ADMISSION PATTERN AND TREATMENT OUTCOMES AMONG PEDIATRIC PATIENTS ADMITTED TO PEDIATRIC INTENSIVE CARE UNIT IN TIKUR ANBESA SPECIALIZED HOSPITAL, ETHIOPIA 2020/21: A CROSS-SECTIONAL STUDY

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Certification

The undersigned certifies that the research entitled Admission Pattern And Treatment Outcomes Among Patients Admitted To Pediatric Intensive Care Unit in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia a cross-sectional study is my original work, and any literature and/or data cited in this article were listed in the reference section and any assist done during this period has been given an acknowledgment.

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ABSTRACT

BACKGROUND: The knowledge of the pattern of admission and treatment outcome of critically diseased pediatric patients admitted to pediatric intensive care units in developing countries where the resource is scarce may help for the identification of priorities and resources to make the facility better. The prevalence of pediatric intensive care unit mortality often varies globally, depending on the facilities of the intensive care unit, the availability of workers, and admission patterns.

OBJECTIVE: The objective of this study was to assess admission pattern and treatment outcome of children admitted to a pediatric intensive care unit (PICU), at Tikur Anbessa specialized hospital, Addis Ababa Ethiopia, from October 2018 to October 2020

METHODS: The study was a cross-sectional study design among 361 pediatrics patients admitted to the pediatric intensive care unit of Tikur Anbessa Specialized Hospital Addis Ababa Ethiopia from October 2018-October 2020 by using a systematic random sampling technique. Descriptive statistics were summarized with data, tables, and figures for display results. The distribution of the data was checked with a normality curve. Bivariate and multivariate analyses were used to see the association of an independent variable on the outcome variable. Factors with a p-value of less than 0.2 in bivariate analysis were exported to multivariate analysis to see if they are independent factors for the outcome variable. The adjusted odds ratio was used to show the strength of association with a 95% confidence interval and the p-value of less than 0.05 was taken as statistical significance in multivariate analysis.

RESULTS: A total of 361(100%) charts were sampled for data collection; 197 (54.6%) were male and 164(45.4) were female. The most common cause of admission was, septic shock (27.14%), whereas the least cause of admission was Asthma 9(2.50%). The mean age at admission was 39.44±44.87 months. The overall mortality rate of our pediatric intensive care unit was 43.8%. From multivariate regression analysis need for mechanical ventilation (AOR= 11.08, 4.25-28.87, 95%CI, P=0.001), need for inotropic (AOR = 10.67, 4.09-27.81, 95%CI P<0.001), comorbidity (AOR=8.38, 3.5-20.5 , 95%CI P<0.001), length of PICU stay from 2-7 days (AOR =7.27, 1.73-30.55, 95%CI P=0.007) and severe GCS (<8) with (AOR =10.51, 3.81-29.05, 95%CI P<0.001) were independent determinant of mortality.

CONCLUSION: The mortality rate at our PICU was 43.8%. Septic shock and meningitis were the common cause of death and the largest death has happened in less than 7 days of admission.

Keywords: Pediatric Intensive Care Unit, Admission Pattern, Treatment Outcome

Abbreviations/Acronyms

AGN	Acute glomerulonephritis
ARDS	Acute Respiratory Distress Syndrome
AOR	Adjusted odds ratio
CVD	Cardiovascular Disease
COR	Crude odds ratio
GCS	Glasgow's Coma Scale
GBS	Gullian barre syndrome
ICU	Intensive Care Unit
LOS	Length of PICU stay
MV	Mechanical ventilation
PICU	Pediatric Intensive Care Unit
TASH	Tikur Anbessa specialized Hospital
TBI	Traumatic brain injury
UAO	Upper airway obstruction
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND

The first intensive care unit was built at Kommunehospitalet in Copenhagen in December 1953, during the polio pandemic (1). An intensive care unit (ICU) is a separate room in a hospital that is dedicated to treating patients with life-threatening illnesses (2) and where doctors and nurses monitor and treat critically ill patients 24 hours a day(1). A pediatric intensive care unit (PICU) is a unit in a hospital, where most critical children with life-threatening conditions receive pediatric care(2). PICU was emerged in the 1960s and has expanded dramatically since then was used for the management of lung injury, sepsis, traumatic brain injury, and postoperative care(3).

Admission to ICU may be required if the patient experiences hemodynamic instability requiring frequent monitoring of vital signs, invasive hemodynamic monitoring, rapid titration of intravenous medication with concurrent monitoring, and respiratory support in ICUs, hence, it is significantly improving the quality of care and outcomes of critically ill and injured patients, predominantly in high-resource settings(4). However critical care is a serious difficulty in developing nations, where health needs frequently exceed available resources, and most critical health care institutions are still in their early stages of development(5).

Both patterns of admission and treatment outcomes vary in different regions of the globe. The most common admission reason for pediatrics cases to the pediatric intensive care unit are trauma, postoperative treatment, complicated meningitis, Cardiovascular neurological, ARDS, and septic shock(2,6–9). The prevalence of intensive care unit (ICUs) admission varied from 1.4% to 54.1% across the world. In North America, Oceania, Asia, and Europe the prevalence of ICU admission was 17.1%, 4.4%, 19.2%, and 54.1% respectively, while in the rest of the world such as Africa, South America, and the Middle East the prevalence of ICU admission was 1.4%, 9.9%, and 3.9% respectively(10).

(10.0%)(11).

The ICU outcomes were determined by the seriousness of the condition, patient age, comorbidities, the seriousness of pre-hospital and emergency trauma care, and factors reported during ICU admission, such as the use of mechanical ventilation, level of consciousness, duration of ICU stay, as well as complications during ICU stay, such as circulatory and ventilator-related respiratory complications(9,10,12,13)

1.2. Statement of the problem

In all African nations, the shortage of basic health care facilities causes a distinctly different continuum of clinical problems. In different regions of Africa, the pattern of ICU admission varied far too widely from country to country or region to region. In sub-Saharan Africa, mortality rates of critically ill patients treated in resource-limited ICUs are often high because the shortage of skilled personnel, equipment, and supply materials is a major challenge (14). The study by WHO shows that the major causes of death among children under the age of five in developing countries are preventable and curable diseases if treatment is optimized(15).

The causes of pediatric patients admitted to PICU vary in different countries of the world. Research performed in a tertiary hospital in Brazil shows that the three most common causes of PICU admission were respiratory dysfunction (43.9%), hemodynamic instability (19.5%), and central nervous system disorders (17.3%) (10); however study done in New South Wales, Australia, shows that the most five common causes of admission were respiratory, congenital anomaly, neurological, neoplasm, and injury(6). A study done in a tertiary hospital in India showed that the three most common causes of PICU admission of pediatrics patients were Cardiovascular (41.1 %), neurological (12.0%), and respiratory (10%) %(9).

The result of research done in different hospitals of Ethiopia also showed that the causes of admission of pediatric patients to PICU were not the same. Research done in Ayder Referral Hospital Ethiopia showed that major causes of PICU admission were due to pathologic emergencies (69.8%) and respiratory system (22.3%) (8); however study done in Gonder University Ethiopia states that the three most common reasons for PICU admission were Neurologic(31.1%), infectious(13.3%), and renal (11.2%) disorders(2). The result of the study performed in Jimma Ethiopia most common causes of PICU admission was, trauma cases(34.7%), Postoperative patients, and medical patients accounted for the rest of the admitted cases (28.2% and 27.6% of the cases respectively(7).

