



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**PATTERNS, TREATMENT OUTCOMES AND ASSOCIATED
FACTORS OF ADMISSIONS TO PEDIATRIC SURGICAL
WARD IN St PAUL's HOSPITAL MILLENNIUM MEDICAL
COLLEGE**

**A STUDENT RESEARCH PROJECT TO BE SUBMITTED TO THE
DEPARTMENT OF PUBLIC HEALTH, St PAUL's HOSPITAL
MILLENNIUM MEDICAL COLLEGE, IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE**

**PREPARED BY: ABENEZER CHALA (Intern)
ADVISORS: TEMESGEN GELETA (Mph)
MARU GAMA (Consultant pediatric surgeon)**

**JULY, 2018.
ADDIS ABABA, ETHIOPIA.**

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❖ Acronyms and Abbreviation

A.A: Addis Ababa

ARM: Anorectal malformation

BLH: Black lion hospital

CHD: Congenital heart disease

ER: Emergency

GI: Gastrointestinal

GU: Genitourinary

HMIS: Health management information system

HSD: Hirschsprung disease

IHPS: Idiopathic hypertrophic pyloric stenosis

I&D: Incision and drainage

JUSH: Jimma University Specialized Hospital

MOF: Multiple organ failure

MSS: Musculoskeletal system

NICU: Neonatal intensive care unit

PEOPD: Pediatric emergency outpatient department

PPV: Persistent processus vaginalis

PROPD: Pediatric regular outpatient department

PS: Pediatric surgery

PSC: Pediatric surgical care

PSRC: Pediatric surgical referral clinic

PUV: Posterior Urethral valve

REEA: Resection and end to end anastomosis

SAM: Severe acute malnutrition

SB: Small bowel

SPHMMC: St Paul hospital millennium medical college

SPSS: Statistical package for social science

SSA: Sub Sahara África

URS: Urethroscopy

❖ **Acknowledgment**

First and for most, I would like to thank almighty God for all the gracious help and mercy I have received in reaching this place. Then I would like to thank both my clinical and public health advisors for their guidance. Also I want to thank HMIS officials of surgical wards, my colleagues and everyone who has participated in bringing forth this research.

❖ ABSTRACT

Background: Pediatric surgery is a sub specialty of surgery involving the surgery of fetuses, infants, children, adolescents, and young adults. Pediatric surgical care has evolved from easy surface procedures in to in utero surgery. It has grown across the globe including Sub Sahara Africa but has associated enormous problems as it is a new field of specialty for developing countries.

Objectives: The aim of this research is to assess the patterns, treatment outcomes and associated factors of admission to pediatric surgical ward in St Paul's Hospital Millennium Medical College from April 15 to May 20, 2010.

Methods: A one year retrospective cross sectional review of medical records of surgical pediatric patients whose age is below 15 years who were admitted and treated at St Paul's Hospital Millennium Medical College between November 2016 and May 2018 using systematic random sampling method. Data collectors extracted data from included patient's chart using a structured questionnaire. Collected data was analyzed using SPSS 23. Frequencies and proportions were used for the descriptive analysis of the data. Chi-square test was used to determine associations among different variables. Finally using multinominal regression the significance of the association was determined.

Result: A total number of 273 patients were included in this study with predominant sex being male (with M: F ratio of 2.4:1) and mean age of 65 months. Most patients were from Addis Ababa (48%) with majority being Oromo in ethnicity (63.4%). Most patients (59%) were admitted as emergency cases with the most common affected system being Gastrointestinal (60.1%) then Genitourinary (34.4%) and Musculoskeletal (4%) diseases with the highest being appendicitis (34.8%). Admissions rose to a major peak in March (megabit) both 2009&2010. 79.9% of patients had improved and discharged outcomes while 19% had complications and 1.1% patients died. The most common complication observed was surgical site infection. Delayed presentation has been associated as one of the strong complicating factor.

Conclusion: The present study has shown there is highest rate of emergency admission which is affecting the gastrointestinal system with delay in presentation affecting treatment outcome significantly.

1. Introduction

1.1 Background

In 1953 Dr. Robert E. Gross summarized the essential challenge of pediatric surgery: "Those who daily operate upon adults, even with the greatest of skill, are sometimes appalled or certainly are not at their best when called to operate upon and care for a tiny patient. Something more than diminutive instruments or scaled-down operative manipulations are necessary to do the job in a suitable manner." In our world today the specialty of pediatric surgery has evolved considerably in its ability to care for the smallest of patients with surgical disorders due to the greatly increased understanding of the anatomy, physiology and pathophysiology involved in the disease process not only that but knowledge at molecular and cellular levels beyond any sort of anatomy and physiology has increased greatly.⁽¹⁾

Pediatric surgery is a subspecialty of surgery involving the surgery of fetuses, infants, children, adolescents and young adults.⁽²⁾ The history of Pediatric Surgery goes back to 14th century with the introduction of easy surface procedures and common sense publication from different surgeons on pediatric surgical care but later in 1700s most extensive procedures like probing for imperforate anus, repair of inguinal hernia, correction of hypospadia and circumcision were being performed as it was illustrated in Turkish manuscripts.⁽³⁾

Modern pediatric surgical care arose in the middle of the 1879 by William Edwards Ladd (September 8, 1880 – April 15, 1967) who was known as the father of pediatric surgery. Prior to

1900, there was an enormous challenge to operate upon children due to difficulty of administering intravenous fluid and difficulty of anesthesia in pediatric age group. From 1900 onwards, newer techniques for [anesthesia](#) allowed surgical repair of previously untreatable birth defects. By the late 1970s, the infant death rate from several major congenital malformation [syndromes](#) had been reduced to near zero. ^(3, 4)In early 1990s, laparoscopic surgery was becoming popular among the general surgeons. However, till late 1990s, there was not much laparoscopic work carried out in children ⁽⁴⁾. But laparoscopic surgery is currently practiced almost everywhere in developed countries even to the extent of in utero surgical procedures. ⁽¹⁾

