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St. Paul's Hospital Millennium Medical College

St. Paul's Hospital millennium medical collage Graduate study program

Length of hospital stay and factor for prolonged stay among surgical patients at
SPHMMC Addis Ababa, Ethiopia

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ADDIS ABABA

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Abstract

Background: The length of hospital stays serves as a proxy for a patient's health while they are there and allows for initiatives to shorten postoperative stays. Data about PLOS are crucial for assessing the effectiveness and caliber of surgical care as well as for efficient resource allocation, management, and use. There isn't much information available in Ethiopia on these problems. In order to evaluate treatment outcomes, hospital stay duration, in-hospital mortality, and factors associated.

Objective: To assess the length of hospital, stay and factors for prolonged length of hospital stay among surgical patients admitted to SPHMMC General surgical ward between SEP 2021-2023

Methods: Health facility-based retrospective cross-sectional study will be conducted among adult patients hospitalized for the surgical case between sep2021-sep2023. data will be collected from the medical charts of the patients using a checklist from the day of admission to discharge and entered to analyzed using spss for analysis.

Results: The study conducted with a sample size of 315 from those 74(23.3%) had prolonged length of stay using 75th percentile as cut of point those who have stay > 5 day considered as prolongedOn bivariate analysis type of admission, residence, day patient admitted, WBC count at admission, post op complication, SSI, HAP, Blood loss, presence of surgery, sex comorbidity. ASA Score, duration of surgery, post of electrolyte selected for multivariate analysis. on multivariate analysis patients who had leukopenia at admission had 36 times more likely to have prolonged stay (AOR 36.6 95%CI(1.6-802),those who had surgical site infection 16 times likely to had PLOS(AOR16.98 95 CI 1.4-196)Post operative complication 4 times likely to have PLOS (AOR 4.078 CI (1.00-16)

Conclusion and recommendations; The study showed 23.3 % had prolonged length of stay SSI, post op complication in general, and preoperative leukopenia those can be modified by using proper SSI prevention methods and early addressing post op complications

CHAPTER ONE

INTRODUCTION

BACKGROUND

Length of hospital stay is defined as the total bed-days occupied by a patient during hospitalization. It is one of the important performance measures for hospital administration and the effectiveness of the healthcare system. Reducing hospital stays may result in lower medical expenses, a lower risk of infection and other hospital-acquired illnesses, and better patient quality of life.(Marfil-Garza et al., 2018)

The average length of stay, which serves as the operational indicator for hospital LOS, allows for the distinction between patients who have a Normal Length-of-Stay (NLOS) and those who have a Prolonged Length-of-Stay (PLOS). Despite the fact that the latter phrase is not standardized. For extended lengths of stay, many studies utilize different cutoff points. According to a study done in Mexico, the 95th percentile was utilized as the cutoff limit for NLOS to be under 34 days and PLOS to be beyond 34 days.(Marfil-Garza et al., 2018) Prolonged hospital stays were defined by Harvard Medical School as stays longer than the 75th percentile (at least 8 days) (Dasenbrock et al., 2015). A PLOS was also determined using data from other studies using the 75th percentile cutoff point. This research includes work done at Oman Tertiary Hospital in Iran with a stay of at least 11 days (Almashrafi et al., 2016) and work done at Michigan University in America with a stay of at least 9 days(Krell et al., 2014) and work done at Jimma University Medical College (JUMC) in Ethiopia with a stay of at least 33 days,(Tefera et al., 2020)

Hospital acquired infections, greater mortality rates, and inefficient use of beds and other resources are all associated with prolonged hospitalization. Knowing how long a patient will stay in the hospital helps with resource planning and the start of quality improvement projects.(Fetene et al., 2022)however There are few hospital-based studies that focus on improving the quality of surgical and anesthesia care in sub-Saharan Africa. Use of implementation and quality improvement methodologies remain low, and some quality domains are neglected.(Brima et al., 2022)

The collection and reporting of the KPIs is central to monitoring and evaluating surgery and anesthesia care in Ethiopia at a national, regional, and facility level. The indicators can be used to guide decision making and performance improvement at all levels. Analyzing data at each level will be useful for tracking changes in the surgical system. From those indicators, Surgical bed occupancy rate is one of the measures of the efficiency of surgical services. If the bed occupancy rate is low, there may be underutilization of resources. If bed occupancy rate is high, there may be low capacity to deal with sudden increases in demand. Bed occupancy rate is partly dependent on sum of length of stay of patients on study period (Iverson et al., 2021)

This proposal is done with the aim of investigating the total length of hospital stay including preoperative and postoperative stay at surgical ward of St Paul millennium hospital and factors contributing to prolonged hospital stay.