The prevalence of PICU mortality also varied in different regions of the globe. In Brazil, India, and Nigeria the prevalence of PICU mortality was 10.3%, 2.1 and 34.6% respectively, while in some parts of Ethiopia such as Gonder University Hospital, Hyder referral hospital, and Jimma university hospital the prevalence of mortality was 30.9%, 8%, and 40% respectively(2,7–9,11).

In developing nations like Ethiopia, providing PICU care is extremely difficult. There is a lack of

PICU materials such as piped oxygen from vacuum-insulated evaporators, oxygen concentrators, dedicated monitoring, ventilators, and defibrillators.

WHO essential drugs are often in short supply. Furthermore, antibiotics for the treatment of complicated infections, are rarely available and Inotropes infusers are not available. These are the problems to give adequate and proper care for PICU admitted patients.

The most common resources not available in most Ethiopian PICU are modern mechanical ventilators, multi-parameter monitors, Precursors, infusion pump and invasive arterial, central venous, and pulmonary artery pressure measurement devices, blood gas analysis, and coagulation profile, bedside X-ray, echo, and thermoregulatory mattress due to financial problems.

Nurses with higher patient ratios increase the load and do not alert physicians to respond on time appropriately. The intensivist and key support staff (e.g. physiotherapist, and nutritionist) are not available.

1.3. Significance of the study

The major purpose of the Pediatric Intensive Care Unit is to reduce death by closely monitoring and treating severely ill children who are considered to be at high risk of death. The effectiveness of therapy will be determined by evaluating the outcomes of medical treatments.

There has been a variation in mortality rates across various parts of the world. Evidence indicates that the trend of PICU admission mortality differs in Africa from country to country. Mortality determinants have varied across the globe and even the proof is inconclusive in Ethiopia, hence we should know the common causes of admission, determinants of treatment outcome, and mortality rate in our setup to prepare adequate resources and establish treatment protocol. There is no research analyzing admission patterns and treatment outcomes among pediatric patients admitted to the PICU of TASH.

The finding from our study may help Tikur anbessa specialized hospital PICUs in achieving their plan to reduce PICU mortality by fulfill the necessary equipment and planning preventive strategies for the identified preventable predisposing factors. This study finding might be used for different governmental and non-governmental organizations working at PICU especially in Addis Ababa Ethiopia to monitor, plan, and allocate resources and work on preventable causes of PICU admission and deaths. Our findings will help the development of preventive and treatment strategies for the major preventable causes of deaths found among patients in the PICU by the concerned bodies. Therefore, the pattern of admission and clinical findings of patients admitted to PICU is very pivotal to study.

CHAPTER TWO: LITERATURE REVIEW

Quality and patient safety assessment continues to gain growing significances these metrics are used for both the enhancement and transparency of healthcare. Pediatric care, particularly in pediatric intensive care units, is sufficiently different from adult care to require precise metrics(16). ICU admission is dependent on the extent and seriousness of the acute medical disease of the patient, their need for ICU intervention(s) or supervision, and the probability of improving the outcome of such interventions and ICU management. Awareness of the features and outcomes of patients represents the quality of treatment in a given ICU and helps to enhance efficiency(17).

2.1. Pattern of admissions

According to a population-based cohort study done by Ibinabo I et al in New South Wales, Australia, 2010–2013 the five most common causes of admission were respiratory, congenital anomaly, neurological, neoplasm, and injury (6).

According to a retrospective study done by abhulimhen I et al on 341 pediatric age patients in a tertiary hospital in India from August 2012 to June 2013 the three most common causes of PICU admission of pediatrics patients were Cardiovascular (41.1 %), neurological (12.0%), and respiratory (10.0) % (9). In a cross-sectional, retrospective study performed by Michel G on admission source and mortality in a PICU from January 2002 to December 2005 on 1815 patients in a tertiary hospital of Brazil the three most common causes of PICU admission were respiratory dysfunction (43.9%), hemodynamic instability (19.5%), and central nervous system disorders (17.3%)(11). A retrospective review conducted in Nigeria Teaching hospital Enugu by Ituku O et al on 766 patients showed that neurosurgical cases 316(41.2%) were accounted for the highest causes of all ICU admissions, with catastrophic occurrences resulting from anesthesia accounting for the lowest percentage.

In another retrospective cross-sectional research done by Haftu H et al, on 400 pediatric age patients in Ayder Referral Hospital Ethiopia, the major cause of PICU admission was due to pathologic emergencies (69.8%) and respiratory system(22.3%) (8). Another cross-sectional study was done by Ashenafi T et al in Gonder University Ethiopia the three most common reasons for PICU admission were neurologic(31.1%), infectious(13.3%), and renal (11.2%) disorders(2). Complicated acute bacterial meningitis (37.5 percent) and Guillain-Barre syndrome (17.3 percent) were the most prevalent neurological conditions, followed by cerebral malaria and epileptic status

(15.4 percent). Complicated meningitis (12.1%) and septic sepsis with shock (9.4%) were the majority of the infectious causes. In a retrospective cross-sectional study performed by Teshome et al on 170 pediatric age patients from 2009-2013 in Jimma Ethiopia showed that the most common causes of PICU admission were, trauma cases(34.7%), Postoperative patients, and medical patients accounted for the rest of the admitted cases (28.2% and 27.6% of the cases respectively(7).

2.2. Interventions in PICU

A prospective hospital-based study conducted at PICU of Abbasi Shaheed Hospital found in Pakistan by Mirza S et al from December 2017 to June 2019 result showed that the need for MV and inotropic was strongly associated with mortality of children admitted to PICU(18). A retrospective review in Nigeria Teaching Hospital Enugu conducted by Ituku O et al showed that a total of patients admitted to ICU (16.7%) received invasive mechanical ventilation during their stay, while (64%) of these patients died on admission. The majority of the deaths recorded in this group were non-postoperative patients as compared to postoperatively ventilated patients (5).

According to a retrospective cross-sectional analysis performed by T Abebe at Jimma University Specialized Hospital Ethiopia out of a total of 170 pediatric patients admitted to ICU, 63 (37.1 %) were manually ventilated from admission to discharge or death, a total of patients spontaneously breathing by face mask were 22.4 %; 15.3 % were spontaneously breathing with or without breathing; tracheostomy had done for16 (9.4%)(7).

Another cross-sectional study was done by Ashenafi T et al in Gonder University from a total of 330 patients, 33 (10 percent) were ventilated mechanically and Children 5-10 years required more frequent mechanical ventilation (n=15, 45 percent) than the other age groups. Among patients on mechanical ventilation 20 (60.6 percent) were died(2).

According to a retrospective study conducted by H Haftu et al in Ayder Referral Hospital, Tigray, Ethiopia, (4 percent) of patients were candidates for MV from the study participants, and 3.5 percent of them were intubated, with 35.7 percent dying. Although the length of MV was not associated with an increased mortality rate, the length of stay at the ICU was an independent mortality predictor. 7.5% of patients were on inotropes, 56.7% of patients survived and 43.3% of patients died (8).

2.3. Treatment outcome

The major causes of death among children under five years of age in developing countries were preventable and curable, according to the World Health Organization. Well-equipped and well-staffed intensive care units can boost outcomes, as such interventions have recorded significant reductions in mortality and morbidity. Intensive care could reduce mortality rates by 15% to 60%, and several studies have shown the unquestionable advantage(7).

A retrospective study done by abhulimhen I et al in a tertiary hospital in India showed that the mortality rate of PICU was 2.1% with a higher proportion of males, (2.5%), who died the following admission compared to females, (1.5%)(9).

