

ASSESSMENT OF PEDIATRIC SURGICAL ADMISSIONS AND OUT COME AT JIMMA  
UNIVERSITY MEDICAL CENTER, JIMMA, SOUTH WEST ETHIOPIA

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**Assessment of patterns of pediatric surgical admissions and outcome at Jimma University  
medical center, Jimma, South west Ethiopia**

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## **ABSTRACT**

**Background:** Pediatric surgical diseases are variety of surgical pathologies occurring in pediatric age groups that require surgical care as the main option of management to save life and avert or decrease disability. The aim of this study was to asses pattern and outcome of pediatric surgical conditions and their outcomes at Jimma medical center, Jimma, Ethiopia.

**Methods:** A prospective cross-sectional, hospital-based study was conducted among children diagnosed with surgical conditions and admitted to Jimma medical center pediatric wards during the study period, April to November 2021 G.C. Descriptive statistics was done by SPSS software, P value of less than 0.05 is considered statistically significant for associated factors. Then the findings are discussed, and compared with similar studies done elsewhere. Based on the results, recommendations and conclusions were made and disseminated.

**Result:** A total of 250 children were included in this study, among which 177 (70.8%) were male and The commonest age group were infants,113 (45.2%). Regarding type of admissions, 136 (54.4%) of them were surgical emergencies, and 161(64.4%) of them were referred from a nearby health facility. The most common cause admissions were congenital surgical conditions (45%), acute abdomen (21%) and trauma (13%). The mean (SD) of duration of hospital stay was 10.5 (8.9), there was no statistically significant difference across the different diagnosis. A quarter of patients (26.2%) developed complications in the hospital, these were surgical site infection (8%), wound dehiscence (6.4%), and Pneumonia (4.4%) and in hospital mortality rate was 6%. Among the 18 deaths, most common cause of death was uncontrolled sepsis.

**Conclusion:** The commonest causes of pediatric surgical admissions were congenital surgical conditions, acute abdomen and trauma. About a quarter of patients developed complications in the hospital, and the most common complications were surgical site infections. In hospital mortality rate of pediatric surgical admissions in JUMC was comparable to findings from other African countries. Early identification of surgical conditions in children and timely intervention saves lives. Regular audit is needed to improve the quality of care and patient outcomes.

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## **Acronyms**

JU; Jimma University

JUMC; Jimma university medical center

LAMA; left against medical advice

SSI; surgical site infection

UTI; urinary tract infections

MOF; multi organ failure

LMIC; Low-medium income countries

ICU; intensive care unit

NICU; neonatal intensive care unit

PPED; pediatrics

ARM ; anorectal malformation

PPV; persistent process vaginalis

HSD; hitschsprung disease

TEF; tracheoesophagealfistula

FB; foreign body swallowing or aspiration

VP shunt;ventriculoperitoneal shunt

## **CHAPTER ONE**

### **1.1 Introduction**

Nowadays there is witnessed growth in the field of medicine especially in the area of subspecialty in surgery (1, 2). This resulted in improved health care delivery, efficient patient care and good outlook for surgical pathology which were considered to be fatal.

Pediatric surgery is an independent specialty and has also evolved into a multidisciplinary field of medicine. In developed countries, each subspecialty is well organized with their own separate wards, trained personnel and facilities so as to handle specific aspect of pediatric surgical pathology which made service delivery easier(1). Admitting children with related surgical disease into a separate ward under the care of highly skilled and specialized nurses makes nursing and evaluation by surgeon's quick and effectual (1, 3).

Thus, the lack of facilities and trained personnel often results in sharing wards, equipment, and nursing staffs with other surgical and even nonsurgical patients (4-8). This influenced the quality of care and outcome of children with surgical pathology in developing countries.



## **Statement of the problem**

Surgical diseases are important public health problems in low- and medium-income countries and the magnitude of surgically treatable conditions exceeds the burden of some of the most widely known and recognized global health problems. Based on report of global disease burden surgical conditions in general are responsible for about 6-12% of all pediatric admissions in Sub-Saharan Africa, although the proportion may be higher in some urban area and rural areas (9)

Surgical conditions in developing countries are taken as so expensive and extravagance, so they are left so focus was given for non-surgical conditions (10, 11, and 12). Policy formulators have misconception that quality surgical care is cost prohibitive and very complex to be considered a viable conduit for improving global health (13). Besides many socio-economic factors contributing to the difficulty in access to surgical care, information gap about the consequence of surgical disease and importance of surgery on communities has led to negligence of surgical facility.

Prevalence of childhood surgical diseases in the developing world is as common as they are in the developed countries. Injuries, congenital anomalies and surgical infections are the most common surgical problems that directly harm African children, and that they pose a major health risk to children (14, 15).

## **Significance of the study**

Admissions of pediatric surgical cases are daily practice at zonal hospital. Knowing the patterns of the condition, magnitude of the problem and factors affecting the outcome are crucial to design strategy for appropriate management.

There is a huge problem in developing countries regarding well documentation about morbidity and mortality associated with the condition. If it was not for foreign literatures, such necessary data about factors affecting surgical admissions in developing countries which are crucial to effective policy formulation are very rare.

