



ASSESSMENT OF MORTALITY RATE AND ASSOCIATED
FACTORS FOR CHILDREN ADMITTED
TO PEDIATRIC INTENSIVE CARE UNIT OF ST.PAUL'S
HOSPITAL MILLENNIUM MEDICAL COLLEGE: A ONE YEAR
RETROSPECTIVE CROSS SECTIONAL STUDY

BY DR WALTENIGUS BIAZEN (ECCM 3rd YEAR RESIDENT)

ADDIS ABABA, ETHIOPIA

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MEDICAL COLLEGE: A ONE YEAR RETROSPECTIVE CROSS
SECTIONAL STUDY**

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Abstract

Background: In resource-limited countries like Ethiopia, PICUs are still developing and face significant challenges, including financial constraints, inadequate insurance, and healthcare system limitations, leading to higher morbidity and mortality rates which is highly correlated with low GCS, SAM, nosocomial infection, young age, MV and vasopressor use during admission.

Objective: The main objective of the study was to determine mortality rate and associated factors among patients admitted to Saint Paul's Hospital Millennium Medical College pediatric ICU.

Methods: A retrospective cross sectional study was conducted among pediatric patients admitted to Saint Paul's Hospital Millennium Medical College pediatric ICU from April 1/2023 to May 30/2024. A simple random sampling method was employed to select study units. Data was collected using a structured and standardized questionnaire by trained data collectors from patient medical records and HMIS registry book. Data was analyzed using SPSS version 27.0. Variables with P-value <0.05 were labeled as statistically significantly associated with the outcome variable.

Result: A total of 282 charts of pediatric patients who were admitted to Saint Paul's Hospital Millennium Medical College pediatric Intensive Care Unit were analysed. Overall, the mortality rate was found to be 28.4%(80) [with a 95%CI: 0.234, 0.337]. Children with the age of <2years (AOR-3.71 with 95% CI: 1.18, 11.68), severe acute malnutrition (AOR-2.97 with 95% CI: 1.409, 2.263), comorbidity (AOR-2.077 with 95% CI: 1.087, 3.970), mechanical ventilator (AOR-2.235 with 95% CI: 1.139, 4.386), GCS level of <8 (AOR-2.612 with 95% CI: 1.169, 5.833), who had stayed > 13 days (AOR-3.504 with 95% CI: 1.079, 11.377) had a higher risk of mortality in pediatric ICU of St. Paul's hospital Millennium Medical College.

Conclusion and recommendation: This study indicated that the overall mortality rate among pediatric patients admitted to PICU of SPHMMC was high, i.e. nearly one-fourth of children in PICU died. There was a significant association between mortality rate and certain variables including age of the child, nutritional status of the child, comorbidity, child's GCS level, mechanical ventilator utilization, and length of stay in PICU. Healthcare providers need to provide adequate and quick treatment for children with critical illness to improve their outcome in the critical care units. Researchers need to do a prospective study to get more reliable result.

Keywords: Children, Mortality rate, Pediatrics Intensive Care Unit, Factors, St. Paul's hospital Millennium Medical College

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Acronyms and Abbreviations

PICU-pediatric intensive care unit

HMIS- Health management information system

Dr.-Doctor

MD-Medical Doctor

MPH-master of Public Health

ECCM-Emergency and Critical Care Medicine

SPHMMC-Saint Paul Hospital Millennium Medical College

SPSS- Statistical Package for the Social Sciences

S.NO-serial Number

ETB-Ethiopian Birr

GCS-Glasgow Coma Scale

CPR-Cardiopulmonary Resuscitation

MV-Mechanical Ventilator

ICU-Intensive Care Unit

SAM: Severe Acute Malnutrition

HAI:Hospital acquired infection

1. INTRODUCTION

1.1. Background

A pediatric intensive care unit (PICU) is a specialized hospital unit designed to provide advanced care for critically ill children. This environment is equipped with state-of-the-art technology and staffed by healthcare professionals trained specifically in pediatric critical care. The focus of a PICU is on monitoring and supporting the vital functions of children with severe medical conditions, leading to improved health outcomes compared to those managed in general wards [1].

The field of intensive care medicine has evolved dramatically over the past few decades, particularly in resource-rich countries. These advancements have been driven by increased expertise, substantial investments, and a commitment to improving outcomes for critically ill patients. This evolution encompasses a wide range of developments, including technological innovations, enhanced clinical practices, and improved interdisciplinary collaboration [1-3].