Statement of the problem

The length of stay (LOS) is an important indicator of the efficiency of hospital management. Reduction in the number of inpatient days' results in decreased risk of infection and medication side effects, improvement in the quality of treatment, and increased hospital profit with more efficient bed management (Baek et al., 2018). Different explanations are given for cause of extended length of hospital stay. The first explanation is that patients experience postoperative complications that extend the LOS through management of the complications. This suggests that hospitals and physicians should focus on preventing and managing complications to improve overall efficiency. The second explanation is that differences in LOS are due to practice style differences among hospitals and physicians. This includes differential adoption of new surgical technologies, such as minimally invasive approaches, and variable use of other efforts to coordinate care processes, such as enhanced recovery pathways. (Krell et al., 2014)

Prolonged LOS is associated with preoperative, intraoperative, and postoperative factors. Preoperative patient characteristics predictive of prolonged LOS were advanced age, diminished functional status, and ASA classes 3 and 4. The most predictive intraoperative and postoperative variables included intraoperative blood transfusion, operative time, return to the operating room, and the number of complications after surgery. Although preoperative factors were independently associated with a prolonged LOS, the factors generating the highest risks for a prolonged LOS were the intraoperative process of care and postoperative adverse events. (Collins et al., 1999)

Based on a systemic review done on literature's, out of 347 articles, 18 were chosen. These research established four factors—clinical, demographic, administrative, and hospital factors that are linked to duration of stay. Techniques from statistics and data mining, including artificial neural networks and decision tree regression, were used to find these criteria. (Hesam Karim 2015, n.d.)

Improvement in the quality of hospital care is a fundamental aspect of health system strengthening. Without addressing the poor quality of healthcare in low- and middle-income countries (LMICs), it will be impossible to reduce excess mortality and disability, according to the "Lancet Global Health Commission on High Quality Health Systems in the Era of the Sustainable Development Goals" report. Poor care in these settings is blamed for more than 5 million more deaths each year, costing the economy an estimated \$6 trillion in lost welfare. Additionally, despite having lower living standards, LMICs account for two-thirds of the estimated 23 million disability-adjusted life years lost annually as a result of adverse hospital events, which are indicative of poor quality. An estimated 93% of people in sub-Saharan Africa (SSA) lack access to timely, safe, cheap, and appropriate surgical and anesthetic care when they need it. (Brima et al., 2022) Despite being younger, having a reduced risk profile, and experiencing fewer complications, the current evidence indicates that surgical patient mortality in Africa is two times higher than the global norm. (Biccard et al., 2018) The morbidity rate for surgical patients is also greater, and surgical site infections (SSIs), the most prevalent type of healthcare-associated illness in African surgical patients, are much more likely than those reported in the USA and Europe. The studies were conducted in 17 out of 48 countries in SSA. fewer than 50 research that looked at enhancing the standard of surgical and/or anesthetic care in SSA hospitals were discovered. This research mostly concentrated on the quality areas of safety and efficacy of care, with minimal attention paid to efficiency, equitability, timeliness, and patient-centeredness. Less than 10 research used established QI or implementation science techniques to support the implementation of interventions. (Brima et al., 2022)

Ethiopia, like other nations, has been working to close the surgical care gap through the use of advanced methods for surgical system development with Saving Lives through Safe Surgery, which aims to increase access to safe, necessary, and emergency surgical and anesthesia care at all levels of the healthcare system. Assessing additional indicators of surgical care quality, such as PLOS, postoperative complications, number of HAI, and mortality rate, is therefore necessary for early identification of the

area that needs focus as well as for appropriate allocation and use of the resources available in this country.(Tefera et al., 2020),most of the surgeries in Ethiopia are done in tertiary hospitals .the preadmission waiting time is also higher on those hospitals (Meshesha et al., 2022) so studies that focus on quality improvement including LOS in those tertiary hospitals would improve the access to surgery