The practice of PS as a specialty in Africa has its roots in South Africa during the 1920s with pediatric surgeons from Great Ormond Street, London, as pioneers⁽⁵⁾. In the late 1940s and 1950s, the first pediatric surgical unit was established at Groote Schuur Hospital in Cape Town by Jan H. Louw, and since then, the practice of PS in Africa has become firmly established. Several national and regional organizations have been formed to promote its practice. In the past five decades, many Africans have trained, both overseas and recently in indigenous residency programs. PS divisions now exist in several departments of surgery, many of which participate in the education of medical students and general surgery residents. In a few centers, subspecialty training in Pediatric surgery has been established with a formalized curriculum.

The practice of PS as a specialty in Ethiopia even though has not been documented appropriately has been going on for more than two decade. The esteemed center for this has been black lion referral hospital which has been receiving every referral from around the country and different hospitals. It was also a pioneer center for pediatric surgery residency program which enabled indigenous opportunity for learning. Currently the good deed of BLH has grown around the nation enabling even zonal hospitals to be active in the management of different pediatric surgical diseases and new residency program has been introduced in another tertiary hospital; SPHMMC even though it hasn't been established yet.

1.2 Statement of the problem

Surgical problem in children results in significant morbidity and mortality. The major well known causes of death among pediatric age group as emphasis is given by WHO and different health promoting organizations include birth asphyxia, prematurity and severe infections (sepsis, pneumonia and diarrheal diseases) but little is known about the burden of pediatric surgical conditions on the overall mortality of children. Due to the burden of the above neonatal and childhood diseases in developing countries, PS is often considered low priority in healthcare budget planning and allocation.

In 2015, the Lancet Commission on Global Surgery (LCoGS) highlighted that 5 billion people worldwide do not have access to safe and affordable surgical care⁽⁸⁾. Particularly Sub Sahara African countries have the highest unmet need for surgical care in the world at 41 million cases/year (29% of the world's unmet need)⁽⁸⁾. Up to 50% of the population in Sub Sahara Africa is made of children⁽⁹⁾. And it is estimated that 2.6 million children are born with a congenital anomaly in SSA each year^(8, 9). Even though exact data on trends of magnitude of the problem still lacks there is a great deal of evidence showing increased survival of children with surgical condition in developed countries due to the availability of antenatal diagnosis, improved surgical skills, technologies, sophisticated pediatric intensive care unit, availability of total parenteral nutrition and adequate staff^(6, 7). What is known from different studies is that there is a great burden of the disease worldwide where even being modernized; there are different factors determining outcomes of this children which has never been studied clearly and more importantly we know that PS is still fraught with a lot of problems in developing countries.

As ps in Ethiopia is relatively a new field of study it is known the field is disadvantaged by the large number of sick children, different disease patterns specific to the region, late presentation, and advanced pathology. In addition, it is practiced in an environment of limited resources and facilities with lack of political commitment by governments and international agencies thereby, making pediatric surgery to be associated with unacceptably high morbidity and mortality^(12, 13) even with the introduction of surgical management in different hospitals children later would have complicated outcome which causes of this should be studied and presented.

1.3 Significance of the study

- ❖ The significance of this study is to provide an insight on the burden of childhood surgical conditions which will further illustrate surgical conditions of children are significant public health problems that require attention from both governmental and private sectors. This study will also demonstrate factors that limit delivery of surgical services and will try to give recommendations to work towards developing cost-effective strategies that benefit the largest number of children. Insight on the burden of the disease and factors limiting delivery of the health care service will help in creating a well thought health care policy systems which ensure adequate resources for PSC that would provide cost effective package of pediatric surgical services, Finally this research would be significant enough to improve PSC at the community level by strengthening pediatric surgical education. After this study we will present clearly where the knowledge gap is whether it is from the lack of knowledge from policy makers about the burden of this disease or whether it lack of infrastructures or even lack of expertise and will make recommendation based on the finding to the responsible body who can have impact on the development of PSC.

2. Literature Review

2.1 Worldwide

On a study conducted in the University Hospital of the West Indies during the period January 1 to December 31, 1999 data was collected from admission/discharge register log book with additional data from the medical statistics and accounts Department. Observations were entered into a Microsoft office access database programme then Univariate statistical analyses were applied using Stata 7. There were 1350 admissions (570 female and 715 male, $p < 0.001$). Admissions "lows" were observed in February, April and July; minor peaks in March and June and the major peaks between October and January coincided with admissions due primarily to respiratory conditions. Respiratory, hematological and gastrointestinal conditions were the commonest reasons for admission, by referral mainly from Emergency Departments. Admissions were greatest among children under the age of two years.⁽¹⁴⁾

2.2 Africa

On a research conducted in Kamuzu Central Hospital in Malawi in 2012 a retrospective analysis of data from pediatric surgery database. Data analysis was performed using STATA v11 software. A total of 1170 pediatric patients aged 0–17 years were admitted to the surgical service during the study period. The mean age was 6.9 years, and 62% were male. Trauma was the most common indication for admission (51%, $n = 596$), and 67% ($n = 779$) of all patients were managed non-operatively. Neonates and patients managed non-operatively had a significantly increased risk of mortality⁽¹⁵⁾.