Another prospective observational study done by Volakli E et al in Hippokratio General Hospital, Thessaloniki, Greece outcome analysis showed that the PICU mortality rate was (9.7%)(19)

A retrospective review in Nigeria Teaching Hospital Enugu conducted by Ituku O et al showed that the mortality rate in ICU was 34.6%. From this 67.5% of patients were males while 32.5% of patients were females. Severe TBI accounted for 45.7% of ICU mortality, postoperative cases accounted for 40.7% while medical admissions accounted for 13.6%. (5)

A retrospective cross-sectional review done by Ballot E et al in Johannesburg, South Africa, showed that the mortality rate of critically ill children admitted to PICU was 41.4% to 47.1% for very low birthweight babies, 26.6% to 30.5%) for bigger babies, and 16.2% 13.1% to 19.3% for pediatric patients(20).

A retrospective cross-sectional analysis performed by T Abebe et al in Jimma University Specialized Hospital Ethiopia the prevalence of mortality rate of PICU was 40%.In children, 6 to 14 years of traumas and postoperative admission were common, with associated mortality rates of 45.8% and 50% respectively. Medical and airway obstruction also accounted for (48.9) % and (12.5%) PICU mortality from each respective total admission(7)

The most common cause of death was sepsis (18.6%) according to a cross-sectional analysis conducted by Ashenafi T et al at Gonder University Ethiopia, followed by complicated meningitis and congestive heart failure, each accounting for (10.7%) of the deaths. In the older age groups, the number of deaths was highest; (52 percent) of patients who died were over the age of 5 years(2).

A retrospective study conducted by H Haftu et al in Ayder Referral Hospital, Tigray, Ethiopia, showed that the prevalence of ICU mortality was 8.5%. According to this study, the most common cause with comorbid illness accounts for 45.8% with a majority of them having one comorbid (41%,). The statistically significant predictors of mortality in this study were: the presence of comorbid illness, the need for MV, the need for inotropes, low GCS level, infectious disease, and duration of ICU stay(8)

2.4. Conceptual framework

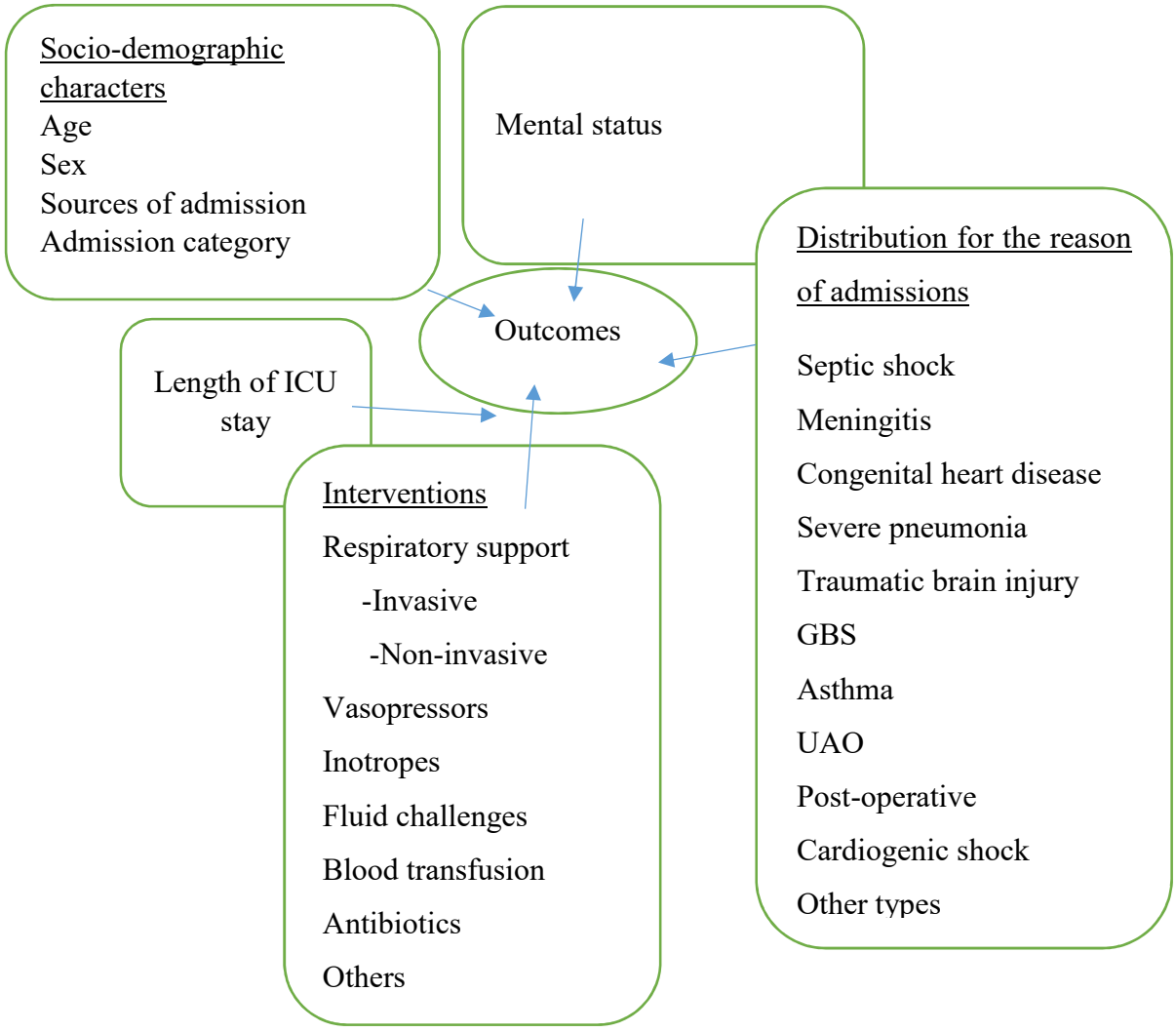

Figure 1: A conceptual framework of the pattern of admission and treatment outcomes of pediatric patients admitted to PICU of Tikur Anbessa specialized hospital from October 2018 to October 2020

CHAPTER THREE: OBJECTIVES

3.1. General objective

The objective of this study was to assess admission pattern and treatment outcome of children admitted to a pediatric intensive care unit (PICU), TASH, Addis Ababa Ethiopia, from October 2018 to O October 2020

3.2. Specific objective

1. To determine the pattern of admission among patients admitted to PICUS of TASH, Addis Ababa Ethiopia from October 2018, to October 2020

2. To assess the treatment outcomes of patients admitted to PICUS of TASH, Addis Ababa from October 2018, to October 2020

CHAPTER FOUR: METHODOLOGY

4.1. Study Area

The study was conducted at Tikur Anbessa Specialized Hospital (TASH) in Addis Ababa, the capital city of Ethiopia. With an area of 527 square kilometers and 11 sub-cities, it is the largest city in the country. The city has 12 government hospitals. TASH is Ethiopia's largest referral hospital. It offers diagnosis and treatment for approximately 370,000- 400,000 patients a year with nearly 8000 surgeries performed annually with 14 operation rooms. TASH has six major and three minor OR tables, 4 PICU tables, and 13 adult ICU beds. The hospital provides specialty of internal medicine, general surgery, orthopedics beds, obstetrics, gynecology, pediatrics, psychiatry, dermatology, pathology, radiology, ophthalmology, and dental health services. The hospital has 28 fully functional NICU beds, 13 adult ICU beds as multipurpose for both medical and surgical cases and the operation room is working with 9 tables and 8 postoperative anesthesia care unit beds.

4.2. Study design & period

A cross-sectional study was conducted using retrospective data from October 2018 to October 2020.

4.3. Population

4.3.1. Source Population

All patients were admitted to the pediatric intensive care unit (PICU) of Tikur Anbessa specialized Hospital.

