged surgical duration, increased body mass index and current smoking) but they do prove useful for preoperative counselling of patients and their relatives regarding their own risk profile of SSI, and the perioperative medical optimization(17).

There are a number of risk factors for SSI,and to mention a few,there is a research done on Intra-operative adverse events (iaes) and it`s relation on SSI and showed Intra-operative adverse events (iaes) are associated independently with increased ssis, particularly in patients with less preexisting risk factors for SSI. Preventing iaes or mitigating their impact, once they occur, may help decrease the rate of ssis.(19).and there is also other research done on the relation of SSI and bathing with chlorhexidine and showed that Bathing with chlorhexidine did not reduce surgical site infection rate(20).

The burden of SSI in developing countries is high when compared to the developed countries, but few data are available from the developing world(5,6). Four relevant abstracts were retrieved from the international conference literature and showed The hospital-wide incidence of HAI varied between 2.5% and 14.8%; in surgical wards, the cumulative incidence ranged from 5.7% to 45.8%. The largest number of studies focused on surgical site infection, whose cumulative incidence ranged from 2.5% to 30.9%. Data on causative pathogens were available from a few studies only and highlighted the importance of Gram-negative rods, particularly in surgical site infection and ventilator-associated pneumonia(6).

There are few studies done in Africa in relation of surgical site infection and associated with pre-morbid illness, use of drain, iodine alone in skin preparation, prolonged duration of the operation and cigarette smoking and also SSI in relation of elective clean and clean-contaminated surgeries(13,21). A cross-sectional prospective study from Tanzania also showed Surgical site infection (SSI) was detected in 65 (26.0%) patients, of whom 56 (86.2%) and 9 (13.8%) had superficial and deep SSI respectively. Among 65 patients with clinical SSI, 56(86.2%) had positive aerobic culture. *Staphylococcus aureus* was the predominant organism 16/56 (28.6%); of which 3/16 (18.8%) were MRSA. This was followed by *Escherichia coli* 14/56 (25%) and *Klebsiella pneumoniae* 10/56 (17.9%). Among the *Escherichia coli* and *Klebsiella pneumoniae* isolates 9(64.3%) and 8(80%) were ESBL producers respectively. A total of 37/250 (14.8%) patients were HIV positive with a mean CD4 count of 296 cells/ml. Using multivariate logistic regression analysis, presence of pre-morbid illness (OR = 6.1), use of drain (OR = 15.3), use of iodine alone in skin preparation (OR = 17.6), duration of operation ≥ 3 hours (OR = 3.2) and cigarette smoking (OR = 9.6) significantly predicted surgical site infection (SSI)(13).

A comprehensive literature review and meta analysis evaluating the incidence of SSI in clean and cleancontaminated surgeries in the developing world was conducted. The combined incidence of SSI in elective clean and cleancontaminated surgeries in all countries analyzed was 6% (95% CI 5– 7%) and increased to 15% (95% CI 6–27%) when post-discharge surveillance was considered. Although the data are variable, it is clear that the incidence of SSI in the developing world is higher than that in the developed world(21). There is also a prospective analysis done in sub Saharan Africa on the burden of risk factors for surgical site infection in children and showed, The SSI rate was 14.3% in clean incisions, 19.3% in clean-contaminated incisions, 27.3% in contaminated incisions, and 60% in dirty incisions ($p < 0.05$). The infection incidence was 25.8% in emergency procedures and 20.8% in elective procedures ($p > 0.05$). The infection incidence was 31% in operations lasting ≥ 2 h and 17.3% in operations lasting < 2 h ($p < 0.05$)(22).

There are few retrospective and prospective studies done in Ethiopia on the incidence of surgical site infection. Some of the studies are, A prospective study done at surgical ward of Hawassa University Referral Hospital, Southern Ethiopia, showed Surgical site infection (SSI) was detected in (19.1%) patients(3). Another Hospital based prospective cross sectional study

was done in Ayder teaching and referral hospital, Mekelle, Ethiopia, showed Surgical site infection (SSI) was detected in (75%) patients(8). There is also a hospital-based cross-sectional study done in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia, showed Surgical site infection (SSI) was detected in (11.1%) patients(7).