A study conducted on tertiary hospitals in Nigeria data were prospectively collected from October 2002 to September 2003. Data was analyzed using means, standard deviation and simple percentages. There were 135 pediatric surgical admission representing 15.5% of the total pediatric admissions with a mean age of $6.2\text{yrs} \pm 4.2$ and male to female ratio of 2.3:1. The three most common diagnostic categories were injuries in 42.2%, surgical infections in 31.1% and congenital anomalies in 12.6% of the patients. 66.7% of the children needed a surgical procedure. There were 3 deaths giving a mortality of 2.2 %⁽¹⁶⁾.

A 2-year prospective study was undertaken at the Pediatric Surgery Unit of the University of Benin Teaching Hospital (UBTH) and Leadeks Medical Centre (LMC), both in Edo state, Nigeria between January 2007 and December 2008 where the data obtained was analyzed using the SPSS version 11; frequency and percentage. Categorical data were analyzed using the Chi-square test and, where necessary, P value <0.05 was regarded as significant. Of 106 neonates comprising 64 males and 42 females with male: female ratio 1.5: 1 who were aged between 1 and 30 days (mean 8.3 ± 2.7 days) and weighed from 1.4 to 5.9 kg (mean 2.8 ± 1.7 kg), a total of 38 deaths, prevalence rate of 35.8%, were recorded. These deaths occurred mainly among neonates with gastrointestinal anomalies who contributed 30 (78.9%) to total deaths. Nutritional problems in 33 (86.8%) cases, late referrals 25 (65.8%), established overwhelming sepsis on arrival 21 (55.3%), lack of basic facilities 15 (39.5%), anesthetic complications 8 (21.1%) and presence of multiple congenital anomalies 3 (7.9%) were the major determinants of poor outcome. Late referrals and sepsis resulted in early deaths whereas nutritional problems caused deaths after ten days of treatment⁽¹⁷⁾.

2.3 Ethiopia

A retrospective analysis was conducted in Jimma university specialized hospital from February 2010 to November 2011. Using theater logbook data, all children age below 15 years, who were operated during the study period were included in the survey. Epidata version 3.1 was used for data entry and stata-10 was used for data handling and analysis. A total of 1065 surgical procedures performed on 964 children. The median age (months) was 84. Majority of the patients were males 647 (67.0%), M:F =2:1. Majority of the patients 687 (71.4%) were operated under general anesthesia. The most common diagnoses which required surgical intervention

were, trauma 224 (23.2%), surgical infection 202 (21.0%) and gastrointestinal problems 142 (14.7%)⁽¹⁸⁾.

A retrospective study undertaken in BLH over five year period showed a total of 6070 surgical procedures were done, accounting for 31% of all operations and 33% of all pediatric admissions to the hospital. The patients were predominantly male (M: F ratio of 2:1) with a mean age of 68 months. Congenital anomalies (37%), trauma (17.1%) and inflammation (16.8%) cause most of the diseases. The gastrointestinal system was most commonly affected (41.8%) followed by the musculoskeletal system (23%). The study demonstrates the presence of a wide range of pediatric surgical conditions that may cause significant health problems among children. Acute appendicitis was the commonest surgical condition, seen in 729 (12%) children and foreign body aspiration or swallowing in 331 (5.5%) cases. Several diagnoses were related with poor surgical care such as: post burn contracture (177), post circumcision phimosis (71) and chronic osteomyelitis (71)⁽¹⁹⁾.

A retrospective analysis of all surgical patients admitted to the Ethio-Swedish Children's Hospital (ESCH) over a five year period from 1984 to 1988 was made. There were a total of 2,281 surgical patients admitted, accounting for 22% of all hospital admissions (total = 10,364). The gastrointestinal and musculoskeletal systems were the most common systems involved. Acute appendicitis accounted for 13.9% (N = 318), cleft-lip and palate 8% (N = 183), and burns 6.9% (N = 157) of all surgical admissions. Accidents and trauma accounted for 25% of the surgical admissions (N = 564). Of these, the most common conditions were burns, car accidents, accidental falls, and foreign body aspirations. The overall mortality rate was 4% (N = 98). Acute appendicitis, intussusception, acute laryngotracheobronchitis (ALTB) and burns were associated with a high mortality. Of the neonatal admissions, one third died shortly after surgery, probably due to anesthetic, fluid and electrolyte imbalance⁽²⁰⁾.

A Prospective descriptive case series analysis in Yirgalem zonal (rural) Hospital, Southern Ethiopia was conducted from September 2004 - August 2005. Data was collected from open ended and administered interview which was analyzed by window Microsoft excel and summarized and presented as simple frequency tables and cross – tabulated to analyze associated factors on the outcome of cases. Out of 144 children were admitted during study period. The

study showed emergency cases were predominating 73.13% (98) and elective cases were less common 36 (26.26%). Mortality recorded exclusively in children admitted on emergency basis 10 children (7.46%). Acute abdomen was found the leading causes of death in this study (6 children). Delay in presentation also recorded in these children ⁽²¹⁾.

A study was conducted in Tikur Anbesa Hospital between January1, 2010 and December 31, 2014 where data was obtained by retrospective review of medical records of surgical neonates who were admitted and treated. There were a total of 652 surgical neonatal admissions during the study period of which 396 were males, 252 females and 4 with indeterminate genitalia with M: F ratio of 1.6:1. Majority of the cases (86.2%) were having congenital diagnoses. Lesions of the gastrointestinal tract (43.3%) mainly anorectal malformations followed by abdominal wall defects (15.5%) were the major pathologies. Two-third of the cases (66.6%) underwent surgical management. The overall hospital mortality following admission was 24.4%. Case fatality rate ranges from 0.03% for Hirschsprung's disease to 73.2% for esophageal atresia with or without fistula. The immediate causes of death among these neonates were ascribed to septic shock and respiratory failure ⁽²²⁾.

3. Objectives

3.1 General Objectives

The main objective of this research is to assess the patterns, treatment outcomes and factors affecting treatment outcomes of admission to pediatric surgical ward in SPHMMC from April 15 to May 20, 2018.