## CHAPTER TWO

### Literature review

According to the current estimation , surgical conditions contribute to up to about 32% of disease >burden globally, 5 billion people, predominantly in low- and middle-income countries(LMIC) lack access to safe and reasonably priced operation .The World Health Organization, the World Bank, and the United Nations have all claim that prevalence of adequate surgical care is essential to achieve the Sustainable development goals, such as through strengthening health system and universal health care coverage(17). Even though addressing surgical needs has been shown to form an essential part of functioning health care systems, addressing gaps in the surgical care for children was not prioritized (18)

Among several recent studies that have estimated the prevalence of surgical conditions in LMICs, most of the studies does not give attention to pediatric surgical disease. (19)

In a case series analysis which was conducted at Bogura on 175 patients admitted 13 children were excluded because of parent's refusal. So 162 children's data were analyzed. Among them most of them were emergency admission accounting for 74.69% of case and the rest were electives. Mortality occurred only on 6 children (3.70%) who were admitted on emergency basis. Congenital anomaly of the gastrointestinal tract was the reason of death which occurred on 4 (2.46%) of children (20)

A 29 month prospective study was done at Gambia on a total of 1726 children who were admitted with surgical condition. Injuries (46.9%), congenital anomalies (24.3%), and infections requiring surgery (14.5%) were the most common reasons of admission, and the major causes for surgical deaths were congenital anomalies, burns and injuries. The average age at presentation

was 5.2 years. More than half were <5 years old, and 13% of them were aged less than 1 year. The ratio of male to female was 1.9:1 (21).

According to the study done in North western Nigeria, the most common categories were congenital anomalies 35.1% (67/191), trauma 30.9% (59/191) and surgical infections 29.8% (57/191). 80% of our patients were discharged improved. However, we recorded a mortality rate of 9.9 % (22).

In black lion Specialized Hospital, among 6070 surgical procedures which were done over a period of 5 years, which accounted 33% of all pediatric admissions to the hospital. The male to female ratio was 2:1 with a mean age at admission was of 68 months. Congenital anomalies, trauma and inflammation were the leading reasons of presentation being, 37%, 17.1% and 16.8% respectively. The most commonly affected system was the gastrointestinal (41.8%) followed by the musculoskeletal system disease (23%). The study revealed the presence of a wide range of pediatric surgical conditions. The commonest emergent surgical disease seen was appendicitis 729 which was about 12% followed by foreign body aspiration or swallowing in 5.5% of the cases. Plenty of diagnoses were due to inadequate and poor treatment and follow up like 177 cases with diagnosis of post burn contracture (177), 71 post circumcision phimosis children and 71 cases of chronic osteomyelitis (23).

Based on research done at Yirgalle hospital on 144 children who were admitted and result of 134 children's were analyzed and it showed that the number of emergency admission were 73.13% (98) and elective cases were 36. Among which 10 were having Pediatric emergency condition which was 7.46%, Out of them 6 died due to acute abdomen, and it was the leading causes of death based on the study (24).

A one year prospective study was done at Adama Hospital Medical College on all admitted surgical patients. The number of Males were 276 (71.9%) with a male to female ratio of 2.5:1. The three commonest cause of admissions were gastrointestinal conditions (33.8%), trauma (25.5%) and congenital anomalies (19%). There were recorded 5 deaths which is 1.3% mortality rate. Based on this study commonest factors associated with death were: delayed presentation to hospital, longer stay in hospital and delay in surgical intervention. The outcomes were better for those who present shorter time (< 6 hrs.) and for those who stayed in the hospital for less than 7 days. Longer hospital stay, delayed treatment and presentation with trauma are independent predictors of outcomes. Death in children with surgical conditions can be prevented or reduced by avoiding these delays. (25)

Firomsa, T. et al. studied trends and outcomes of emergency pediatric surgical admissions from a Tertiary Hospital in Ethiopia (Black Lion Hospital), in the year 2018. It was a retrospective analysis of medical records of patients, and they found **out of a** total of 454 patients common diagnosis were abdominal/gastrointestinal emergencies 210(46.3%), foreign body in aero digestive system in 133(29.3%), urogenital surgical emergencies in 27(5.9%). The other causes include superficial and deep tissue abscess collections in 22(4.8%), trauma /injury related cases in 24(5.3%) and others in 38(8.4%) respectively while congenital malformations were only 57(12.6%) of the cases. The outcome they found was, 439(96.7%) discharged improved without major disabilities documented, while 9(2%) died (26). A study from Uganda on Epidemiology and mortality of pediatric surgical conditions revealed that congenital anomalies including Hirschsprung's, anorectal malformations, intestinal atresias, omphalocele, and gastroschisis were the most common diagnoses (38.6%) followed by infections (15.0%) and tumors (8.6%).

Mortality rates were substantially higher than those of high-income countries. Post-operative mortality was highest in the congenital anomalies group (15.0%) (27).

Another retrospective study from Tikur Anbessa University Hospital, Addis Ababa, Ethiopia on the pattern of pediatric surgical conditions had shown common causes for pediatric surgical admissions. These were congenital anomalies, trauma and inflammation, 37%, 17.1% and 16.8% respectively (28). A study from Gambia demonstrated a different pattern of admission. From a total of 1726 children admitted with surgical problems, the most common admission diagnoses were injuries (46.9%), congenital anomalies (24.3%), and infections requiring surgery (14.5%). The diagnoses that accounted for the greatest number of inpatient days were burns (18.8%), osteomyelitis (15.4%), fractures (12.7%), soft tissue injuries (3.9%), and head injuries (3.4%). Gambian children were rarely admitted for appendicitis and never admitted for hypertrophic pyloric stenosis. The leading causes of surgical deaths were burns, congenital anomalies, and injuries other than burns (29). Unlike the study from Gambia, in Ethiopia, congenital anomalies were the most common group of pediatric condition that required surgery (30).