4.3.2. Study Population

Pediatrics patients admitted to TASH PICU from October 2018 to October 2020

4.3.3. Study participant

All pediatric patients who were included in the study

4.4. Study variables

4.4.1 Dependent variable

Treatment Outcome

4.4.2 Independent variables

Age

Gender

Clinical diagnosis at admission

Presence of comorbid illness

Source of admission

Frequency

Category of admission

Mental status

Intervention during ICU stay, and

Length of ICU stay

4.5. Eligibility Criteria

4.5.1. Inclusion Criteria

All pediatric age group patients who were admitted to the PICU of TASH during the study period.

4.5.2. Exclusion Criteria

Those who died on arrival within two hours of admission(21,22)

4.6. Sample size and **sampling** procedure

4.6.1. Sample size calculation

The Sample size was calculated using a single proportion formula. We had calculated using both outcome variables and get the largest sample size with PICU mortality. By considering 95% CI, 5% margin of error, and 30.9% PICU mortality from a previous study (3).

The formula was

$$n = \frac{pqz^2}{d^2}$$

p= 0.309

q=0.691

d= 0.05

Finally, the total sample size required to detect the difference was 328 and we add 10% for contingency 328+33=361

4.6.2. Sampling procedure or technique

Systematic random sampling was used to select study participants by using skip interval of K=N/n 680/361= 1.88=2

N- Total study population admitted to TSH PICU October 2018 to October 2020

n- Total sample size

K- Skip interval

4.7. Data collection procedures:

Two BSc anesthetists used pretested structured questionnaires to collect data at Pretest was done on 5% of the total samples at Hawassa university compressive specialized hospital. The medical records of the patient were examined. The patient's charts were appropriately replaced in their original location after data collection.

4.8. Data processing and analysis procedure

Data were checked, coded, entered, cleaned, and analyzed by using SPSS version 26 software packages. Descriptive statistics were summarized with data, tables, and figures for display results. The distribution of the data was checked with a normality curve. Bivariate and multivariate analyses were used to see the effect of independent risk factors on the outcome variable. Variables that were significant on bivariate analysis at a p-value less than 0.2 were transferred to multivariate analysis. In multivariate analysis, a p-value of less than 0.05 was used as a cut of point for the presence of an association. The magnitude of the association was determined using the odds ratio of each predictor variable with a 95% confidence interval.

4.9. Data Quality assurance

To ensure the quality of data, training on the objectives and relevance of the study and brief Orientations on the assessment tools was provided for data collectors. Pretest was done on 5% of the total samples at Hawassa university compressive specialized hospital before actual data collection which was not included in the main study. Regular supervision and follow-up were carried out during data collection. Supervisors were checked each questionnaire daily with a further cross-check by the principal investigator for completeness and consistency of data.

4.10. Operational definitions

Clinical outcome: Indicate either patient survived or died at the time of discharge.

Survived: Patients who survived during ICU stay, including patients who improved and got discharged, were transferred to the wards.

Non-survived: Patients who are not alive at the time of discharge.

Length of ICU stays (LOS): was a period in hours, days, or months that the patients stayed in ICU from admission to discharge.

ICU Intervention: prevention of vital function failure and treatment of critically ill patients and applied in an appropriately staffed and equipped ICU.

ICU Mortality: was calculated as the number of deaths of patients given particular diagnoses divided by the total number of patients with that diagnosis

The pattern of admission: Clinical diagnosis of admission.

4.11. Ethical considerations

The study was conducted after approval by Addis Ababa University, an Ethical review board to conduct the study. A legal letter was submitted to Tikur Adbasal Specialized hospital, where the study took place to get permission for data collection. After taking permission from the hospital data collection was being conducted.

4.12. Dissemination of Results

As part of the MSc in advanced clinical anesthesia thesis, the outcome of this analysis will be presented to the anesthesia department. It will also be discussed at an annual research conference and will be submitted for publication in local and international journals. The Ethiopian Ministry of Health, the Addis Ababa Health Bureau, and customers working in the study field at TASH will benefit from this research.

CHAPTER FIVE: RESULTS

5.1. Socio-demographic and clinical characteristic of pediatric patients admitted to PICU OF Tikur anbessa specialized hospital

A total of 361 (100%) charts were available for data collection, with 197 (54.6%) males and 164 (45.4%) females. The median length of PICU stay was 3 days. The mean age at admission was 39.44±44.87 months. Pediatric ward took the high source of PICU admission 131(36.3%) followed by emergency pediatric ward 105(29.1%), operation room 90(24.9%), Surgical ward 18(5%), and recovery room 17(4.7%). Of all 318 (88.1%), were admitted for the first time while 43(11.9%) pediatric patients were readmitted to PICU. The majority of the pediatric patients stay in PICU for 1-7 days. Among 158(43.8%) dead patients; 84(23.27%) were males and 74(20.23%) were females. The most reason for immediate death in PICU was multi-organ failure 86(23.82%) followed by cardiac arrest 67(18.56%) and respiratory failure 5(1.38%).

Table.1. Socio-demographic and outcomes of pediatric patients admitted to PICU OF TASH from October 1, 2018, to September 30, 2020 (n=361)

Variable	Admission	Survive	Death
Age:			
Birth-1 Month	77(21.34%)	35(9.7%)	42(11.64%)
1 Month-2 years	118(32.68%)	73(20.2 %)	45(12.48%)
2 Years-12 years	166(45.98%)	95(26.3%)	71(19.68%)
Total	361(100%)	203(56.2%)	158(43.8%)
Gender:			
Male	197(54.6%)	113(31.31%)	84(23.27%)
Female	164(45.4%)	90(24.93%)	74(20.50%)
Total	361(100%)	203(56.2%)	158(43.8%)
Length of ICU stay			
Less than 2 days	47(13.02%)	27(7.48%)	20(5.54%)
2-7 days	128(35.46%)	64(17.72%)	64(17.72%)
7-14 days	101(27.98%)	58(16.06%)	43(11.91%)
14-28days	38(10.52%)	19(5.26%)	19(5.26%)
Greater than 28 days	47(13.02%)	35(9.70%)	12(3.32%)
Total	100%	203(56.2%)	158(43.8%)

5.2. Diagnosis of admission

From our result the common reason of admission in our setup were septic shock 98(27.14%), meningitis 67(18.56%), CVD 44(12.19%), post-operative 34(9.42%), severe pneumonia 22(6.09%), UAO 19(5.26%), TBI 18(4.98%), ARDS17 (4.71%), Cardiogenic shock 13(3.60%), AGN 10(3.60), GBS 10(2.77%), and Asthma 9(2.50%).