3.2 Specific objectives

- To determine the patterns of admission to pediatric surgical ward; SPHMMC from April 15 to May 20, 2018
- To describe the general outcomes of patients admitted to pediatric surgical ward SPHMMC from April 15 to May 20, 2018
- To find out the associated factors that determine outcome of patients admitted to pediatric surgical ward SPHMMC from April 15 to May 20, 2018

4. Methods and Materials

4.1 Study Area

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), AA has a total population of 3,384,569 and lies at an altitude of 7,546 feet (2,300 meters). The City has surface area of about 530.14 km². The city possesses a complex mix of highland climate zones. The study will be conducted in one of the best tertiary hospitals of the country; SPHMMC pediatric surgical ward unit, the area is selected because it is the second largest central referral hospital in Ethiopia next to BLH and pediatric surgery was started as new field of practice. And also currently residency program for PS is initiated as of 2010. The Hospital was built by Emperor Haileselesie I in 1969 G.C as a source of medical care for underserved populations and was named St Paul General specialized Hospital till 2008G.C and a medical college were formed in 2007G.C. The college has undergraduate programs in medicine of doctor since 2007. The post graduate programs were launched in 2012 with departments of OB-GYN, IESO (Integrated Emergency Surgery and Obstetrics) and general surgery. It currently has 492 beds, has an annual average of 200,000 patients and a catchment population of more than 5 million. Approximately 75% of the patients receive medical services free of charge. There are over 1300 clinical and non-clinical staff in over 13 departments, most recently launched its new hemodialysis and transplant unit. Pediatric surgical ward is a newly established ward which is located in the third floor of general surgery ward. Surgical care for less than 5 age group was established one years and three months ago but has been a center for pediatric orthopedics and above five care center for quite some time now. The department has 1 pediatric surgeon, 1 resident who attaches weekly from general surgery. The ward has two rooms. It is divided in to under 5 and above 5. The ward has a total of 16 beds where both elective and emergency cases are admitted.

4.2 Study Design

- Hospital based retrospective cross sectional descriptive and analytic study was conducted from April 15 to May 20, 2018 G.C

4.3 Study period

- The study was conducted from April 15 to May 20, 2018 G.C

4.4 Population

4.4.1. Source Population

All surgical pediatric patients seen in pediatric and surgical opd.

4.4.2. Study Population

All pediatric patients admitted to SPHMMC surgical ward.

4.4.3 Study subject

All pediatric patients admitted to SPHMMC surgical ward that fulfilled the inclusion criteria.

4.4.4. Inclusion Criteria

The inclusion criterion was charts of all pediatric patients whose age is below 15 admitted to SPHMMC pediatric surgical ward.

4.4.5. Exclusion Criteria

The exclusion criterion was charts of patients who have gone against medical advice.

4.5. Sample size determination

Using p value as 50%; sample size was calculated using Hollander's formula with confidence level of 95% and margin of error 5%. Where

N= study population which is 1304, the number of children below the age of 15 admitted to SPHMMC pediatric surgical ward.

D= margin of error

P= proportion=0.5

n = sample size

$$n = \frac{\frac{Z^2 p(1-p)}{d^2}}{1 + \frac{1}{N} \left(\frac{Z^2 p(1-p)}{d^2} \right)} = 273$$

4.6. Sampling technique

Sampling frame for this study was taken from HMIS book of patient records from which pediatric patients were sampled by systematic random sampling method. The first chart to be reviewed was chosen by lottery method. With $k = N/n = 4$.

4.7. Study variables

4.7.1. Independent Variables:

- Socio demographic variables: Age, Sex, Address, ethnicity, Month of first presentation.
- Clinical Status: Month of first presentation, mode of admission, diagnosis, mode of management, Intraoperative finding, follow up
- Associated factors: Time of illness for ER and elective cases, Time of admission, Time of surgery, Co morbid illness, day of discharge

4.7.2. Dependent Variables:

- Patterns and treatment outcome

4.8. Operational definition

Pattern- is defined as clinical diagnosis of patients with respect to seasons of a year.

Death- is defined as in hospital death.

Complicated- has developed one or more postoperative complications throughout his/her stay.

4.9. Data Collection method

A structured questionnaire after some modifications from existing literatures was prepared. Following permission from authorized personals of HMIS, surgical ward log book and operation theatre book was accessed; each chart was reviewed at the same time response to prepared questioners was filled by the data collector. Questionnaire was checked for completeness and accurateness to determine the validity.

4.10. Data Processing and Analysis

Data from all the questionnaires was coded entered and analyzed using SPSS 23. Frequencies and proportions were used for the descriptive analysis of the data. Chi-square test and multinomial regression was used to determine the significance of associations among different Variables.

5. Ethical Considerations

Approval from SPHMMC public health department academic & research committee was received for this study prior to enrollment. A formal letter was written by the department to the concerned academic and research office vice provost. Permission was obtained and HMIS officials accessed the card numbers which were submitted to them by me. After permission was obtained from HMIS officials' data was collected using questionnaires from the cards which were available. Even though permission was obtained from all the above bodies I was not able to ask consent from the patients whose charts were being reviewed. So confidentiality was kept by not recording names of patients and data was used only for the purpose of this research.

6. Dissemination of results

Findings of the study will be submitted to the public health department of SPHMMC and department of surgery.