Regarding surgical site infection (SSI) in children, a prospective analysis of the burden and risk factors in a sub-Saharan African setting by Ameh AE. et al. had shown SSI rate of 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 rate was 25.8% in emergency procedures and 20.8% in elective procedures ( $p > 0.05$ ). The average length of hospital stay was 26.1 days (range, 8-127 days) in patients with SSI and 18.0 days (range, 1-99 days) in those without SSI ( $p < 0.05$ ). The mortality rate of patients with SSI was 10.5%, the burden of SSI in this setting is high (31). 32).

Livingston M. et al reported mortality of pediatric surgical conditions in low and middle income countries in Africa. They found out of 107 selected literatures, the overall mortality rate for all conditions was 12% and the highest pooled mortality rates were seen with esophageal atresia (72%), midgut volvulus (36%), and jejunoileal atresia (35%). Pooled mortality was 17% for congenital conditions and 9% for acquired disease (33). A study from Ghana had shown predictors of poor postoperative outcomes in pediatric surgery patients, gastrointestinal surgery, surgical trauma, surgical infection and lack of insurance were significantly associated with prolonged LOS. Young age and female gender were significantly associated with in-hospital mortality. They suggested expansion of the surgical work force, particularly pediatric surgeons, could improve perioperative survival in the very young population (34).

## **CHAPTER THREE**

### **OBJECTIVES**

#### **3.1 General objectives**

The goal of this study was to determine the pattern and outcome of patients admitted with pediatric surgical conditions, Jimma University Medical Center, Jimma, Ethiopia. From April 2021 to November 2021

#### **3.2 Specific Objectives**

- To determine the socio-demographic status of pediatric surgical patients admitted to JUMC From April 2021 to November 2021
- To assess common causes of pediatric surgical admissions to JUMC From April 2021 to November 2021
- To assess the rate of complications among pediatric surgical admissions to JUMC from April 2021 to November 2021.
- To determine outcome at the time of discharge from the hospital of surgical pediatric patients admitted to JUMC From April 2021 to November 2021



## CHAPTER FOUR

### METHODS AND MATERIALS

#### 4.1 Study area and period

The study was conducted at Jimma University Medical Center, Pediatric surgical unit and pediatric wards, from April to November, 2021 GC. JUMC is located in Jimma town, Southwest Ethiopia, Oromia region, 350 km southwest of, Addis Ababa. Jimma zone encompasses Jimma town and proximate woredas, has estimated population of 2,486,155. JMC is the only referral teaching hospital in southwest Ethiopia. It is known to provide health care services with in catchment area of 15 million populations in the South West Ethiopia.

#### 4.2 Study design

A hospital based prospective cross-sectional study was conducted

#### 4.3 Population

##### 4.3.1 Source population

All admitted pediatric surgical patients.

##### 4.3.2 Study population

Pediatric surgical patients admitted to JUMC, during study period whose parents are willing to participate in the study

#### Eligibility criteria

- **Inclusion criteria** : All surgical patients admitted to pediatric surgical ward, pediatric ward and neonatology, in JUMC, during the study period

**Exclusion criteria:** Patients whose parents were not willing to participate in the research

## **4.4 Data collection procedures**

### **4.4.1 Data collection methods and instruments**

Data collection was held through face-to-face interview of parents and patient document review.

Pre-tested semi-structured questionnaire and checklist was used as tools for data collection. Data collectors were surgical residents and supervisors were given orientation on procedures, techniques and ways of collecting the data. The questionnaire was prepared in English. The questionnaire was pre tested prior to the actual data collection that would not be included in the main study.

### **4.4.2 Data quality Assurance**

Properly designed data collection instrument, training of both data collectors and supervisors, reviewing and checking the collected data for completeness and relevance by the supervisors and principal investigator daily, are crucial for the assurance of data quality

## **4.5 Study variables**

### **4.5.1 Dependent variables**

Disease condition

Outcome

### **4.5.2 Independent variables**

- Age
- Sex
- Duration of illness
- Occupational status of the parents or care takers
- Family size
- Residence
- Source of referral

- Time between referral and arrival
- Time between referral patient presentations
- Length of stay

#### **4.6 Data processing and analysis**

Data was Edited and entered into EPI data version 3.1 then it was exported to SPSS (Version 26) for statistical analysis. Data was cleaned for inconsistencies and missing values. Variables that were missed in more than 10% of total sample were excluded from analysis. Descriptive statistics was used to summarize categorical variables. Continuous data were analyzed with Chi-square test and P value of less than or equal to 0.05 was considered statistically significant.

#### **4.7 Ethical clearance**

Official letter was obtained from Jimma University Research and Graduate studies coordinating office and was submitted to the responsible authorities of Jimma University Medical Center to have permission for data gathering. Verbal consent was requested from parents of study participant included in the study during data collection time after explaining the objectives of the study. All the information collected from the study subjects were handle confidentially through omitting their personal identification and the data was used for the research purpose only. Data collectors and supervisors had informed the subjects that they had the right to participate or not in the study

#### **4.8 Operational definition**

Left against medical advice: patient left hospital against the expressed advice by treating team before completing treatment

Outcome: patient condition during the hospital admission and at time of discharge.