There are few research on the length of hospital stays and related factors among surgical ward patients in Ethiopia. On study done jimma university medical center surgical ward for 3 consecutive month found that the median length of stay 7.74 ± 14.5 before surgery , 17.61 ± 16.87 postoperatively, over all stay 25 ± 21.42 w/c was higher than the studies done by the International Surgical Outcomes Study group which is 4 day(Pearse et al., 2016) female gender, government paid, burn related surgeries, patients who have cancer had 3 times higher risk of PLOS.>2antibiotic use and waiting for surgery >7days had about 4times risk of having PLOS.5.2% had sepsis and 2.6%HAP showing some of factors can be modified(Tefera et al., 2020).since the length of stay hospital is combination of factors studying those factors in individual hospital level is necessary

The length of hospital stays relies on a variety of variables and has a significant impact as mentioned above so it is necessary to research each component at the level of the individual hospitals even in different specialty wards.

Significance of the study

Hospital LOS is complicated and multifaceted since it depends on institutional and organizational factors in addition to patient and disease-related factors. The number of acute beds available decreases as the LOS increases. Blocking beds causes hospital bottlenecks, lowers turnover, and increases the likelihood that waiting lists for patients hoping to be admitted. LOS improvements could help hospitals better allocate and manage their resources to deal with constraints on the healthcare system like waiting lists.(Buttigieg et al., 2018)

Tertiary-level hospitals are indeed complex systems that need to adapt to the various emerging challenges facing health systems today. St Paul millennium medical college is one of tertiary hospital in Ethiopia so doing this research in this hospital be useful for the hospital to pick factors significantly associated with PLOS of inpatient surgical patients and take measure that address those factors, adjust the surgical environment accordingly, develop clinical protocols have better discharge plan and advance medical knowledge. Also, the hospital can use to benchmark its performance against national average for LOS. In addition to the hospital the research insight policy makers and quality improvement focal persons to develop new policies and strategies that can make a change on health care resource management, quality of care, patient safety, health care cost and better regulation system

CHAPTER TWO

Literature review

There are several studies about length of hospital stay in the world however no much in Africa specially in LMIC. A scoping review done to identify variables affecting hospital length of hospital stay 46 articles are chosen and use Donabedian quality improvement model used to assess factors associated with PLOS in those literatures. based on this study factors are classified structural, process related and outcome related.(Buttigieg et al., 2018)

Structural factors further classified as health care systems' characteristics, patients' characteristics, social and family characteristics. (Buttigieg et al., 2018) Health care system character such as admitting service can affect LOS. For example having short-stay unit for elective low complexity patients' admissions lower length of hospital stay and improve availability of bed(Ortiga et al., 2013).The other element is date and time of admission, patients who are admitted at week end tend to experience delays in receiving major procedures and had longer stay.(Ryan et al., 2006) .Efficiency of support service such as early imaging with CT, MRI, or nuclear scintigraphy, particularly on the day before or the day of admission, was associated with significantly shorter LOS of inpatients compared with patients who underwent advanced imaging later .(Batlle et al., 2010)and also LOS is affected by patients transfer between facilities .on study done to asses impact of specialized centers of care for spinal cord injury on length of stay, complications and mortality showed decreased overall mortality and LOS by early transfer to specialized centers(Parent et al., 2011)

Patient characteristic including demographic characteristic such as age (Agboado et al., 2012) race(Rechel et al., 2012) and medical history such as having comorbidity prolongs inpatient stay (Agboado et al., 2012)

Social and family characteristics like patients with social deprivation and in particular for patients living in social isolation and patients with inadequate housing and also Low income associated with inadequate housing significantly increases lengths of stay(Yilmaz & Raynaud, 2013)

Clinical care giver characteristic such as early discharge planning(Fox et al., 2013), priority of ward round(Soliman et al., 2013), Communication& Multidisciplinary approach(Zwarenstein et al., 2013), Leadership(Ahmad et al., 2011), Professional behavior(De Jong et al., 2006) all process related factors affect LOS directly or indirectly.