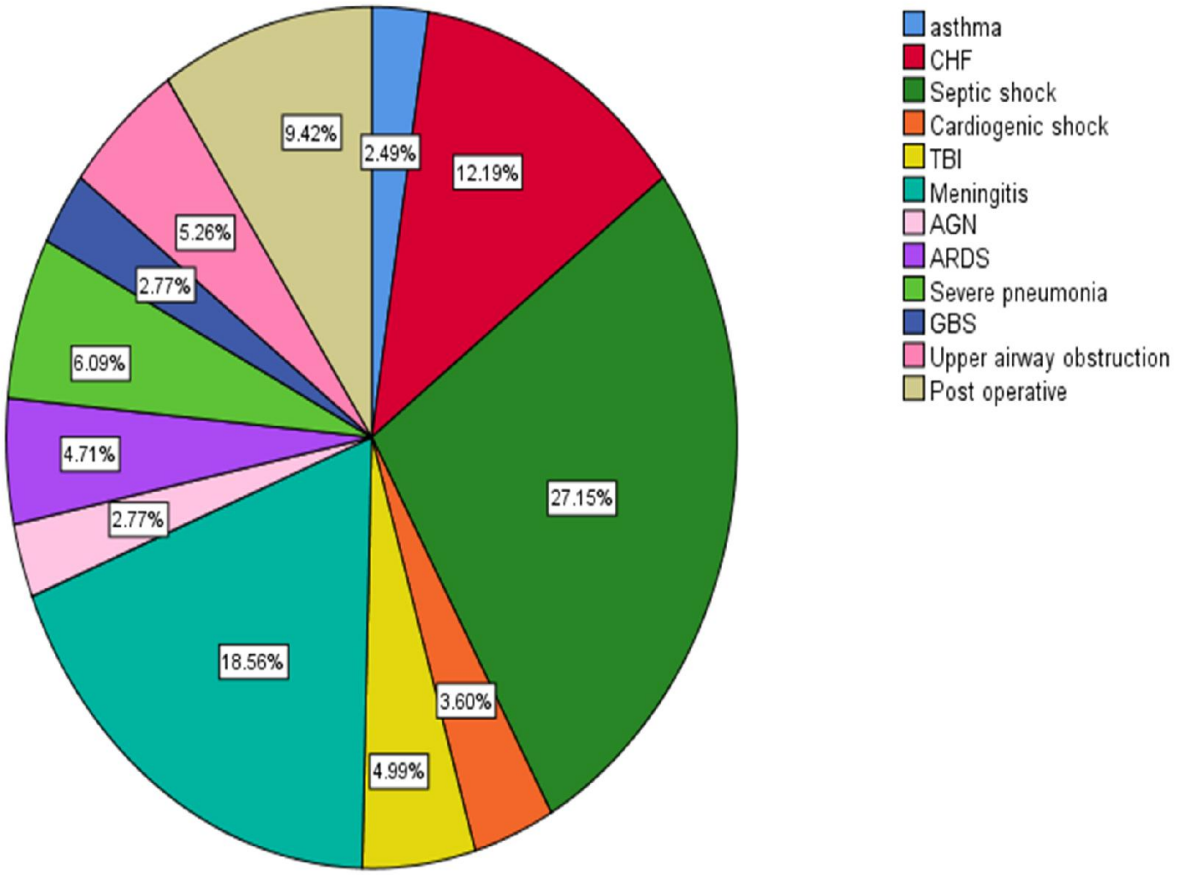

Figure 2. Admission diagnosis of pediatric patients admitted to PICU of Tikur anbessa specialized hospital from October 1, 2018, to September 30, 2020 (n=361)

UAO=upper airway obstruction

Table 2. Top five causes of admission and outcomes among pediatric patients admitted to the PICU of Tikur anbessa specialized hospital from October 1, 2018, to October 30, 2020 (n = 361).

Causes of Admission	Admission %	Death%	Case fatality
Septic shock	98(27.15%)	63(17.45%)	64.29%
Meningitis	67(18.56%)	41(11.36%)	61.19%
CVD	44(12.19%)	24(6.65%)	54.54%
Post-operative	34(9.42%)	8(2.22%)	23.52%
Severe pneumonia	22(6.09%)	1(0.27%)	4.55%

5.3. Clinical outcome on discharge from PICU

Among pediatric patients admitted to PICU of Tikur anbessa specialized 50.69% were improved and transferred to the wards, 43.8% have died, 3.60% were left against medical advice and 1.9% were referred to other hospitals.

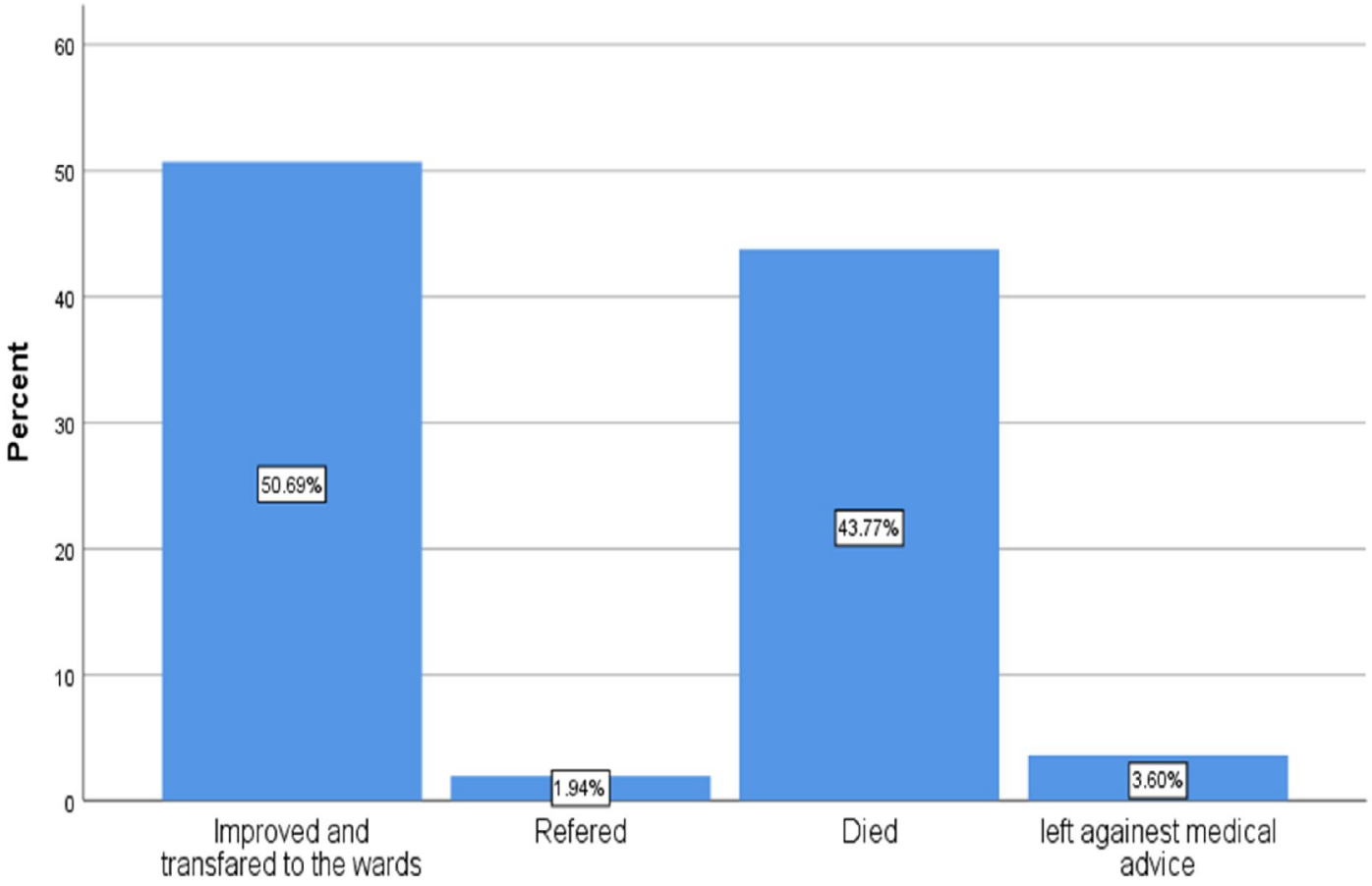

Figure.3. Clinical outcome on discharge of pediatric patients admitted to the PICU of Tikur anbessa specialized hospital from October 1, 2018 to October 30, 2020.