However, in resource-limited countries like Ethiopia, PICUs are still developing and face significant challenges that hinder their ability to provide optimal care for critically ill children. These challenges contribute to higher morbidity and mortality rates compared to those observed in resource-rich countries. Understanding these barriers is crucial for implementing effective interventions and improving patient outcomes [4].

The characteristics of diseases and outcomes in PICUs can differ significantly between resource-limited and resource-rich countries. These variations are influenced by several factors, including healthcare infrastructure, staffing levels, and availability of medical resources. Understanding these differences is essential for improving patient outcomes in various settings [5, 6].

Mortality rates in PICUs can significantly differ among hospitals within the same country. This variation is influenced by multiple factors, including patient demographics, clinical practices, and resource availability. Identifying the independent predictors of PICU mortality is essential for improving patient care and outcomes [7, 8]. Independent predictors of mortality in PICUs include the reason for admission, the necessity for mechanical ventilation, the glasgow coma scale score, the requirement for inotropic support, instances of cardiac arrest during admission, the presence

of non-reactive pupils upon admission, and the pediatric index of mortality (PIM II) score [6, 7, 9-12].

1.2.Statement of the Problem

Children admitted to Pediatric Intensive Care Units (PICUs) in resource-limited countries are at a significantly higher risk of mortality compared to their counterparts in resource-rich nations. This discrepancy arises from differences in the structure, staffing, and availability of resources within PICUs [6]. Studies have highlighted varying PICU mortality rates among different hospital settings in developing countries, including South Africa, Pakistan, and India [7, 8, 13].

Furthermore, within a single country, such as Ethiopia, mortality rates can differ notably between various healthcare centers [14-16]. Within Ethiopia, existing research indicates a lack of comprehensive data on PICU mortality rates and associated factors. This gap highlights the need for targeted studies to understand local challenges better.

The proposed study seeks to fill a critical gap in knowledge regarding mortality rates and associated factors in the PICU at SPMHC. By conducting this research, we aim to provide valuable data that can inform policy, improve training, and enhance resource allocation, ultimately leading to better patient outcomes in pediatric critical care settings across Ethiopia.

1.3.Significance of the study

The findings from this study will significantly enhance the existing knowledge surrounding mortality rates and associated factors in patients admitted to the Pediatric Intensive Care Unit (PICU) at St. Paul Hospital Millennium Medical College (SPHMMC). By providing critical insights, this research aims to inform and guide various stakeholders involved in healthcare delivery.

2. LITERATURE REVIEW

2.1.1. Mortality Rates across Different Hospitals in Ethiopia:

A study conducted in Ayder Referral Hospital PICU showed the lowest mortality rate of 8.5%. This relatively lower rate could be indicative of better healthcare infrastructure, availability of specialized medical staff, and efficient patient management protocols in the PICU [9]. Another study carried out in St. Paul's Hospital PICU revealed that the mortality rate of 21.1%. Factors contributing to this rate might include limited resources, patient influx, and the severity of cases treated [16].

A study in Gondar Tertiary Hospital indicated that 32.6% of children were died, reflecting a higher level of risk for children admitted to the PICU. The increased mortality could be due to factors like delayed admissions, resource constraints, or lack of specialized care [14]. Another study in Tikur Anbesa Specialized Hospital showed that 43.8% periatrics patients admitted to PICU were died, this hospital faces the most considerable difficulties in providing care to critically ill children. Issues such as a high patient-to-staff ratio, lack of equipment, inadequate training, and late presentations of severe cases might contribute to this alarmingly high rate [15].

2.1.2. Mortality Rates in Low-Resource and Middle-Income Countries:

India: Reports a PICU mortality rate of 10.52%, indicating challenges in managing critically ill children despite the country's strides in healthcare advancements [13].

Pakistan: Has a mortality rate of 12.9% in its PICUs, highlighting the need for improved care facilities and better management strategies to address pediatric critical illnesses [8].

South Africa: The PICU mortality rate stands at 15.6%, reflecting disparities in healthcare access and the uneven distribution of medical resources across the country [17].

Malawi: Registers a mortality rate of 16.8% in its PICUs, emphasizing significant healthcare challenges related to limited resources and high disease burdens affecting pediatric populations [18].