Outcome indicators mostly used for hospital LOS include the patient's health status and complications(Buttigieg et al., 2018) Complications have great impact on hospital stay. for example, a study done on Hospital-acquired infections in Belgian acute care hospitals: an estimation of their global impact on mortality, LOS and health care cost found each year hospital-acquired infections affect 125,000 patients (per 10.9 million inhabitants) with an excess mortality of 2.8% and excess LOS of 7.3 days corresponding to a public health care cost of 290 million euros(Vrijens et al., 2012)

A study done in German to identify risk factors affecting hospital stay among patients undergoing colon cancer surgery, > 14 day used to define prolonged stay and postoperative reintervention, surgical site infection, open surgery, and distant metastasis are some of factors that lead to PLOS but two of the strongest independent predictors of prolonged LOS were surgical site infection and open surgery(Orive et al., 2019) Whereas in a study conducted in Mexico, an 18-year retrospective study to identify risk factors for prolonged hospital stays discovered 5.1% had PLOS and >34 day as cut off point w/c is higher than

the former study and PLOS events occurred more frequently in younger people (48 years [IQR 32-62] vs 52 years [IQR35-66], $p<0.001$) and those with lower median socioeconomic level (2 [IQR 2-3] vs 3 [IQR 2-4], $p<0.001$). When compared to NLOS, events of PLOS showed a greater proportion on admissions from the ED (28.8% vs 11.0%, $p<0.001$), were more likely to be admitted on weekends (36.5 vs 30.9%, $p<0.001$), and were more likely to occur in shared rooms (78.1 vs 71.9%, $p<0.001$). most of surgical cases 62.5 have prolonged stay.(Marfil-Garza et al., 2018)

On research done to assess factors associated with prolonged length of stay for elective hepatobiliary and neurosurgery patients: a retrospective medical record review found The median LOS for both the HPB and NS samples was 6 days. The interquartile range (IQR) for the HPB sample was 2-8 days while the IQR for the NS sample was 4-9 days. The mean ($\pm$ standard deviation) LOS for the HPB and NS samples were 7.18 ($\pm$ 8.01) and 10.99 ($\pm$ 21.02) days respectively. Factors associated with prolonged LOS for the HPB sample were age and admission after 5 pm(Lee et al., 2018) w/c support study in England black pool on factors associated with LOS of COPD patients determining age as independent factor(Agboado et al., 2012) Factors associated with prolonged LOS for the NS sample were functional status, referral to occupational therapy, and the number of hospital-acquired infections. Preoperative factors had the greatest association with prolonged LOS for HPB and NS elective surgeries even after adjusting for surgical complexity, suggesting that patient safety and quality of care may be improved with better pre-surgery patient preparation and admission practices(Lee et al., 2018)

Another study done on 524 patients who underwent gastrointestinal surgery in 4 institutions discovered Patients with an albumin level less than 30 mg/dL had a higher relative risk of developing SSI and a prolonged inpatient stay.(Hennessey et al., 2010) in favor of this a study malnutritional at the time of admission can contribute to a prolonged hospital stay(Caccialanza et al., 2010) this study also marked clinical setting, the type and severity of disease, the presence of comorbidities, the quality and number of interventions, and the patient's age are Some other factors related to PLOS. On a paper done to assess impact of preoperative cachexia on postoperative length of stay in elderly patients with gastrointestinal cancer, the results showed that preoperative cachexia was significantly associated with prolonged postoperative stay. Postoperative LOS was 17.1 $\pm$ 8.7 d in the non-cachexia group and 20.6 $\pm$ 10.8 d in the cachexia group. The study suggests that cachexia should be assessed and treated before surgery in elderly patients with gastrointestinal cancer.(Fukuta et al., 2019)