5.4. Factors associated with mortality

5.4.1. Results of Bivariate analysis

The mortality rate was 6 times higher in septic shock (COR=5.85, 2.39-14.30, 95%CI, P<0.001) 5 times higher in meningitis (COR=5.12, 2.01-13.02, 95% P=0.01), and about 4 times higher in CVD (COR=3.90, 1.44-10.49, 95%CI P=0.007) than those who were admitted to PICU from the operation room.

Mortality was 3 times higher in patients stay in PICU for 2-7 days (COR=2.91, 1.38-5.18, 95%CI P=0.005), than patients who were staying in PICU for greater than 28 days. Death was more likely increased by 28 times in study participants with a severe level of consciousness (GCS<8) (COR=28, 14.23-55.28, 95%CI P<0.001) and 4 times in moderate level of consciousness (GCS, 9-12) (COR=3.39, 1.89-6.07, 95%CI P<0.001) more likely higher than participants with a mild level of consciousness.

The odd of death of pediatrics with co-existing diseases admitted to PICU of TASH 177(49.03%) with the coexisting disease was 12.5 times higher than those without coexisting diseases (COR= 12.53, 7.55-20.79, 95% CI, P=0.001). Regarding patients needed for mechanical ventilation 209(57.89%) were requiring mechanical ventilation. Mortality was 18 times more likely to happen in those patients who were requiring mechanical ventilation. Concerning needed for Inotropic patients who required inotropic (COR= 11.42, 6.72-19.26, 95%CI P<0.001) had approximately 11.5 times higher mortality rate than those who did not require inotropic during PICU stay.

5.4.2. Results of multivariate analysis

The findings of a bivariate binary logistic regression study show that moderate and severe GCS, admission diagnosis (septic shock, meningitis, and cardiovascular disease), length of PICU stay, comorbidities, need for mechanical ventilation, and need for inotropic were associated with mortality.

Patients who were staying in PICU for 2-7 days (AOR=7.3, 1.73-30.55, CI=95%, p=0.007) had 7 times more likely to die than those who stay in PICU for greater than 28 days. Death was increased by 10 times in study participants with a lower level of consciousness (GCS<8) (AOR=10.518, 3.80-29.05, 95%CI P=0.001), and 4 times in moderate level of consciousness (GCS, 9-12) (AOR=4.185, 1.47-11.99, 95%CI P=0.007) as compared to participants with a mild level of consciousness.

Coexisting disease 71.75% vs 16.84% (AOR= 8.377, 3.40-20.51, 95%CI p<0.001).Regarding patients needed for mechanical ventilation 209(57.89%) were requiring mechanical ventilation.

Mortality was 11 times more likely to happen in those patients who were requiring mechanical Ventilation (AOR=11.084, 4.25-28.87, 95%CI P<0.001) than those who did not require mechanical ventilation. Concerning needed for inotropic patients who required inotropic had a 10.7 times mortality rate than those who did not require inotropic during PICU Stay (see table 4 below). Among pediatric patients admitted to PICU of TASH 177(49.03%) were with the coexisting disease. Mortality was 7 times in patients with coexisting disease as compared to patients without

Table 4.Factors associated with mortality pediatric patients admitted to the PICU of Tikur anbessa specialized hospital from October 1, 2018, to October 30, 2020 (n = 361).

Variable	Outcome				
	Survived	Dead	COR	AOR (95%CI)	P-value
Level of GCS					
12-15	144(39.88%)	33(9.14%)	1	1	
9-12	45(12.47%)	35(9.70%)	3.39(1.89-6.07)	4.185(1.47-11.99)	0.007**
Less than 9	14(3.89%)	90(24.93%)	28(14.23-55.28	10.51(3.81-29.05)	<0.001**
Admission diagnosis					
Septic shock	35(9.69%)	63(17.45%)	5.85(2.39-14.30)	51.05(0.22-.93)	0.942
Meningitis	26(7.20)	41(11.36%)	5.12(2.01-13.02)	1.61(0.32-7.97)	0.55
CVD	20(5.54%)	24(6.65%)	3.90(1.44-10.49)	2.38(0.07-2.59)	0.35
Severe Pneumonia	21(5.82%)	1(0.27%)	6.45(0.02—1.34)	30(0.001-1.81)	0.095
UAO	19(5.26%	0(0%)			
TBI	4(3.87%)	4(1.11%)	1.08(0.23-3.63)	6.06(0.02-1.35)	0.094
ARDS	10(2.77%)	7(1.94%)	2.27(0.65-7.93)	1.9(0.78-3.66)	0.52
Cardiogenic shock	10(2.77%)	3(0.83)	1.02(0.215-4.43)	6.2(0.007-3.93)	0.266
AGN	7(1.93%)	3(0.83)	1.39(0.29-6.67)	5.18(0.02-2.35)	00.99.197
GBS	9(2.50%)	1(0.27%)	2.77(0.24-3.30)	9.9(0.007-1.81)	
Asthma	6(1.66%)	3(0.83%)	1.62(0.33-8.02)	2.139(0.21-21.27)	0.517
Post-operative	26(7.20%)	8(2.22%)	1	1	
LOS					
Less than 2 days	27(7.48%)	20(5.54%)	2.16(0.90-5.17)	5.81(1.07-31.34)	0.041**
2-7 days	64(17.72%)	64(17.72%)	2.91(1.38-5.18)	7.27(1.73-30.55)	0.007**
7-14 days	58(16.06%)	43(11.91%)	2.16(1-4.64)	5.42(1.18-24.80)	0.029**
14-28 days	19(5.26)	19(5.26%)	2.91(1.17-7.27)	7.02(1.08-45.19)	0.04**
>28 days	35(5.70%)	12(3.32%)	1	1	
Comorbid illness					
No	153(42.38%)	31(8.59%)	1	1	
Yes	50(13.85%)	127(35.18%	12.53(7.55-20.79)	8.38(3.42-20.5)	<0.001**
Need for MV					
No	136(37.67%)	16(4.43%)	1	1	
Yes	67(18.56%)	142(39.34%)	18.02(9.95-32.63)	11.08(4.25-28.87)	<0.001**

Need for inotropes					
No	177(49.03)	59(16.34%)	1	1	
Yes	26(7.20%)	99(27.43%)	11.42(6.72-19.26)	10.67(4.09-27.81)	<0.001**
Blood transfusion					
No	181(50.14%)	132(36.56%)	1	1	
Yes	22(6.09%)	26(7.20%)	1.62(0.88-2.98)	1.24(0.39-3.93)	<0.001**
Need for vasopressor					
No	175(48.48%)	80(22.16%)	1	1	
Yes	28(7.75%)	78(21.61%)	6.1(3.67-10.1)	1.56(0.58-4.22)	0.37

** Statistically significant

CHAPTER SIX: DISCUSSION

The main aim of our study was to assess the reason for admission and treatment outcome with its predictors. The determinants of the ICU outcome were based on the seriousness of the condition, patient age, comorbidities, the quality of pre-hospital and emergency trauma care, and factors reported during ICU admission, such as the use of mechanical ventilation, level of consciousness, duration of ICU stay, as well as complications during ICU stay, such as circulatory and ventilator-related respiratory complications(9,10,12,13). It is challenging to give effective and adequate care for the children admitted to PICU without knowing the causes of admission; Hence for the health system to be successful, it is important to know the key obstacles in the way to improve the patient health and how this challenge can be overcome (23).