## CHAPTER FIVE

### RESULT

#### Socio Demographic Characteristics of the study population

A total of 250 children were included in this study, among which 177 (70.8%) were male and more than half, 146 (58.4%) came from rural area. The commonest age group were infants (Children of age one month to 12 months) accounting for 113 (45.2%) of the total. Majority of the care takers were Oromo in Ethnicity, 155(62%) and 185 (74%) of their parents were Muslim in Religion. The care givers for the majority of children were their mothers (74%). Regarding occupation of the care takers, close to half of them were farmers, 119 (47.6%); followed by housewives 71 (28.4%), (Table 1).

**Table 1. Socio Demographic Characteristics of pediatric surgical cases and their care takers in Jimma University Medical Center from April 2021 to November 2021.**

Variables		Frequency	percent
Ethnicity	Oromo	185	74
	Amhara	19	7.6
	Tigre	2	0.8
	SNNP	30	12
	Gambela	11	4.4
	Other	3	1.2
	Total	250	100
Age in month	<=1	48	19.2
	1.1-12	113	45.2
	12.1-36	58	23.2
	36.1-72	14	5.6
	72.1-144	15	6
	>=144	2	0.8
	Total	250	100
Sex	Female	73	29.2
	Male	177	70.8
	Total	250	100
care taker	Mother	185	74
	Father	56	22.4
	Sibling	3	1.2

	close relative	4	1.6
	Friend	2	0.8
	Total	250	100
Address	urban	104	41.6
	Rural	146	58.4
	Total	250	100
Ethnicity	Oromo	185	74
	Amara	19	7.6
	Tigre	2	0.8
	SNNP	30	12
	Gambela	11	4.4
	Other	3	1.2
	Total	250	100
Religion	Muslim	155	62
	orthodox	52	20.8
	protestant	42	16.8
	Other	1	0.4
	Total	250	100
Occupation of care giver	Farmer	119	47.6
	house wife	71	28.4
	Government employee	28	11.2
	private business	25	10
	Other	7	2.8
	Total	250	100

- **Admission information of the study population**

Close to Half, 136 (54.4%) of the admissions were for surgical emergency, and majority 181 (72.4%) of the patients were admitted directly to pediatric surgery ward or in to surgical emergency ward; and 161(64.4%) of them were referred from a nearby health facility.

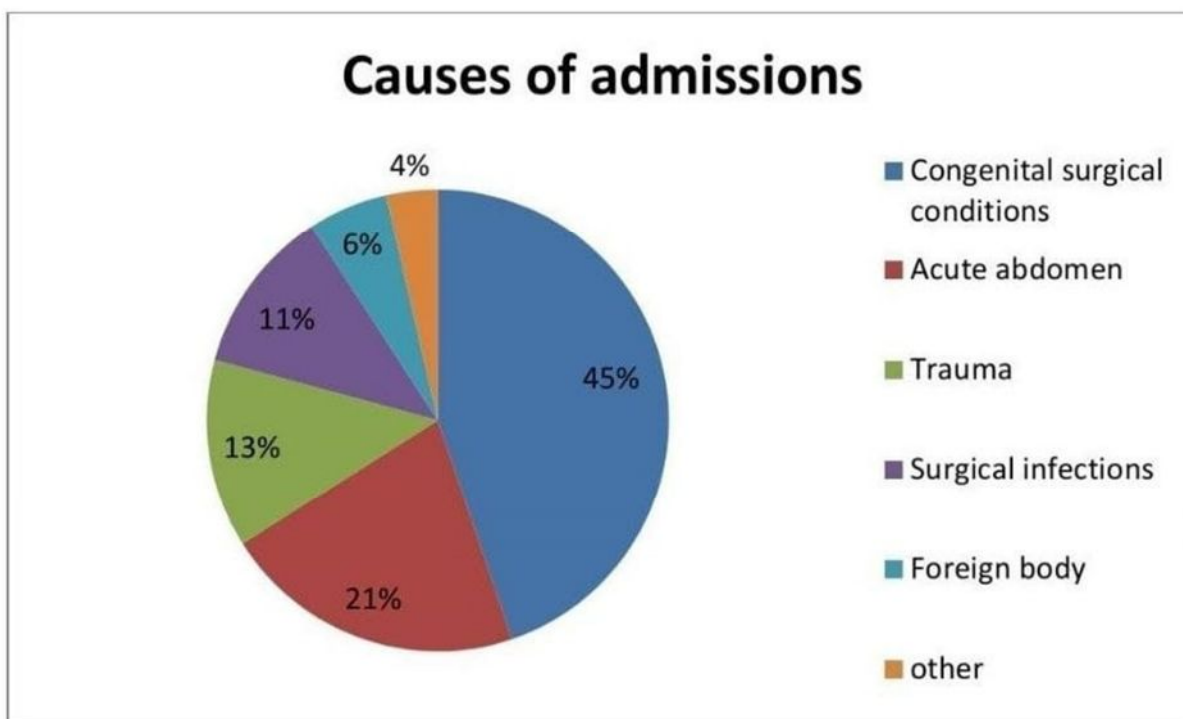
Significant proportion of patients were referred after greater than one week stay in the referring health facility 16 (6.4%), and some 11(4.4%) of them arrived to Jimma medical center after one week of the time of referral. Only 9 (3.6%) of the patients reported visiting traditional healers before coming to the hospital (Table 2).