Los of stay is multifactorial and some researches also indicate day of admission also had un deniable effect on LOS. The study analyzed data from the Healthcare Cost and Utilization Project Florida State Inpatient Database from 2007 to 2010 found that patients who underwent urgent general operative procedures on weekends had increased postoperative complications, longer duration of stay, and higher hospital charges compared to those who underwent the same procedures on weekdays even common surgeries like appendectomy and cholecystectomy.(Zapf et al., 2015)

A research done on General Surgical Operative Duration Is Associated with Increased Risk-Adjusted Infectious Complication Rates and Length of Hospital Stay shown Across all procedures, adjusted LOS increased geometrically with operative duration at a rate of about 6% per half hour (coefficient for natural log transformed LOS 0.059 per half hour; 95% CI, 0.058 to 0.060; $p<0.001$)(Procter et al., 2010)

Though the average length of hospital stays for patients admitted to the surgical units has been declining in industrialized countries, in Africa it is still high despite its negative effect on patients and the hospital. PLOS at Ibadan university hospital Nigeria has been demonstrated to cause patient and family dissatisfaction since they are un able to do various investigations following surgery, purchase post-operative drugs and pay hospital bills due to financial reason. on this study median LOS for surgical

patients were 11 days, with interquartile range of 5-20 days w/c is better than the study done at Mexico and Longer stay was statistically significant in 75% of patients who had emergency surgery ($p < .001$), 87.5% Neurological Surgery ($p = .01$), 66.9% General anesthesia ($p = .02$), and 81.0% of those who had blood transfusion ($p < .001$). This indicates types of surgery, emergency surgery, higher American Society of Anesthesiologist's (ASA) grade and blood transfusion were the factors identified to have led to longer LOS. These factors are non-modifiable. need further work up (Ilesanmi, 2014)

In a study done in Ethiopia with aims to identify the factors associated with prolonged length of hospital stay among patients admitted at a surgical ward in selected public hospitals in Arsi Zone, Oromia, Ethiopia found that 24.7 % of study participants experience PLOS which is comparable with study done at Jimma University hospital (25%). However, the factors significantly associated with PLOS somehow different from a study in Jimma University. On this study those patients who had comorbidity have 4.6 times more likely to have prolonged stay [AOR=4.59, at 95% CI= (2.46-8.56)], those who have SSI 5 times [AOR=5.02 at 95% CI= 1.97-12.80], and those who developed HAI 3 times more likely to have PLOS [AOR= 3.43 at 95% CI= (1.36-8.64)]. Indicating more of the factors are modifiable and mandate additional research. (Fetene et al., 2022).

Another study done in Ethiopia to assess impact of nutritional status on length of hospital stay in northern Ethiopia, Length of hospital stay was significantly correlated with disease duration (Adjusted Hazard Ratio (AHR) = 3.7, 95% Confidence interval (CI): 2.35-5.82), history of surgery (AHR = 1.4, 95% CI 1.40, 95% CI 1.17-1.86), nutritional status (BMI (AHR = 1.38, 95% CI 1.28-1.51), mid upper arm circumference (AHR = 1.29, 95% CI 1. It is advised to check patients for malnutrition upon admission and provide dietary supplements based on their nutritional status.

CHAPTER THREE

3.Objective

3.1 General objective

To assess the length of hospital stay and factors associated with prolonged length of hospital stay among surgical patients admitted to surgical ward of SPHMMC at a study period.

3.2 Specific objective

- To determine the length of hospital stay of patients admitted to SPHMMC general surgical ward
- Factors for prolonged length of hospital stay among surgical patients admitted to general surgical ward

CHAPTER FOUR

4. Methods

4.1. Study Area and Study period

The study will be conducted in the surgical department of SPHMMC, the second largest government tertiary care hospital located in Gulele sub-city, Addis Ababa, Ethiopia. It is a medical center for catchment area of more than 5 million people. On average, daily the hospital gives medical services for 1,200 patients with diversified complaints in several specialty and sub-specialty fields. The prospective study will be conducted from Sep 2021-sep 2023

4.2. Study Design

A hospital based cross sectional study will be conducted on patients admitted to surgical ward from sep2021-sep 2023

4.3 population

4.3.1source population

All patients who were admitted to St Paul millennium medical collage during the study period