7. Result

7.1. Socio demographic characteristics of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C

A total of Two hundred seventy three (273) children under the age of fifteen (15) years who were admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C were included in the study with a response rate of 100% with replacement of incomplete records. Among charts of children included in this survey; more than half of them 193 (70.7%) were male and the remaining 80 (29.3%) are female with M: F ratio of 2.4:1. The highest proportion of children 114 (41.8%) were admitted at school age category (6-12years) then followed by 64 (23.4%) infant age group with the mean age of admission being 5.4years and from a minimum of 3 days to 15years. 142 (42%) of children were from outside Addis Ababa and the remaining 131 (48%) were from Addis Ababa. Majority of children 173 (63.4%) were Oromo in ethnicity.

Table.1 Socio demographic variables of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Socio demographic variables	Frequency	Percent
Sex		
Male	193	70.7
Female	80	29.3
Address		
Urban	131	48
Rural	142	52
Ethnicity		
Oromo	173	63.4
Amhara	45	16.5
Tigre	33	12.1
Gurage	14	5.1
Others	8	2.9
Age in category		
Neonate (0-28 days)	4	1.5
Infant (29 days-1 year)	64	23.4
Toddler (1 -3 year)	47	17.2
Preschool (3 -5 year)	31	11.4
School age (6 -12 year)	114	41.8
Adolescent (13 -15 years)	13	4.8

7.2 Patterns of admission to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C

Gastrointestinal diseases were the major source of morbidity and indication of treatment in about 166 (60.8%) cases which is then followed by genitourinary system lesions accounting for 92 (33.6%) cases then musculoskeletal and neck anomalies accounting for 11 (4.1%) & 4(1.5%) cases. Appendicitis accounted for the first most common isolated pathology observed while congenital anomaly of different systems contribute as the majority of cases observed during this study.

Table 2 Clinical diagnosis of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C

Clinical diagnosis	Frequency	Percent
Gastrointestinal diseases		
Appendicitis	95	34.8
Foreign body swallow	24	8.8
Intussusception	24	8.8
Omphalocele	1	0.4
Perianal fistula	1	0.4
IHPS	4	1.5
Imperforate anus	7	2.6
HSD	6	2.2
Blunt abdominal trauma	2	0.7
Rectal prolapse	2	0.7
Genitourinary diseases		
Puv	3	1.1
Ureteric stone	1	0.4
Inguinal abscess	3	1.1
Inguinal hernia	14	5.1
Undescendedtestis	35	12.8
Hypospadia	36	13.2
Musculoskeletal diseases		
Pyomyositis	4	1.5
Ganglion cyst	7	2.6
Head and neck diseases		
Thyroglossal cyst	4	1.5

Gastrointestinal diseases have two major peaks and two minor peaks in the past one year and six months as they increase in magnitude from Hidar 2009 to peak in Megabit 2009 then decreases and have its minor peak in Nehase 2009 and Hidar 2010 then have its major peak in Megabit 2010. Also genitourinary complaints have the same pattern as GI diseases with the same peak of months.