The mean age of the study participants admitted to TASH was 39.44+44.87 months with a 1.2:1 male to female ratio and the majority of the children were under 5 years. The mean age in our study was lower than the study done in months(8), India(54.26 ± 49.93), Greek(40.01 ±45.79)(9,19), and Ayder referral (62.99+60.94). This is maybe due to narrow age distribution (from birth to 12 years) was used and most of the study participants were under five in our study. The male predominance (54.6%) in our study was similar to research done in India (55.9%), Ayder referral hospital (53.8), Gondor University (57.8), and general ICU in Jimma University specialized hospital (54.7%)(2,7–9).

Sixty-one percent of pediatrics patients admitted to TASH were with a medical diagnosis like Septic shock 27.14%, meningitis 18.56%, and cardiovascular disease 12.9%, which is in line with studies done in Greek and Ayder referral hospitals in which common reasons of admission were pathological disease(8,19). The cause of admission in our setup was different from a study done in general ICU in Jimma University specialized hospital (54.7%) where surgical and trauma patients were the dominant reason for admission(7). The difference might be due to injury secondary to blunt assault and road traffic accident is higher in Jimma zone.

Of the total patients admitted to PICU 57.89% were ventilated mechanically which was higher than the study done in Nepal (30%), the general intensive care unit in Jimma university specialized hospital (37.1%), Ayder referral hospital (4%), and Gondor university hospital (10%)(2,7,8,24).

The high proportion needed for Mechanical ventilation in our setup can be explained by the reality our hospital is among the specialized hospital where critical patients admitted from the district, Zonal, regional, and even from other tertiary and specialized hospitals. Mortality among patients on mechanical ventilation was 67.94% which is in line with research done in Nepal(68%)(24) and somehow higher than a study done in Gondar(60.6%)(2). The need for mechanical ventilation was an independent predictor of mortality with p<0.001.

Usually Intensive care unit admitted patients have coexisting disease in addition to the cause of admission(25). Coexisting diseases have been a remarkable effect on acute illness, complications in PICU, and clinical outcomes(26). Among pediatric patients admitted to PICU of TASH 177(49.03%) were with coexisting disease and their odd of death were 7 times those without coexisting diseases (AOR=8.38, 3.42-20.5, 95%CI P<0.001). The overall mortality rate of patients with co-morbidity was 71.75% which was higher than a study done in the west of Scotland (24%-53%)(25). The difference might be due to resource scarcity and lack of early treatment for comorbidities in our setup.

Length of PICU stays 2-7 days was an independent effect on mortality with p=0.007. Patients who were staying in PICU for 2-7 days 7 times more likely to die than those who stay in PICU for greater than 28 days which was different from a study done in Ayder referral hospital which stated mortality was higher in patients stay greater than 28 days(8). The difference is due to most patients who stay in PICU for 2-7 days were on mechanical ventilation in our study. We further found that the patients who required inotropic had more likely about 11 times mortality rate than those who did not require inotropic during PICU Stay which is in line with studies done in different parts of the world (7,8,18). Death was increased by nearly 10 times in our study participants with a severe level of consciousness (GCS<8) than those with a mild level of consciousness (AOR=10.51, 3.80-29.05,95% P=0.001) which is similar to study done in Ethiopia Ayder referral hospital(8).

The overall mortality rate of our PICU was 43.8% was higher than the study done in different countries of the world. The high mortality rate in our setup might be related to resource scarcity and our hospital is among the specialized hospital where critical patients admitted from the district, Zonal, regional, and even from other tertiary and specialized hospitals result in delayed admission.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1. CONCLUSION.

The mortality rate at our PICU was 43.8%. Septic shock and meningitis were the common causes of death and the largest death has happened in less than 7 days of admission Our study found that the need for mechanical ventilation, need for inotropes, presence of comorbidity, length of PICU stay from 2-7 days and lower GCS were the independent determinant of mortality in PICU of TASH from October 2018 to October 2020.

7.2. RECOMMENDATION

The federal ministry of health and Addis Ababa health bureau in collaboration with TASH should be generating awareness in the community on an early stage of admission, and quality of life. TSH must increase the PICU capacity to give adequate PICU care for patients with life-threatening conditions.

7.2. LIMITATION

The nature of cross-sectional study design limits the degree of cause and effect association among variables.

7.3. STRENGTH

A significant number of patients were analyzed which may reduce possible biases from incomplete patients records.

CHAPTER EIGHT: REFERENCE

1. Berthelsen PG, Cronqvist M. The first intensive care unit in the world: Copenhagen 1953. Acta Anaesthesiol Scand. 2003;47(10):1190–5.

2. Tazebew A, Tilahun BC, Heye TB. Admission pattern and outcome in a pediatric intensive care unit of Gondar university hospital. Ethiop Med J. 2019;57(2):111–5.

3. Epstein D, Brill JE. A history of pediatric critical care medicine. Pediatr Res. 2005;58(5):987–96.

4. Sawe HR, Mfinanga JA, Lidenge SJ, Mpondo BCT, Msangi S, Lugazia E, et al. Disease patterns and clinical outcomes of patients admitted in intensive care units of tertiary referral hospitals of Tanzania. BMC Int Health Hum Rights. 2014;14(1):1–8.

5. Onyekwulu FA, Anya SU. The pattern of admission and outcome of patients admitted into the Intensive Care Unit of University of Nigeria Teaching Hospital Enugu: A 5-year review. Niger J Clin Pract. 2015;18(6):775–9.

6. Ibiebele I, Algert CS, Bowen JR, Roberts CL. Pediatric admissions that include intensive care: A population-based study. BMC Health Serv Res. 2018;18(1):1–8.

7. Abebe T, Girmay M, G/Michael G, Tesfaye M. The epidemiological profile of pediatric patients admitted to the general intensive care unit in an Ethiopian university hospital. Int J Gen Med. 2015;8:63–7.

8. Haftu H, Hailu T, Medhaniye A, Gtsadik T. Assessment of pattern and treatment outcome of patients admitted to pediatric intensive care unit, Ayder Referral Hospital, Tigray, Ethiopia, 2015. BMC Res Notes [Internet]. 2018;11(1):11–6. Available from: https://doi.org/10.1186/s13104-018-3432-4

9. Abhulimhen-Iyoha BI, Pooboni SK, Vuppali NKK. Morbidity Pattern and Outcome of Patients Admitted into a Pediatric Intensive Care Unit in India. Indian J Clin Med. 2014;5:IJCM.S13902.

10. Vincent JL, Marshall JC, Ñamendys-Silva SA, François B, Martin-Loeches I, Lipman J, et al. Assessment of the worldwide burden of critical illness: The Intensive Care Over

Nations (ICON) audit. Lancet Respir Med. 2014;2(5):380–6.

11. El Halal MGDS, Barbieri E, Filho R, Trotta E, Carvalho P. Admission source and mortality in a pediatric intensive care unit. Indian J Crit Care Med. 2012;16(2):81–6.

12. Mohammed SO, Abdi OA, Getish BG. Clinical outcomes of patients admitted in intensive care units of Nigist Eleni Mohammed Memorial Hospital of Hosanna, Southern Ethiopia. Int J Med Med Sci. 2017;9(6):79–85.

13. Labelle A, Juang P, Reichley R, Micek S, Hoffmann J, Hoban A, et al. The determinants of hospital mortality among patients with septic shock receiving appropriate initial antibiotic treatment. Crit Care Med. 2012;40(7):2016–21.

14. Riviello ED, Kiviri W, Fowler RA, Mueller A, Novack V, Banner-goodspeed VM, et al. Predicting Mortality in Low-Income Country ICUs : The Rwanda Mortality Probability Model (R-MPM). 2016;34:1–14.

15. Riviello ED, Letchford S, Achieng L, Newton MW. Critical care in resource-poor settings: Lessons learned and future directions. Crit Care Med. 2011;39(4):860–7.