4.3.2study population

All patients who were admitted to surgical ward and included on the study

4.4 inclusion and exclusion criteria

4.4.1 inclusion criteria

All adult patients who were admitted to general surgical ward of St Paul millennium hospital at the study period

4.4.2exclusion criteria

Those who were under 18 and patients who stayed < 1 day in the ward

4.5 sample size

A single population proportion formula is used to calculate the sample size by considering the following statistical assumptions

The required sample size is calculated using a single population proportion formula:

$$n = (Z_{\alpha/2})^2 P (1-P) / d^2$$

Where n=required sample size,

$Z_{\alpha/2}$ = critical value for normal distribution at 95% confidence level (1.96),

p = proportion of prolonged length of stay taken from previous study done at Arsi ,Ethiopia found on literature review

d=0.05(5% margin of error)

$$n = (1.96)^2 \times (0.247(1-0.247)/0.05^2$$

$$n=286$$

assuming a 10 % non-response rate, the final sample size will be 314.6

4.6 sampling method

Systematic random sampling method will be implemented.

4.7study variable

4.7.1 Dependent variable

Length of hospital stay

4.7.2Independent variable

- Age
- sex
- residence
- Surgical site infection
- types of surgery
- American society of anesthesiology (ASA) class
- co-morbid conditions and types
- smoking status
- length of hospital stays before surgery
- duration of operation
- HAI
- Sepsis
- blood loss during operation

- type of surgical admission
- diagnosis
- day of admission
- laboratory values(hct), albumin

4.8. Data Collection Procedure and Data Quality Management

Data collected on Sep. A data collection checklist prepared in English language and adopted from literature review of this study used with modification. Record number of patients who were admitted to surgical ward during the study period will be taken from ward log book and used to retrieve card from record room and Training given to 3 data collectors, general practitioners or interns on the components of the questioner and how to fill data. the record of the study population checked for completeness before data entry. Entered data will be checked by data supervisor on daily basis for any incompleteness or inconsistency.

4.9 Data Analysis

Data will be analyzed using the statistical package of social science (SPSS)version 26 for Microsoft window. Percentage and frequency will be used for categorical variables. Continuous variables will be expressed using measures of central tendency and variability such as mean and standard deviation. Those variables who had association on bivariate analysis will take to multivariate analysis. statistical significance will be accepted at p-value < 0.05. The result will be presented by the use of charts, tables, texts, and graphs using Microsoft excel.

4.10 Ethical Consideration

Ethical clearance will be obtained from the Institutional Review Board of SPHMMC, and then permission will be sought from the school administration through the academic provost of the school to carry out the study. Each patient's information will be collected using a structured checklist and the collected information will only be used for this particular study and will be kept confidential.

4.11 Dissemination of results

The final result of this study will be disseminated to SPHMMC and concerned bodies

4.12 Operational definition

Length of hospital stay- is defined as the total bed-days occupied by a patient during hospitalization and calculated using admission day and discharge

prolonged lengths of stay patients who had longer stay than anticipate or > 75th percentile

Type of surgery -surgery is performed on elective or emergency base

CHAPTER FIVE

5 Result and Discussions

5.1 RESULTS

The total number of sample collected during the study was 314

5.1.1sociodemographic factors

Among the 315 patients who were studied majority were male accounting 60% of admission on study period the mean age of study participants was 40 ± 15 ,77.5% (244) were living in urban area and majority55.8% have health insurance and 56.8% referred from health center

Table1: sociodemographic characteristic of participants at surgical ward of St Paul millennium medical collage

Variable	Categories	frequency	Percent
Age	18-35	144	44.8
	36-55	119	37.8
	≥ 56	55	17.5
Sex	Female	191	60.6
	Male	124	39.4
Residence	Urban	244	77.5
	Rural	71	22.5
Referral type	Health center	179	56.8
	Self-referral	39	12.4
	Private	47	14.9
	Zonal hospital	34	10.8
	Regional	16	5.1
Cost of health	Insurance	179	56.8
	self-covered	136	43.2

5.2 clinical characteristic of study participant

Taking 75th percentile as cut of point around 214 (76.5%) had hospital stay < 5 day whereas 74(23.5 %) had stay > 5 day .217(68.9%) of patients admitted on elective base the other 98(31.1%) admitted as an emergency. From those participants 255 had normal WBC where 4(!.3%) had leukopenia and 56(17.8%) had leukocytosis .5.4% had preoperative anemia .300 (95.2%) had surgery,90(28.6%) had comorbidity.