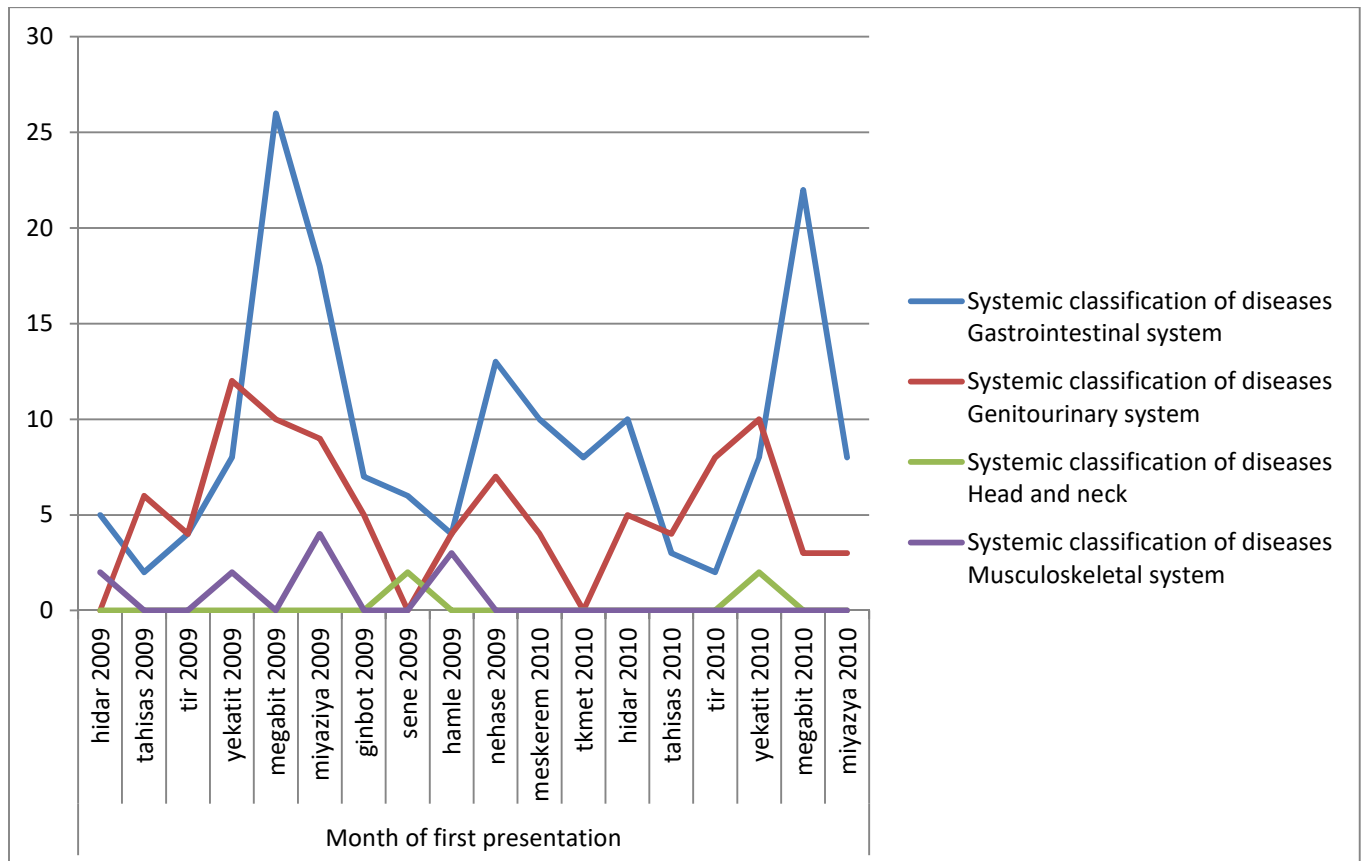


Fig 1 Patterns of admissions to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C (Hidar 2009 to Miyaziya 2010 E.C)

Almost all patients 272 (99.6%) admitted to SPHMMC pediatric surgical ward were managed surgically and only 1 (0.4%) case was managed conservatively. GI surgery accounted for most procedure performed with appendectomy being the major procedure performed (35.5% with 97 cases).

Table 3. Type of surgery performed to patients admitted to pediatric surgical ward from April 15 to May 20, 2018 G.C.

Type of surgery	Frequency	Percent
Gastrointestinal surgery		
Appendectomy	97	35.5
Foreign body removal	24	8.8
Laparatomy	12	4.4
Colostomy	12	4.4
Manual reduction	10	3.7
Resection and anastomosis	3	1.1
pyloromyotomy	3	1.1
Anoplasty	4	1.4
Genitourinary surgery		
Urethroplasty	37	13.6
Orchidopexy	35	12.8
PPV ligation	14	5.1
PUV repair	3	1.1
URS	1	0.4
I&D	3	1.1
Musculoskeletal system		
I&D	6	2.1
cyst excision	5	1.8
Head and Neck surgery		
sistrunk operation	4	1.5

7.3 Treatment outcomes of admission to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

The outcome of patients admitted to SPHMMC pediatric surgical ward is visualized in the pie chart below; 217 (79.5%) are improved and discharged patients while 53 (19.4%) had complicated outcome and 3 (1.1%) patients died.

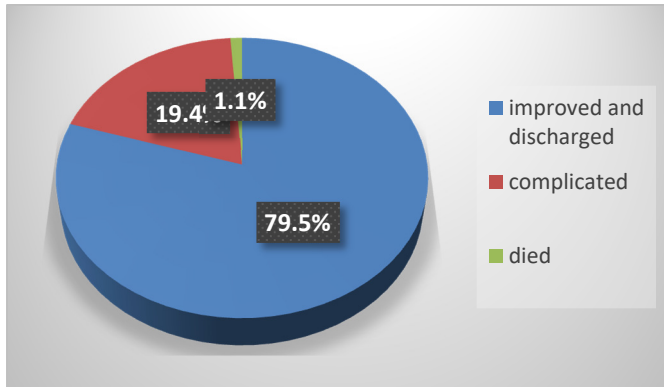


Fig.2 Outcomes of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Table.4 Complicated outcomes of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Complications	Frequency	Percent
Surgical site infection	17	6.2
Stitch granuloma	1	0.4
Wound dehiscence	2	0.7
Urinary tract infections	10	3.7
Esophageal ulcer	1	0.4
Hospital acquired Infection	4	1.5
Paralytic ileus	1	0.4
Infected urinoma	1	0.4
Meatal stenosis	4	1.5
Postoperative adhesion	4	1.5
Urethrocuteaneous fistula	5	2.2
Postoperative collection	2	0.7

Table.5 Death outcomes of patients admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Age	Sex	Duration of illness	Diagnosis	Type of Surgery	Intraoperative finding	Cause of Death
6 year	F	10 days	Intussusception	R_E_E_A	Gangrenous SB	MOF
3 days	F	3 days	Omphalocele	Conservative		GI onset sepsis
8 years	F	5 days	Appendicitis	Laparotomy	Gangrenous SB	MOF

7.4 Associated factors affecting treatment outcomes of admission to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

The total duration of illness for emergency cases ranges from 1 hour to 30 days with mean duration of 4.03 days. The total duration of stay at the emergency before admission to surgical ward ranges from 1 to 24 hours with the mean duration of 8 hours. The total duration of waiting time till surgery after admission ranges from 1 to 7 hours with mean duration of 3 hours.

The total duration of illness for elective cases ranges from 9 days to 8 years with mean duration of 9 months. The total duration of stay from presentation to admission for elective cases ranges from 1 day to 3 months with mean duration of 16 days. The total duration of stay in the hospital after admission for surgery ranges from 1 day to 14 days with mean duration of 3 days.

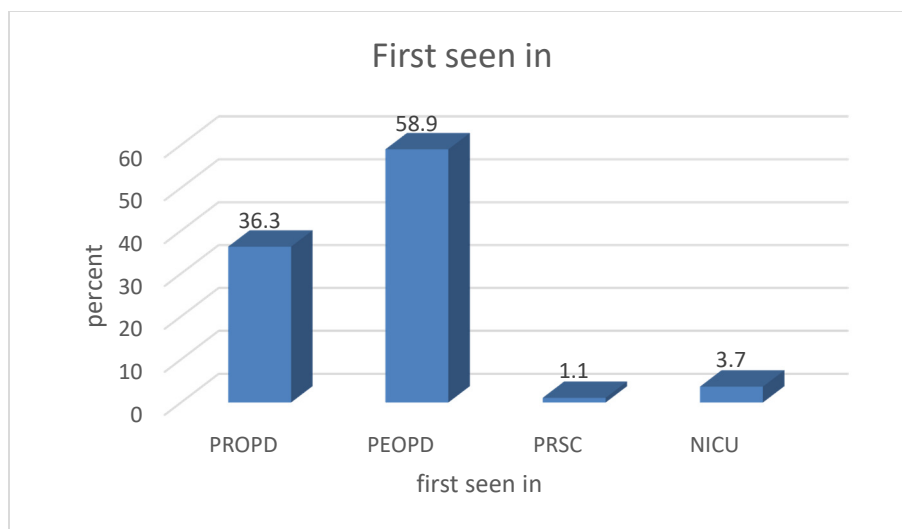


Fig.3 Patients admitted to pediatric surgical ward from April 15 to May 20, 2018 G.C.

were first seen in the above depicted picture.