**Table 2. Admission information of the study population, Jimma University Medical Center from April 2021 to November 2021**

<b>Variables</b>		<b>Number</b>	<b>Percent</b>
Type of admission	Emergency	136	54.4
	Elective	114	45.6
	Total	250	100
admission ward	pediatric ward	45	18
	pediatric surgery ward	158	63.2
	PICU	4	1.6
	NICU	19	7.6
	Surgical emergency	23	9.2
	Oncology ward	1	0.4
	Total	250	100
Referral	Yes	161	64.4
	No	89	35.6
	Total	250	100
Time of referral after presenting to health facility (in days)	<=1	94	37.6
	1.1 – 3	33	13.2
	3.1 – 7	18	7.2
	>7.1	16	6.4
	Total	161	64.4
Duration between referral and arrival	<=1	108	43.2
	1.1 – 3	25	10
	3.1 – 7	18	7.2
	>=7.1	11	4.4
	Total	162	64.8
Visited traditional healer	Yes	9	3.6
	No	241	96.4
	Total	250	100

- **Common pediatric surgical admissions**

Congenital surgical conditions were the leading cause of admission, accounting for 45% of the total admissions, followed by acute abdomen (21%) and trauma (13%). The top three common congenital surgical conditions were, Anorectal malformation 34 (30.35%), Hirschsprung disease 31 (27.67%) and myelomeningocele 22 (19.64%). From the acute abdomen cases, appendicitis accounted quarter of the cases 13(25%). (Pie chart 1.) (Table 3). The median time of duration of illness was 5 days.



**Pie chart 1. Common pediatric surgical admissions in Jimma University Medical Center from April 2021 to November 2021**

**Table 3. Congenital surgical conditions in Jimma Medical Center from April 2021 to November 2021**

<b>Congenital surgical condition</b>	<b>Number</b>	<b>Percent</b>
Anorectal alformation	34	30.35
Hitschsprung disease	31	27.67
Myelomeningiocele	22	19.64
Persistent process vaginalis and inguinal hernia	8	7.1
Hypospadiasis	8	7.1
Undescended testis	2	1.7
Omphalocele	2	1.7
Others	5	4.46
Total	112	100

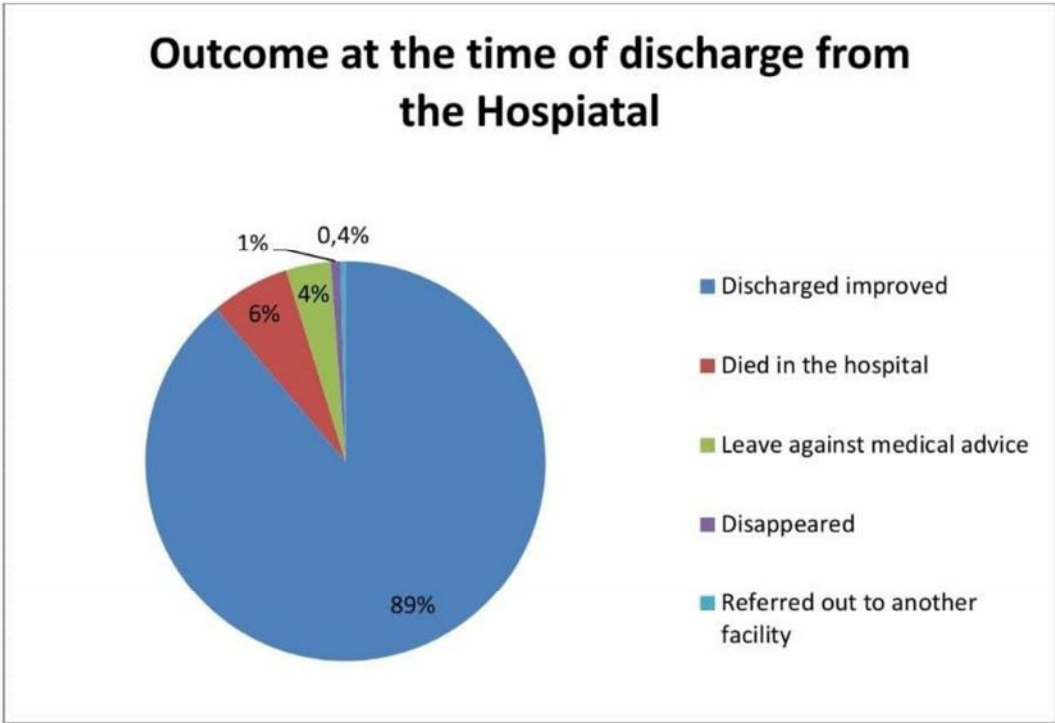
- **Duration of Hospital stay, complications and outcome at the time of discharge from the Hospital**

The mean (SD) of duration of hospital stay was 10.5 (8.9), there was no statistically significant difference across the different diagnosis. Majority, 187 (74.8%) of the patients did not develop complications in the hospital, while in those who had complications, surgical site infection was the leading cause 20(8%), followed by wound dehiscence 16(6.4%), and Pneumonia 11(4.4%) (Table 4). Majority of the patients (89%) discharged improved, while 18 (6% ) of them died and 4% of the care takers taken the children out of the hospital against medical advice (Pie chart 2). Among the 18 deaths that occurred during the study period (68.7%) were male, 81.6 of deaths occurred after surgical intervention, and in majority (81.6%) of deaths the immediate cause was uncontrolled sepsis, majority of the deaths (83.3%) were surgical emergencies.