Another similar retrospective research done in Borumeda Hospital, Northeast Ethiopia based on Surgical Antimicrobial Prophylaxis and Incidence of Surgical Site Infection showed that The incidence of surgical site infections was 46.7% and There was high inconsistency between surgical antimicrobial prophylaxis practice and international surgical site infections prevention guideline. Wrong selection of antimicrobial agents was the most noncompliant to the guidelines. The incidence of surgical antimicrobial prophylaxis was high and requires due attention(23).

Surgical site infection is not a rare complication: Probably more than 3% of surgical patients are affected. Although many incisional infections are controlled easily, deeper and more extensive infections may have devastating consequences. Patient factors, including immune function, body temperature, oxygenation, glycemic control, the particular surgical procedure carried out, and the infecting organism, all may pose risks for SSI. Antimicrobial prophylaxis, although important, does not itself prevent or reduce the risk of SSI. Good surgical technique is essential; local measures other than antisepsis may prove to be part of the solution to the problem of SSI(24).

Therefore, this study aimed to show the incidence and determinants of SSI in surgical ward of SPHMMC. The result of our study will provide baseline information for surgeons, governmental and non-governmental organizations working in health care system of SPHMMC as well as in the country to decrease incidence and in the mean time complications related with SSI.

3. Objectives

3.1 General objectives

To assess the incidence of Surgical site infection(SSI) among hospitalized adult patients in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia,2022 in the study period.

3.2 Specific objectives

1. To determine the incidence of Surgical site infection(SSI) among hospitalized adult patients in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia,2022 in the study period.

2. To identify the magnitude of Surgical site infection(SSI) among hospitalized adult patients in St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia,2022 in the study period in each department.

4. Methodology

4.1 study setting

The study was conducted in surgery wards, Gyn/obs ward, maxillofacial & ENT ward, orthopedic ward, neurosurgical ward of SPHMMC. It is one of the largest tertiary referral government hospitals, which is located in Addis Ababa, Ethiopia, with bed capacity of 654. The hospital gives diagnostic and treatment service for about 400,000 patients per year. It provides surgery service for around 12,650 patients per year.

4.2 Study period

The Study has been conducted from May 19- August 19, 2014

4.3 Study design

A prospective cross sectional descriptive study design has been used and all patients who developed SSIs in the study period were evaluated.

4.4 population

4.4.1-Source population

All surgical patients admitted to surgical ward, Gyn/obs, Maxillofacial & ENT ward, orthopedic ward, Neurosurgical ward, both emergency and elective surgical patients during this study period.

4.4.2-Study population

All adult patients who had surgery and has been admitted for recovery in the hospital in the study period.

4.4.3 Inclusion and exclusion criteria

Inclusion criteria:

All patients who undergo both emergency and elective surgeries under general (GA) or regional anesthesia, more than 18 years of age, of either gender, has been included in the study.

Exclusion criteria:

Patients whose ages less than 18 years old and Patients who has not been admitted for recovery are excluded.

4.5. Sample size determination

The required sample size will be determined using single population proportion formula as

$$\text{Follows: } N = \frac{(Z_{\alpha/2})^2 p (1-p)}{d^2}$$

N=Sample size.

Z=Standard error from the mean corresponding to 95% confidence level=1.96

P=75% taken from previous study conducted at ayder Referral Hospital, mekelle with the prevalence (p) of SSI was 75 %(8) in order to get the highest sample size.

D = margin of error taken as 5%

The sample size calculated using the above formula is

$$N = \frac{(Z_{\alpha/2})^2 p (1-p)}{d^2}$$

$$N = \frac{(1.96)^2 \times (0.75) (1-0.75)}{(0.05)^2}$$

$$N = 288.12 \sim 288 \text{ Participants}$$

By adding 20%, of non-response rate, b/c we communicate with mobile phone and the number of non-respondant may be too much, so we take the 20% rather than 10%. the final sample size will be 346.