Most patients 161 (58.9%) were first seen in PEOPD while 99 (36.3%) were seen in PROPD. 10 (3.7%) and 3 (1.1%) patients were seen in NICU and PSRC. 171(62.6%) patients were admitted on emergency basis while 102 (37.4%) patients were admitted on elective basis. 13 (4.8%) patients had associated co morbidities.

Table 6 Co morbid illness in pediatric patients admitted to SPHMMC from April 15 to May 20, 2018 G.C.

Co morbid illness	Frequency	Percent
Diabetes	6	2.2
CHD	4	1.5
Renal disease	2	0.7
SAM	1	0.4

After admission the total number of stay in the hospital ranged from 1 day to 25 days with a median day of 5.3 days. Majority of patients 241 (88.3%) had follow up after discharge from the hospital and 28 (10.3%) had none. After discharge 16 (5.9%) patients were readmitted back for whom 15 (5.5%) patients were admitted for the same reason but 1 (0.4%) was admitted for different reason.

In this study the association of different factors with treatment outcomes was investigated at both chi square and multivariate analysis levels. Variables having p value < 0.05% were taken as having association when using chi square test to find out association; variables such as age in category, gender, ethnicity, the place where they were first seen in, duration of illness for ER cases, Time of admission for ER cases, Time of surgery for ER cases, mode of admission, Time of admission for elective cases, co morbidities and date of discharge were found to have association using the above test.

Table 7 Bivariate analysis showing the association between treatment outcomes and others different variables in children admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Variables	Chi square (p-value)
Age in category	0.006
Gender	0.011
Ethnicity	0.035
Place of first seen	0.035
Duration of illness for ER cases	0.001
Time of admission for ER cases	0.001
Time of surgery for ER cases	0.002
Time of admission for elective cases	0.009
co morbidity	0.001
Date of discharge	0.001

The above variables which had association were taken to multivariate analysis to control the confounders and to observe the significant association between more than two variables. The variable that showed significant association was Duration of illness for emergency cases as it shows 20times increased risk of complication for every 72 hour time elapse.

Table 8 Multivariate analysis showing the association between treatment outcomes and others different variables in children admitted to SPHMMC pediatric surgical ward from April 15 to May 20, 2018 G.C.

Variables	COR(95%CI)	P-value
Age in category	0.814 (0.649-1.021)	0.075
Gender	0.017 (1.44-1.94)	0.968
Ethnicity	2.333 (0.258-21.134)	0.451

Place of first seen	1.493 (0.179-12.463)	0.714
Duration of illness for ER cases	20.076 (6.859-58.761)	0.004
Time of admission for ER cases	2.3 (0.2-23.4)	0.482
Time of surgery for ER cases	1.3 (0.13-9.463)	0.996
Time of admission for elective cases	0.179 (0.013-2.42)	0.196
co morbidity	0.734 (0.076-7.056)	0.789
Date of discharge		0.935

8. Discussion

The results of this study provide valuable insight into the surgical conditions that affect children by studying the patterns, treatment outcomes and associated factors for outcomes of patients admitted to SPHMMC pediatric surgical ward from November 10, 2016 to May 5, 2018 G.C (Hidar 2009 to Miyaziya 2010). A total number of 273 patients were included in this study with predominant sex being male (M: F ratio of 2.4:1) and mean age of 65 months which was comparable to retrospective cross sectional study done in BLH and JUSH with predominant male sex (M:F ratio of 2:1) with a mean age of 68 months and M:F ratio of 2:1 with mean age of 84 months respectively. The male predominance observed everywhere is contributed by the clinical diagnosis as the commonest admission diagnoses are of only males ^(17, 18). Comparable number of patient visits the hospital both from A.A and out of Addis (48% vs. 42%). Majority of children 173 (63.4%) were Oromo in ethnicity as the surrounding population to the hospital are different oromian states.

A wide spectrum of surgical conditions affect children and in this particular study gastrointestinal diseases were the major source of morbidity and indication of treatment in about 166 (60.9%) cases of which the predominant disease being appendicitis accounting for 95 (34.8%) cases which is then followed by foreign body swallow accounting for 24 (8.8%) cases

then comes genitourinary system lesions accounting for 92 (33.7%) of which congenital anomalies of the GU system account for 74 (27.1%) cases then musculoskeletal and neck anomalies account for 11 (4.1%) cases & 4 (1.5%) cases respectively. When seeing total cases of congenital anomaly in every system the total cases which is about 114 predominate the cases of appendicitis which is only of 95 cases. Compared to the study done in BLH and Ethio-Swedish Children's Hospital (1984-1988) in Addis Ababa; gastrointestinal system was also most commonly affected (41.8% accounted to it in BLH) of which Acute appendicitis was the commonest surgical condition, seen in 729 (12%) children in BLH while 318 (13.9%) was observed in Ethio-Swedish Children's Hospital then was followed by musculoskeletal system (23% in BLH) in both hospitals ^(17, 20). But when compared to JUSH and Kamuzu Central Hospital in Malawi in 2012 a retrospective cross sectional study the most common diagnosis which required surgical intervention was trauma 224 (23.2%) whereby only 2 (0.7%) cases were seen in SPHMMC which is due to the triaging system of SPHMMC in which cases all trauma patients will be sent to Aabet hospital which is the biggest trauma center in town ^(15,18).