**Table 4. In Hospital complications among pediatric surgical admissions in Jimma University Medical Center from April 2021 to November 2021**

<b>Complications</b>	<b>Number</b>	<b>Percent</b>
No complications	187	74.8
Surgical site infection	20	8.0
wound dehiscence	16	6.4
Pneumonia	11	4.4
Anemia	3	1.3
UTI	3	1.3
Malnutrition	2	0.8
Blood stream infection	5	2.0
other	3	1.3
Total	250	100





**Pie chart 2. Common pediatric surgical admissions in Jimma Medical Center from November 2020 to September 2021**

## CHAPTER SIX

### Discussion

The top three causes of pediatric surgical admissions observed in the current study were congenital surgical conditions (45%), acute abdomen (21%) and trauma (13%). And among the congenital malformations, anorectal malformation (30.35%), Hirschsprung disease (27.67%) and myelomeningocele (19.64%) accounted for three fourth of the cases. Majority, 89% of the patients were discharged improved while 6 % of them died and 4% of the care takers decided to leave the hospital against medical advice.

Majority of the patients were male, with the ratio of 2.4.: 1, this is consistent with other findings reported in the literature. Firomsa T. et al also reported 2:1 male to female ratio (26). The commonest age group were infants, accounting 45.2% of all the cases, with mean (SD) of 8months (30.4) and median 18 months of age, this age distribution is similar with the report of Cheyng M et al. they reported 50.4% of their patients were children less than 1 year old (27). This is unlike the report of Deribew M et al, they found a mean age of 68 months (28), the average age reported from Gambia was 5.2 years (29), and Amezene et al also reported median (IQR) age of 48(12 -96) month among pediatric surgical condition (30).

Similar to our finding, Amezene T. et al. from Black lion Hospital in Ethiopia found congenital conditions as the leading indication for admission and procedure (47.6%) in 2019(30). And a study by Deribew M et al from the same hospital also reported that congenital malformations were the commonest cause of admission accounting for 37% in 2006 (28). While Firomsa T et al in the year 2018 found congenital conditions accounting for 12.6% of pediatric emergency surgical cases, this is likely due to the study population difference, they included emergency pediatric surgical conditions unlike the current study which likely excluded the non-emergency

congenital surgical conditions (26). However a similar study from Gambia by Bickler WS. et al reported traumas as the leading cause of pediatric surgical admissions (46.9%), in our case trauma accounted for only 13% of the cases (29).

The average length of hospital stay was 10.5 days, which was longer than reports from developed countries, but significantly lower than the 26 days report of Cheung M et al. (27). We have not found statistically significant difference across the different diagnosis for length of stay. About a quarter of patients developed complications in the hospital. These were surgical site infection (SSI) (8%), followed by wound dehiscence (6.4%), and Pneumonia (4.4%). The rate of SSI observed in this study is lower than that of Ameh EA, et al. (23.6%) (31), and higher than the report of Chagas M. et al. 2.9% among pediatric orthopedic surgeries; the discrepancy could be due to the difference of the study population, as they studied among pediatric orthopedic surgeries only(32).

The mortality rate observed in the current study is lower than that of the report from low middle income countries in Africa, which was 12% overall mortality rate for all conditions (33). And our finding is slightly higher than that of reports from other hospitals in Ethiopia, from Black line hospital in Ethiopia in hospital mortality rate was only 2 % (26). But the other studies from Ethiopia were retrospective card review, while the current study is a prospective study with a better quality of data.

## CHAPTER SEVEN

### Conclusion and recommendation

#### Conclusion

- The top three commonest causes of pediatric surgical admissions in JMC were congenital surgical conditions, acute abdomen and trauma in order of occurrence.
- Three fourth of congenital malformations requiring surgical interventions were anorectal malformation, Hirschsprung disease and myelomeningocele.
- In hospital mortality rate of pediatric surgical admissions in JMC was 6%, which is comparable with the reports from similar African settings.
- The average length of hospital stay of pediatric surgical admissions was 11 days.
- About a quarter of patients developed complications in the hospital, and the most common complications were surgical site infection, followed by wound dehiscence and Pneumonia

#### Recommendation

- Since congenital malformations are the commonest causes of surgical admission, health professionals should identify and refer the children on time to prevent complications arising from delayed presentation. Especially among congenital malformations, most of the anorectal malformations require urgent intervention to relieve obstruction.
- Even though the in Hospital mortality rate was comparable with the report from similar setting, improving the quality of care could reduce the risk of death as most of the deaths occurred due to uncontrolled sepsis.

- Reducing the rate of complications is important, as a quarter of patients had complications in the hospital. Regular audit could help to alert health professionals giving the care.
- Reducing the average length of stay in the hospital needs attention as reduced length of stay benefits in several ways, in terms of reducing the cost of medical care, and reducing risk of hospital acquired infections.
- Further study is required to identify factors affecting the outcome pediatric surgical admissions, with appropriate study design and representative sample size.