N.B: WE TOOK ALL THE PATIENTS WHO DEVELOPED SSIs, B/C WE DID NOT GET THE REQUIRED AMOUNT OF PATIENTS.

4.6.measurement

4.6.1. Dependent variable

- ✓ SSI

4.6.2. Independent variable

- ✓ Socio demographic factors (sex, age, marital status, education status and residence)
- ✓ DM
- ✓ HTN
- ✓ SMOKING
- ✓ Patients on steroid
- ✓ HIV/AIDS

4.6.3.Confounding variables

- ✓ Extended operative time
- ✓ Good surgical technique
- ✓ Intra-operative adverse events (iaes)
- ✓ Bathing with chlorhexidine
- ✓ Antimicrobial prophylaxis
- ✓ Body temperature, oxygenation, glycemic control

4.7 . Data Collection and Quality control:

4.7.1.Techniques of Data collection and Procedures

First, the operation theatre and morning report records was reviewed to develop lists of SSI cases or patients presented and operated during the study period. Then, using the patient's card number on the operation theatre log book or morning report paper, patient's card was sought from the hospital's card room. Finally, data was collected from patient's card, operation record and admission record using a structured questionnaire by principal investigator and residents throughout data collection period.

4.7.2 . Data quality management/quality control:

The quality of the data was controlled starting from the time of Questionnaire preparation. The data, was cleaned ,checked, and cross checked for the completeness and internal consistency by the data collector then data was entered.Then,soft copies of the data was stored on a hard drive and a backup copy was stored on a separate drive. Besides this, data was handled by a flash disks and CD tools. Latter both hard and soft copies of the data was kept safely.

4.8. Data Processing and Analysis:

The collected data was cleaned, entered, and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0 software. Descriptive statistics was employed. All variables with $p < 0.05$ considered as statistically significant.

4.9 . Operational definitions

Incidence of SSI: the proportion of admitted patients who have developed SSI at the time of the study.

Surgical site infections are infections that develop within 30days after an operation or within one year if an implant is left in place.

Surgical antimicrobial prophylaxis refers to the use of antibiotics for the prevention of SSIs and does not include preoperative decolonization or treatment of established infections.

4.10 . Ethical consideration:

Prior to data collection a formal letter of permission was collected from SPHMMC, department of surgery and forwarded to SPHMMC administrative office to get permission for the study. Purpose and procedure of study was explained to SPHMMC administrative office and other concerned body to avoid ambiguity. Patient's record was kept confidential.

4.11 . Dissemination of Results:

After analyzing data, conclusion and recommendation has been made and the result will be submitted to SPHMMC, department of surgery and final findings will also finally be published on scientific journals to be used as base line information for further study and for decision making.

5:RESULT

5.1:Patient characteristics

A total of 228 patients who developed surgical site infection were studied. During the study period, 2,486 patients were operated on. Amongst which 129 (56.6 %) were male and the rest 99 (43.4 %) were female. Most patients (n=110, 48.2 %) were in the age group between 20 and 39 years. On the other hand, 72 (31.5 %) patients had comorbidities, the most common being HTN found in 35 (15.0%) patients. While majority of the patients didn't use substances, 40 (17.5 %) patients use alcohol only or with smoking.[Table 1]

Table 1: Frequency and percentages of socio-demographic characteristics of patients who patients who were operated in SPHMMC and developed SSI from May 19- August 19, 2022.