Admissions "lows" were apparent in January (Tir) and July (Hamle), with minor peaks in November (Hidar), December (Tahisas), February (Yekatit) and August (Nehase). Admissions rose to a major peak in March (megabit). Gastrointestinal diseases had their major peak in the above months. In comparison to study conducted in the University Hospital of the West Indies during the period January 1 to December 31, 1999 the minor March peak seemed due to increases in respiratory unlike the above study which is the major peak and I couldn't find the exact reason for the pattern observed ⁽¹⁴⁾.

Most patients 161 (59%) were admitted as emergency cases while the rest were elective which was comparable to a Prospective descriptive case series analysis which was conducted in yirgalem hospital from September 2004 - August 2005 which showed out of 134 children admitted emergency cases were predominating 98 (73.13%) while the rest were planned or elective case. The outcome of patients admitted to SPHMMC pediatric surgical ward is 217 (79.9%) are improved and discharged patients while 53 (19%) had complicated outcome and 3 (1.1%) patients died which compared to the study in yirgalem has higher complication rates (11.4%) but lower death rates (4.3%) which might be explained by the level of expertise, type of

management and available resources. The most common complication observed in SPHMMC is surgical site infection (6.2%) which is compared to yirgalem hospital which has higher rates of surgical site infection (9.8%). The most common cause of death was sepsis of GI focus that has resulted in multi organ failure which accounts 3 (1.1%) of cases in SPHMMC while half mortality was recorded in yirgalem hospital to be due to intussusception (5 cases which is about 4%) with unspecified cause of death⁽²¹⁾.

Prolonged duration of illness resulted in higher rates of complication in SPHMMC which was also the contributing factor in yirgalem hospital that resulted in increased complication⁽²¹⁾.

9. Strength and Limitation

9.1 Strength

- As the study design was retrospective documentary review; it will be baseline for prospective study.
- Many independent variables were considered to explain the outcome variable.

9.2 Limitation

- Since the study was document review it was not able to address the ethical issues properly.
- Since the study design was retrospective documentary review; this might inevitably be complicated by incomplete data due to lost records
- Also, this study selectively addressed certain factors of treatment while various factors are found to cause complications.
- This study will not be a strong tool to have recommendation since it's a retrospective

10. Conclusion and Recommendation

10.1 Conclusion

The present study has shown there is highest burden of surgical diseases in children with highest rate of emergency admission which is affecting the gastrointestinal system during the month of March (megabit). Most patients were discharged improved but some had complication with delay in presentation having significant association with outcome.

10.2 Recommendation

- St Paul's hospital millennium medical college should increase the vastness and quality of service provided to patients admitted to every ward.
- For department of surgery and pediatrics in SPHMMC
 1. Increase collaboration among the departments; early admission of pediatric emergency and elective surgical cases.
 2. Improving the communication and consultation system between the two departments in order to intervene timely and decrease delay in management.
- Other regional and primary hospitals should initiate early and effective referral system.
- There should be ways to develop awareness of the community as well as awareness of parents to bring their children as early as possible.
- Other researchers who are interested in this field should study other unexplored associated factors that were not included in this study.

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Annexes

I. Consent form

St. Paul's Hospital Millennium Medical College

Department of Public Health

A greeting, my name is AbenezerChala and I am a final year medical student in under graduate program in faculty of medicine at SPHMMC.

I am requesting the office of chart keeping regarding permission to conduct the stated study in this hospital. Please read the following information for further understanding:

What the study is about: The purpose of this study is to assess patterns, treatment outcomes and associated factors affecting outcomes of patients admitted to pediatric surgical ward SPHMMC from November 2016 to May 2018. If you agree to do this study, I will conduct by using a check list to collect necessary data from the records and patient file. I would like to thank you for your cooperation.

All information gathered from the log book and patient file will be kept confidential.

Contact Address of the Principal Investigator

Name: AbenezerChala

Cell Phone: +251920292714

E-Mail: c.abibela@gmail.com

II.English version Questionnaire

I. Sociodemographic data

1. Card no

2. Age of the child

3. Sex of the child

☐ Male

☐ Female

☐ Indeterminate

4. Region

☐ Urban

☐ Rural

5. Month of first presentation.....

6. Month of PSRC visit after first seen.....

II. Associated factors determining outcome

7. Duration of illness for ER cases.....

8. Duration of illness for elective cases.....

9. Time of admission from presentation for ER cases.....

10. Time of admission from presentation for elective cases.....

11. Time of surgery after admission to ward for ER cases.....

12. Time of surgery after admission to ward for elective cases.....

13. First seen in

☐ RPOD

☐ EPOD

☐ Pediatric surgical referral clinic

☐ NICU

14. Co morbid illness

☐ Diabetes

☐ CHD

☐ Renal disease

☐ others

15. Mode of admission

☐ Elective

☐ Emergency

III. Clinical status

16. Diagnosis at admission

17. Treatment option

- ☐ Conservative
- ☐ Surgical

18. Intraoperative finding.....

19. Outcome

- ☐ Improved and discharged
- ☐ Complicated
- ☐ Died

20. If complicated

- ☐ SSI
- ☐ UTI
- ☐ Paralytic ileus
- ☐ others

21. Date of discharge

22. Readmission

- ☐ Yes
- ☐ No

23. If yes to the above question,

- ☐ For the same disease
- ☐ Different disease

24. Follow up after discharge

- ☐ Yes
- ☐ No

25. Cause of death