## REFERENCES

1. Graham RJ. Specialty services for children with special healthcare needs: Supplement and not supplant of the medical home. *Arch Dis Child* 93: 2-4, 2008
2. Nwomeh BC, Mshelbwala PM. Paediatric surgical specialty: how relevant to Africa? *Afr J Paediatr Surg* 1: 36-42, 2004
3. Mungongo C, Nandi B, Lakhoo K. A comparison of neonatal surgical admissions between two linked surgical departments in Africa and Europe. *Pediatr Surg Int* 24: 939-942, 2008
4. Rode H, Bickler SW. Surgical services for children in developing countries. *Bull World Health Organ* 80 (10), 2002
5. Bickler SW, Kyambi J, Rode H. Pediatric surgery in sub-Saharan Africa. *Pediatr Surg Int* 17: 442-447, 2001
6. Zeder S, Hollwarth ME. Paediatric problems in a paediatric surgical department. *Pediatr Surg Int*; 20: 329-333, 2004
7. Mhando S, Lyamuya S, Lakhoo K. Challenges in developing pediatric surgery in sub-Saharan Africa. *Pediatr Surg Int* 22: 425-427, 2006
8. Thanni OA, Shonubi AMO, Akiode O. A retrospective audit of pediatric surgical admission in a sub-urban tertiary hospital. *West Afr J Med* 24: 10-12, 2005
9. Bickler S.W, Weiser Thomas G, Kassebaum Nicholas, et al. global burden of surgical conditions, disease control priorities. *Essential surgery*. (3<sup>RD</sup> ed) 1:19:40
10. Ameh EA, Chirdah L.B. Pediatric surgery in the rural setting prospect and feasibility. *West Afr J Med* 2001; 20:52-55.
11. Abatanga DA, Mock CN. A survey of pediatric trauma in Kumasi, a hospital based study *Ghana Med J* 1998; 32h: 977-80
12. Bickler SW, Rode H. priorities for pediatric surgery in Africa *Afr Health* 2000; 22:59
13. Bickler Stephen W. *The Lancet Commission on Global Surgery*. Boston, MA ;2012. Jan 16, Global Burden of Surgical Disease. [Google Scholar]
14. Bickler SW, Sanno-Daunda B, Epidemiology of pediatric surgical admission to governmental referral hospital in Gambia *bull WHO* 200;78:1330-6.
15. Beveridge M, Howard AW. The burden of orthopedic disease in developing countries. *J Bone Joint Surg. Im* 2000; 86:1819-22

16. Meara JG, Leather AJ, Hagander L, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Lancet*. 2015; 386(9993):569-624.
17. Canfin P, Eide EB, Natalegawa M, et al; Foreign Policy and Global Health Group. Our common vision for the positioning and role of health to advance the UN development agenda beyond 2015. *Lancet*. 2013; 381(9881):1885-1886.
18. Greenberg SL, Ng-Kamstra JS, Ameh EA, Ozgediz DE, Poenaru D, Bickler SW. An investment in knowledge: research in global pediatric surgery for the 21st century. *Semin Pediatr Surg*. 2016; 25(1):51-60.
19. Groen RS, Samai M, Stewart KA, et al. Untreated surgical conditions in Sierra Leone: a cluster randomised, cross-sectional, countrywide survey. *Lancet*. 2012; 380(9847):1082-1087.
20. M Nessa, Journal of Armed Forces Medical College Bangladesh Vol.14 (2) 2018: 109-112
- 21 Stephen W. Bickler 1, 2 & Boto Sanno-Duanda Epidemiology of paediatric surgical admissions to a government referral hospital in the Gambia 2000.v78n11/1330-1336/
- 22 Kache, Stephen & Sale, Danjuma & Ajah, Jonathan & Yusuf, Nuhu & Omisakin, Oluleke & Makama, Jerry. (2017). Pattern and Outcome of Paediatric Surgical Admissions in a New Tertiary Hospital in Northwestern Nigeria. *Journal of Surgery*. 5. 78-81.  
10.11648/j.js.20170505.13.
- 23 Derbew M, Ahmed E. The pattern of pediatric surgical conditions in Tikur Anbessa University Hospital, Addis Ababa, Ethiopia, *Ethiop Med J*. 2006 Oct;44(4):331-8
- 24 Tekle and Mollalegne, Pattern of Pediatric Surgical Admission in Yirgalem Hospital Southern Ethiopia *Vasc Med Surg* 2016, 4:1
25. Tsegaye Ketema<sup>1, \*</sup>, Sileshi Garoma Abeya<sup>1</sup>, Kalide Abdela<sup>2</sup>, Tolossa Eticha Chaka  
Pediatric Surgical Admissions and Their Outcomes at Adama Hospital Medical College: A Facility Based Cross Sectional Study January 2017 *American Journal of Pediatrics* 3(3 4):23-27
26. Firomsa, T., M. Teferra, and A. Tadesse, Trends and Outcomes of Emergency Pediatric Surgical Admissions from a Tertiary Hospital in Ethiopia. *Ethiopian journal of health sciences*, 2018. 28(3): p. 251-258.