Mozambique: Experiences a particularly high PICU mortality rate of 25%, indicating severe limitations in healthcare infrastructure, resource constraints, and difficulties in managing pediatric critical care effectively [19].

2.1.3. Mortality Rates in Higher-Income Countries:

In contrast, the mortality rate at five U.S. teaching hospitals is reported to be significantly lower at 2.39%. This considerable difference in mortality rates suggests that high-resource settings benefit from advanced medical technologies, well-trained healthcare professionals, and efficient patient management protocols, which collectively contribute to better outcomes in critically ill children [20].

2.2. Factors Associated with mortality rate in PICU

2.2.1. Demographic factors

Age

SPHMMC PICU: In a retrospective study conducted at the St. Paul's Hospital Millennium Medical College (SPHMMC) PICU, researchers identified a significant correlation between age and mortality rates. The study revealed that children under the age of two years were at a markedly higher risk of mortality compared to their older counterparts [21]. This elevated risk may stem from various factors, including the developmental vulnerabilities of younger children, who may have less physiological reserve to withstand critical illness.

PICU in Western Iran: A similar retrospective study performed in a PICU in western Iran corroborated the findings from SPHMMC. This study also reported a strong association between being under two years of age and increased mortality rates [22]. The results suggest that the challenges associated with treating younger children in critical care settings are not unique to one geographic location, indicating a broader trend that warrants attention.

2.2.2. Clinical factors

Level of GCS at admission

A retrospective study conducted in the PICU at Ayder Referral Hospital revealed a significant association between the level of consciousness, as indicated by GCS, and patient mortality. The

study found that patients with a GCS of less than 8 exhibited a 7.8-fold increase in mortality compared to those with mild levels of consciousness (GCS 14-15). This suggests that severely impaired consciousness is a critical indicator of poor prognosis in pediatric patients [9].

Another study at Tikur Anbesa Specialized Hospital reinforced the findings from Ayder. It demonstrated that low GCS at admission was strongly linked to elevated mortality rates. The multivariate analysis revealed alarming odds ratios: patients with severe GCS (GCS <8) had an 11-fold increased risk of mortality, while those with moderate GCS (GCS 9-13) faced a 4-fold increase compared to those with mild GCS (GCS 14-15). This underscores the importance of GCS as a prognostic tool in pediatric critical care [15].

A retrospective analysis conducted in a PICU in West Iran further corroborated these findings. The study established a significant correlation between low GCS and increased mortality rates among pediatric patients. The implications of this study highlight the need for immediate and aggressive intervention strategies for patients presenting with low GCS upon admission [22].

Nutritional status

A retrospective study conducted in the PICU at Grey's Hospital, South Africa demonstrated a stark contrast in mortality rates between severely malnourished children and those with normal nutritional status. Among the 15 children classified as suffering from severe acute malnutrition, 7 (46.7%) succumbed to their conditions, compared to only 4 deaths (5.9%) among children who were well-nourished. The statistical significance of this difference highlights the critical vulnerability of malnourished children in intensive care settings, emphasizing the need for targeted nutritional interventions to improve outcomes [17].

A prospective study in an Indian PICU further corroborated the findings regarding the adverse effects of severe acute malnutrition. This study found that children with severe acute malnutrition faced not only increased mortality rates but also prolonged stays in the PICU and a higher likelihood of requiring mechanical ventilation. The implications of these findings suggest that malnourished children not only have worse immediate outcomes but also experience longer recovery times, straining healthcare resources and complicating treatment protocols [23].

Vasopressor use

A retrospective cross-sectional study conducted at Ayder Referral Hospital revealed a concerning association between the need for inotropic support and mortality rates. Patients requiring inotropes had a staggering 10 times higher mortality compared to those who did not require this intervention. This stark difference underscores the severity of illness in patients needing inotropic support, indicating that their critical condition significantly impacts survival rates [9].

Similarly, a retrospective cross-sectional study at Tikur Anbesa Specialized Hospital found that vasopressor use was associated with approximately 11 times higher odds of death compared to patients who did not receive this intervention. This finding reinforces the notion that the use of vasopressors may serve as a marker for more severe underlying conditions, contributing to higher mortality in critically ill pediatric patients [15].