		Frequency(n=228)	Percent (%)
Sex	Male	129	56.6
	Female	99	43.4
Age	< 20	26	11.4
	21-39	110	48.2
	40-59	74	32.5
	≥ 60	18	7.9
Comorbidities	HTN	35	15.4
	DM	24	10.5
	Cardiac Dos	14	6.1
	Liver Dos	15	6.6
	None	156	68.4
Behavior	Alcohol	29	12.7
	Smoking	19	8.3
	Both	11	4.8
	None	169	74.1

5.2: Incidence of surgical site infection

According to this prospective study, 228 (9.2 %) out of 2,486 patients who underwent surgery in any surgical department in SPHMMC from May 19- August 19, 2022, developed SSI. This makes the prevalence of SSI in SPHMMC from May 19- August 19, 2022, 9.2 %. When each type of procedure performed was evaluated, urologic surgery showed higher prevalence of SSI. [Table 2]

Table 2: Frequency and percentages of SSI in patients who were operated in SPHMMC from May 19- August 19, 2022 and developed SSI.

		Frequency	Percentage (%)
Type of procedure done	General	84 (n=622)	13.5
	Urologic surgery	29(n=92)	31.5
	ObGyn surgery	47(n=992)	4.7
	Orthopedic surgery	29(n=234)	12.4
	Neurosurgery	31(n=184)	16.8
	Maxillofacial & ENT	8(n=362)	2.2

5.3: Pattern of preoperative surgical preparation and postoperative follow up

The most common skin preparation agent was Iodine, used on 196 (86.0 %) patients while both alcohol and iodine were used only in 17 (7.5 %) patients. On the other hand only 18 (7.9 %) patients were washed with chlorhexidine prior to surgery.

All patients were on antibiotics either prophylactic or therapeutic. Culture and sensitivity were done for 46 (20.2 %) of patients with SSI and among those whose results were documented, most 11 (4.8 %) had multiple micro-organism growth.

Post-operative stay in considerable number of patients was between 3 – 7 days (n= 87, 38.2 %). [Table 3]

Table 3: Frequency and percentages of pattern of preoperative surgical preparation and postoperative follow up in patients who were operated in SPHMMC and developed SSI from May 19- August 19, 2022.

		Frequency(n=228)	Percent (%)
Skin preparation	Alcohol	17	7.5
	Iodine	196	86.0
	Both	15	6.6
Preoperative preparation with chlorhexidine	Yes	18	7.9
	No	210	92.1
Culture and sensitivity	Done	46	20.2
	Multiple MOs	3	1.3
	No growth	11	4.8
	Klebsiella	1	0.4
	Staph aureus	1	0.4
	Unspecified	30	13.2
	Not done	182	79.8
Type of ABCs	Prophylactic	108	47.4
	Therapeutic	120	52.6
Duration of postoperative hospital stay	< 3 days	14	6.1
	3 - 7 days	87	38.2
	7 - 14 days	68	29.8
	> 14	59	25.9

5.4:Pattern of surgery

Intraoperative adverse events were recorded in 48 (21.1 %) patients while more than half of the procedures were done on elective basis (n=131, 57.5 %) and by senior consultants (n=132, 57.9 %).

Additionally, majority of the patients had a wound class of clean contaminated (n=99, 43.4 %) and most of the patients who developed SSI had procedures lasting between 2 – 3 hrs (n= 97, 42.5 %).[Table 4]

Table 4: Frequency and percentages of pattern of surgery in patients who were operated in SPHMMC from May 19- August 19, 2022 and developed SSI.

		Frequency(n=228)	Percent (%)
Intraoperative adverse event	Yes	48	21.1
	No	180	78.9
Procedure was done by	Senior consultant	132	57.9
	Senior resident	90	39.5
	Junior resident	6	2.6
Type of surgery	Elective	131	57.5
	Emergency	97	42.5
Type of procedure done	General	84	36.8
	Urologic surgery	29	12.7
	ObGyn surgery	47	20.6
	Orthopedic surgery	29	12.7
	Neurosurgery	31	13.6
	Maxillofacial & ENT	8	3.5
Wound class	Clean	83	36.4
	Clean-contaminated	99	43.4
	Contaminated	38	16.7
	Dirty	8	3.5
Duration of surgery	< 1 hr	5	2.2
	1 - 2 hrs	40	17.5
	2 - 3 hrs	97	42.5
	3 - 4 hrs	70	30.7
	> 4 hrs	16	7.0