27. Cheung, M., et al., Epidemiology and mortality of pediatric surgical conditions: insights from a tertiary center in Uganda. *Pediatr Surg Int*, 2019. 35(11): p. 1279-1289.
28. Derbew, M. and E.J.E.m.j. Ahmed, The pattern of pediatric surgical conditions in Tikur Anbessa University Hospital, Addis Ababa, Ethiopia. 2006. 44(4): p. 331-338.
29. Bickler, S.W. and B.J.B.o.t.W.H.O. Sanno-Duanda, Epidemiology of paediatric surgical admissions to a government referral hospital in the Gambia. 2000. 78: p. 1330-1336.
30. Amezene Tadesse, M., M. Abay Gossaye, and M. Milliard Derbew, PEDIATRICS SURGICAL ADMISSIONS AND PROCEDURES: A FIVE-YEAR EXPERIENCE AT TIKUR ANBESSA SPECIALIZED HOSPITAL IN ADDIS ABABA.
31. Ameh, E.A., et al., Surgical site infection in children: prospective analysis of the burden and risk factors in a sub-Saharan African setting. *Surg Infect (Larchmt)*, 2009. 10(2): p. 105-9.
32. Chagas, M.d.Q.L., et al., ANALYSIS OF SURGICAL SITE INFECTIONS IN PEDIATRIC PATIENTS AFTER ORTHOPEDIC SURGERY: A CASE-CONTROL STUDY. *Revista paulista de pediatria : orgao oficial da Sociedade de Pediatria de Sao Paulo*, 2017. 35(1): p. 18-24.
33. Livingston, M.H., et al., Mortality of pediatric surgical conditions in low and middle income countries in Africa. *J Pediatr Surg*, 2015. 50(5): p. 760-4.
34. Peiffer, S., et al., Predictors of Poor Postoperative Outcomes in Pediatric Surgery Patients in Rural Ghana. *BMC Surg*, 2020. 20(1): p. 211.



## ANNEX II: QUESTIONNAIRE

Jimma university faculty of medical sciences, department of general surgery, data collection format on pediatric surgery disease pattern and outcome, jimma, south west Ethiopia, 2021 G.C

Questionnaire for pediatric surgery disease pattern and outcome			
Socio demographic characteristics			
Code	Question	Response	Skip rule
101	Card Number	□□□□□□□□	
102	Study ID		
103	Age(< 5 years in months)	□□□□ (months/years/days)	
104	Sex	1 Female      2 Male	
105	Address	1 Urban      2 rural	
106	Care Taker	1.Mother      4. Close relative 2.Father      5. Friend 3.Sibling      6. Other	
107	Ethnicity	1. Oromo      4. SNNPR 2. Amhara    5.Gambella 3. Tigre      6. Other	
108	Religion	1.Muslim      2. Orthodox 3.Protestant 4.Other	
109	Occupation of care taker	1.Farmer      2. Housewife 3.gov't employee    4.private business 5.other	
Admission information			
201	Type of admission:	1.Emergency    2.Non-emergency	
202	Admission Ward	1.Pediatric critical 2.Pediatric(noncritical) 3.Pediatric surgery 4.Ped ICU 5.NICU 6.SurgEmergency 7.Ortho	
203	Admission date:	□□□-□□□-□□□□□□ (dd/mm/yyyy)	
204	Referred from other health facility?	1.Yes      2.No	
205	If yes, after how many days of presentation to the health facility	□□□□	
206	aAfter how many days of referral from the initial health facility patient presented to us	□□□□	
207	Did the patient Visited traditional healer, holy water or similar other?	1.Yes      2.No	
208	For how long Patient stayed in the traditional healer, holy water or similar other place ?	□□□□	
209	Care takers perception of the outcome traditional treatment	1.Good    2.Poor3.Indifferent	
Presentation and diagnosis			
301	Diagnosis at admission	_____	

302	Duration of illness	_ _  (days)	
304	Final diagnosis made based on	1.Clinical only 2.Clinical and Laboratory 3.Clinical and imaging	
<b>Intervention</b>			
401	Was Surgery done?	1.Yes2.No	
402	If yes who did the surgery?	1.Resident 2.Senior	
403	Time between arrival and surgical intervention in hours	_ _ hours	
404	Type of Surgery:		
405	Was the treatment conservative/ non surgical ?	1.Yes2.No	
406	If yes to 404 specify		
407	Additional diagnoses after admission		
408	Outcome	<ul style="list-style-type: none"> <li>• Discharged improved</li> <li>• Died in the hospital</li> <li>• Leave against medical advice</li> <li>• Disappeared</li> <li>• Referred out to another facility</li> </ul>	
409	Duration of hospital stay	_ _ days	
410	Duration of hospital stay:	_ _ _  (days)	
411	Complication diagnosed in the hospital:	1.SSI 2. wound dehiscence 3.Pneumonia 4. Anemia 5.UTI 6. Malnutrition 7.Blood stream infection 8.other	
412	Reoperation needed	1.Yes            2.No	
413	If reoperation needed, specify the reason		
414	Final outcome:	1.. Discharged improved 2. Died in the hospital 3. Leave against medical advice 4. Disappeared 5. Referred out to another facility 6. Refusal to treatment	
415	If 3 for 503 Specify reason of LAMA		
	Was LAMA after intervention?	1.Yes            2.No	
416	If patient has died, what was the cause of death:	1.Sepsis related MOF    2.Respiratory failure 3.Cardiac failure        4.Unknown 5.Other	
417	Date of discharge/death:	_ _ - _ _ - _ _ _ _  (dd/mm/yyyy)	
<b>FORM COMPLETION</b> Name of person completing this form: _____ Signature _____ Date of form completion  _ _ - _ _ - _ _ _ _  (DD-MM-YYYY)			