Generally, post op complication occurs in 37patient (11.7%) SSI 14Patient (4.4%),4 patients have HAP (1.3%) and 10 patients (3.2 %) had post op electrolyte abnormality

Table 2 clinical characteristic of study participants

Variable	Categories	frequency	Percent
Length of hospital stay	<5 day	241	76.6
	>5 day	74	23.5
Admission pattern	Elective	217	68.9
	Emergency	98	31.1

Admission day	Wk end	63	20
	Wk day	252	80
WBC at admission	Normal	255	81
	Leukocytosis	56	17.8
	Leukopenia	4	1.3
HCT at admission	Normal	297	94.3
	Low	17	5.4
Cr at Admission	≤1.2	202	64.1
	>1.2	4	11.3
Comorbidity	No	225	71.4
	Yes	90	28.6
Surgical procedure done	Yes	300	95.2
	No	15	4.8
Procedure duration	<1hr	67	21.3
	1-2 hr	114	36.3
	2-4hr	105	33.3
	4-6hr	13	4.1
	>6hr	2	0.6
Intraoperative bleeding	<1500	126	40
	>1500	16	5.1
	Not detected	158	50
Post op complication	Yes	37	11.7
	No	263	83.8
SSI	Yes	286	91.1
	No	14	4.4
HAP	Yes	4	5.7
	No	296	94.3
Electrolytes abnormality	Yes	10	3.2
	No	290	92.1

5.3 Behavioral characteristics of the study participants

From study participants only 2 (0.6 %) patients smoke cigarette and took Alcohol

Variable	Categories	Frequency	Percent
Smoking	Yes	2	0.6
	No	313	99.4
Alcohol	Yes	2	0.6
	No	313	99.4

5.4 Factors associated with prolonged length of stay

On bivariate analysis type of admission, residence, day patient admitted, WBC count at admission, post op complication, SSI, HAP, Blood loss, presence of surgery, sex comorbidity. ASA Score, duration of surgery, post of electrolyte selected for multivariate analysis. on multivariate analysis patients who had leukopenia at admission had 36 times more likely to have prolonged stay (AOR 36.6 95%CI(1.6-802)), those who had surgical site infection 16 times likely to have PLOS (AOR 16.98 95 CI 1.4-196) Post operative complication 4 times likely to have PLOS (AOR 4.078 CI (1.00-16))

Variable	categories	normal	Prolonged	AOR at 95%CI	P VALUE
Wbc count at admission	Normal	198	57	1.47(.449-4.83)	
	Leukopenia	2	2	36(1.646-802)	
	leukocytosis	41	15		
Post op complication	Yes	9	28	4(1.00-16.6)	0.05
	No	226	38		
SSI	Yes	1	13	16(1.468-196)	0.023
	No	234	53		

6 Discussion

The study conducted with a sample size of 315 from those 74(23.3%) had prolonged length of stay using 75th percentile as cut off point those who have stay > 5 day considered as prolonged. when this study compared with other studies done in our country had comparable out come for example study done at Arsi university and jimma how ever stay is much lower

On this study factors such as on leukopenia at admission had 36 times more likely to have prolonged stay (AOR 36.6 95%CI(1.6-802)), those who had surgical site infection 16 times likely to have PLOS (AOR 16.98 95 CI 1.4-196) Post operative complication 4 times likely to have PLOS (AOR 4.078 CI (1.00-16)). Which is also true on study done on Arsi zone those who had surgical site infection 5 times likely to have prolonged stay than those who doesn't have SSI

7 Limitation of study

Retrospective study, missing data, decrease the representativeness of the study

8 conclusions and recommendation

The study showed 23.3 % had prolonged length of stay SSI, post op complication in general, and preoperative leukopenia those can be modified by using proper SSI prevention methods and early addressing post op complications