6:DISCUSSION

The incidence of SSI among patients who underwent surgery in SPHMMC from May 19- August 19, 2022 according to this prospective study was 9.2 %. One cross-sectional research done in a Northern Ethiopia, Shire Suhul hospital in 2016 showed an institutional incidence of SSI 11.1 %.(10)Similarly, a prospective cohort study done in hospitals in west Africa shows an SSI incidence of 11.5 %.(25) Another retrospective cross-sectional study conducted in 2014 at Pulau PinangHospital, Malaysia showed a higher figure, a SSI incidence of 18.8 %.(26)One retrospective review titled European perspective on incidence of SSI states that the incidence of SSI in institutions in every study was consistently between 2 and 5 %.(27)These data shows that our institution's incidence of SSI is lower than other institutions in Africa and Southeast Asia but considerably higher than in Westerns.

This study shows that 31.5 % of patients with SSI had comorbid illnesses and 25.9 % has history of substance use and these numbers are considered higher than normal population. According to aretrospective observational cohort study done in US on Impact of patient comorbidities on surgical site infection, comorbid illnesses were confirmed to have significant association with SSI.(28)Similarly, a research on SSI demonstrates that history of alcohol use is a determinant factors with an OR of 0.04 (95% CI 0.004-0.43) (10)

Among patients who developed SSI, most or 54.7 % had post-operative hospital stay of more than 3 days. This finding is in agreement to the classic association between prolonged postoperative hospital stay and SSI underlined in many researches.(10,11)

On the other hand, this study identified that most patients who developed SSI had clean-contaminated wound class (n=99, 43.4 %). However, most studies show association between dirty wound class and SSI. For instance a local study demonstrates that dirty incision classification had statistically significant association with SSI (OR 17; CI 1.249-232.362).(10)

In reference to our study, around 35 % of patients after urologic procedures developed SSI, showing a great discrepancy from the overall incidence. In contrary, another research done in

Ethiopia, shows that the incidence was rather high in patients who had undergone orthopedics (54.3%) and abdominal (30%) surgeries.(11)

The most commonly used types of skin preparations are chlorhexidine and povidone iodine. And, the antiseptic solutions of both agents are strengthened with alcohol to prevent postoperative wound infection. However, this research shows an institutional practice of using Iodine solely as a preoperative preparation and poor usage of chlorhexidine.(29)Operative duration is often cited as an independent and potentially modifiable risk factor for SSI, as mentioned in one systematic review on determinant factors of SSI.Pooled analyses in this review demonstrated that the association between extended operative time and SSI typically remained statistically significant, with close to twice the likelihood of SSI observed across various time thresholds. Correspondingly, our research shows that 80.2 % of patients with SSI had a surgery duration of more than 2 hrs.(9)

6.1: Limitation of the study

The most important limitation of the study is that,we only took those patients who develop SSIs in the study period and not taking those patients who did not develop SSIs,so we did not done association.

Due to the prospectively collection of data, there might have been an underestimation or overestimation of the incidence of SSIs in each department.

7:Conclusion

The overall incidence of SSIs in SPHMMC in the study period was 9.2% which was lower compared with report from some developing countries and higher compared to reports from developed countries. Around 31.5% of patients had comorbidity and the most common skin preparation used is iodine. The majority of patients who developed SSI is operated by the senior consultant, from the study urology surgery showed higher incidence of SSI (31.5%) and Maxillofacial & ENT surgery showed the least incidence (2.2%). The majority of patients who developed SSI (43.4%) had around class of clean contaminated wound. This study demonstrates comprehensively that prolonged operative time, associated comorbidity and prolonged hospital stay can increase the likelihood of developing SSI across a broad array of surgical procedures and surgical specialties.

8: Recommendations

Due attention should be given to infection prevention systems, and more has to be done to manage contaminated incisions, urology surgical unit should work together with the other departments like maxillofacial and ENT unit on incidence of SSI. Efforts should be made to improve appropriate and timely hospital discharge. This study calls researchers to conduct prospective cohort studies considering SSI after hospital discharge.

9. References

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