16. Scanlon MC, Mistry KP, Jeffries HE. Determining pediatric intensive care unit quality indicators for measuring pediatric intensive care unit safety. Pediatr Crit Care Med. 2007;8(2 SUPPL.):3–10.

17. Khalil MM, Salem HM, El MF. Characteristics and clinical outcome of patients treated in the respiratory ICU of Abbassia Chest Hospital. 2020;93–9.

18. Mirza S, Malik L, Ahmed J, Malik F, Sadiq H, Ali S, et al. Accuracy of Pediatric Risk of Mortality (PRISM) III Score in Predicting Mortality Outcomes in a Pediatric Intensive Care Unit in Karachi. Cureus. 2020;12(1984):1–8.

19. Volakli E, Sdougka M, Tamiolaki M, Tsonidis C, Reizoglou M, Giala M. Demographic profile and outcome analysis of pediatric intensive care patients. Hippokratia. 2011;15(4):316–22.

20. Ballot DE, Davies VA, Cooper PA, Chirwa T, Argent A, Mer M. Retrospective cross-sectional review of survival rates in critically ill children admitted to a combined

paediatric/neonatal intensive care unit in Johannesburg, South Africa, 2013-2015. BMJ Open. 2016;6(6):1–8.

21. Hung SC, Kung C Te, Hung CW, Liu BM, Liu JW, Chew G, et al. Determining delayed admission to the intensive care unit for mechanically ventilated patients in the emergency department. Crit Care. 2014;18(4):1–9.

22. Phua J, Ngerng WJ, Lim TK. The impact of a delay in intensive care unit admission for community-acquired pneumonia. Eur Respir J. 2010;36(4):826–33.

23. Murray CJL, Lopez AD. Measuring the Global Burden of Disease. N Engl J Med. 2013;369(5):448–57.

24. Basnet S, Shrestha S, Ghimire A, Timila D, Gurung J, Karki U, et al. Development of a PICU in Nepal: The experience of the first year. Pediatr Crit Care Med. 2014;15(7):e314–20.

25. Simpson A, Puxty K, McLoone P, Quasim T, Sloan B, Morrison DS. Comorbidity and survival after admission to the intensive care unit: A population-based study of 41,230 patients. J Intensive Care Soc. 2021;22(2):143–51.

26. Esper AM, Martin GS. The impact of cormorbid conditions on critical illness. Crit Care Med. 2011;39(12):2728–35.

CHAPTER NINE: ANNEXES

8.1. INFORMATION SHEET

Title of the Research Project: Admission Pattern and Treatment Outcomes among Patients Admitted To Pediatric Intensive Care Unit in Tikur Anbassa Specialized Hospital, Ethiopia 2020/21: A Cross-Sectional Study

Name of Principal Investigator: Oliyad Eshetu

Name of the Organization: Addis Ababa University, College of Health Science, Department of Anesthesia

Introduction: Greetings! My name is Oliyad Eshetu. I am a student at Addis Ababa University Department of Anesthesia, College of Health Science in Masters of Science (MSc) in advanced clinical anesthesia. As part of this degree, I am undertaking a research Project "Admission Pattern and Treatment Outcomes among Patients Admitted to Pediatric Intensive Care Unit in Tikur Anbassa Specialized Hospital.

Risk and /or Discomfort: The data will be taken from the patient chart, so it will not impose any harm on patients.

Benefits: The study has no direct benefit for those pediatric clients whose information is abstracted but indirectly beneficial if the result utilized by planners and clinicians of Tikur Anbesa Specialized hospital will get the result of the study

Confidentiality: During data collection, the patients' names will not be taken, instead they will be identified by their card number in the questionnaire. All questionaries collected will be kept confidential. The information collected will be used only for research purposes. The thesis will be submitted to Addis Ababa University Department of Anesthesia College of Health Sciences and displayed in the University Library and website. This study will also intend to be submitted for publication in scholarly journals.

Person to contact: If you have any further questions or would like to receive further information about the project, please contact

1. Oliyad Eshetu (principal investigator):+251916892811/979839535.
2. Dawit Tafessa (B.Sc. M.Sc. lecturer in anesthesia) advisor: 0920553345

   Ashenafi Seifu (B.Sc. M.Sc. lecturer in anesthesia) advisor: 0920177925

Thank you for reading the information sheet and asking any questions that you have might have had.

8.2. Data collection tool

Addis Ababa University College of Health science department of Anesthesia

Data collection tools to assess the disease pattern and treatment outcomes in patients admitted to TASH pediatric Intensive care Unit, Ethiopia, 2020/21.

The purpose of this questionnaire is to investigate the pattern, and treatment outcomes in patients admitted to TASH pediatric Intensive care Unit from October 1, 2018, to September 30, 2020

Part I: socio-demographic characteristics			
S/N	Variables	Possible response	Code
101	Age	_____ years	
102	Gender	1. Male 2. Female	

Part II. Patterns of admissions

201	Vital signs at admission	Levels of consciousness	
202	Source of admission	1. Emergency department 2. Medical wards 3. Surgical wards 4. Operation room 5. Recovery room 6. Other specify_____	
203	Admission category	1. Surgical 2. medical 3. Trauma 4. others_____	
204	Frequency of admission	1. first admission 2. Readmission	
205	If the answer for question number 206 is readmission how many times were the patients readmitted?	1. Once 2. twice 3. Three times and above	
206	Diagnosis at the admission of PICU	Asthma CVD Septic shock Cardiogenic shock TBI ARDS Severe pneumonia Meningitis AGN GBS Upper airway obstruction Post-operative Others _____	

207	Comorbid illness	1. Yes 2. No	
208	If the answer for question number 10 is "YES", mention the number of comorbidities If the answer for question number 10 is "NO" pass to Q12	1. One 2. Two 3. Three 4. Other specify	
209	If the answer for question number 10 is “YES”, mention comorbidities	1. Cardiovascular 2. Respiratory 3. Renal 4. Infectious diseases 5. Neurological 6. Endocrine 7. Gastro intestinal 8. Hematologic 9. Rheumatologic 10. Other specify_____	

Part III ICU intervention

Ser. Number	Questions	Response
301	Intervention during PICU stay	1. Respiratory support I. Mechanical ventilator II. Noninvasive ventilation

		1. Inotrope support 2. Vasopressor support 3. Fluid challenge 4. antibiotics 5. Transfusion 6. Feeding 7. Surgery 8. GI prophylaxis 9. Other specify_____
302	Did the patient complication in PICU	1. Yes 2. No
304	Length of PICU stay	1)_____Hours 2)_____Days 3)_____Months 4)_____ Years
305	Clinical outcome on discharge from PICU	1. Improved and Transferred to the wards 2. Referred 3. Died 4. Left against medical advice

Name of data collector signature

_____ _____

Name of supervisor(s) signature

_____ _____

8.3. Data safety and accuracy sheet

Data safety assuring sheet

Code

s.no	Tools Checked	yes	No
1	Are the inclusion and exclusion criteria done appropriately?		

Data Accuracy check sheet

Code

S.no	Tools	Yes	No
1	Are all questions on socio-demographic data-filled appropriately		
2	Are all data on admission diagnosis filled appropriately?		
3	Are all data during PICU filled appropriately		

8.4. Declaration

I, the undersigned, declare that this thesis proposal is my original work, has not been presented, in this or any other university, and that all sources of materials used for the thesis proposal have been fully acknowledged.

Name_____ Signature _____Date _____

Adviser I

Name_____ Signature _____Date_____

Adviser II

Name_____ Signature _____Date _____