CPR during admission

A study conducted at St. Paul Hospital found a significant association between the need for CPR during admission and increased mortality rates among pediatric patients. The study indicated that children who required resuscitation upon admission faced a markedly higher risk of death compared to those who did not require such intervention. This suggests that the necessity for CPR is often a reflection of severe clinical instability and poor prognosis [16].

Similarly, a study conducted in Malawi corroborated the findings from St. Paul Hospital, revealing that the need for CPR during admission was associated with increased mortality rates. The study emphasized that pediatric patients requiring resuscitation are often in critical condition, which significantly impacts their survival outcomes [18].

Comorbid illness

A study at Ayder Referral Hospital found a marked difference in mortality rates between pediatric patients with comorbid illnesses and those without. Specifically, the mortality rate was 14.8% among patients with comorbidities, compared to just 3.2% in those without. This statistically significant difference underscores the increased vulnerability of children with additional health issues, highlighting the need for careful monitoring and tailored interventions [9].

A similar study conducted at Tikur Anbesa Specialized Hospital corroborated the findings regarding comorbid illnesses and mortality. This research revealed a significant correlation between the presence of comorbidities and increased mortality rates in pediatric patients, emphasizing the impact of additional health challenges on patient outcomes in intensive care settings [15].

Mechanical ventilation

A study conducted at Ayder Referral Hospital revealed alarming results regarding mechanical ventilation. Patients requiring mechanical ventilation had a staggering 17.6 times increased mortality compared to those who did not need this intervention. This finding indicates that the need for mechanical support often reflects the severity of the patient's condition and significantly impacts survival rates [9].

In a prospective cohort study at Gonder Specialized Hospital, the results further corroborated the high mortality associated with mechanical ventilation. The study found that mortality rates were significantly elevated in patients who required mechanical ventilation during admission, highlighting the critical nature of their illnesses [14].

A study at Tikur Anbesa Specialized Hospital found that the need for mechanical ventilation was associated with 11 times higher odds of death.

This suggests that mechanical ventilation is a marker of severe illness and is closely linked to poor outcomes in pediatric patients [15].

Similarly, a study conducted at St. Paul Hospital indicated a strong association between mechanical ventilation during admission and increased mortality. The results align with previous findings, reinforcing the need for heightened vigilance when managing patients requiring respiratory support [16].

A retrospective study in a PICU in West Iran examined the outcomes of patients who were intubated before admission. The study revealed that these patients also faced high mortality rates, further emphasizing the risks associated with severe respiratory distress and the necessity for mechanical ventilation [22].

Length of stay

Research conducted at Ayder Referral Hospital demonstrated that mortality rates were significantly higher among patients with longer ICU stays compared to those with shorter stays. This finding emphasizes the potential correlation between prolonged hospitalization and the severity of underlying conditions, which may increase the risk of adverse outcomes [9].

A retrospective cross-sectional study at the ICU of Jimma University highlighted a significant association between LOS and mortality. Notably, the study found that mortality was highest among children who stayed for less than one day or more than 28 days. In contrast, those with a stay of 7 to 14 days experienced relatively low mortality rates, suggesting that the middle range of ICU stays may be linked to better management and recovery outcomes [10].

A study conducted at Tikur Anbesa Specialized Hospital further reinforced the role of LOS in mortality. The research indicated that patients with varying durations of stay (2-7 days, 14-28 days, less than 2 days, and 7-14 days) had significantly elevated odds of death, with the highest being approximately 7 times greater for those in the 2-7 days and 14-28 days categories. This variability underscores the complexity of patient care in relation to ICU duration [15].

A retrospective study in a PICU in West Iran found that patients staying less than one day or more than one week had higher mortality rates. Additionally, factors such as being younger than two years, low Glasgow Coma Scale (GCS) scores, and prolonged PICU stays were significantly correlated with mortality in a multiple linear regression analysis. This suggests that both short and extended LOS can serve as indicators of increased risk in critically ill children [22].

Hospital acquired infection

In a prospective study conducted in PICU located in Peru, a developing country researchers found a significant correlation between the presence of nosocomial infections and increased mortality among pediatric patients. The study reported mortality rates of 38.2% in patients with HAIs compared to 20.4% in those without these infections, with a statistically significant difference ($p < 0.001$). This stark contrast underscores the critical impact that HAIs can have on patient outcomes [24].

Pediatric Intensive Care Units (PICUs) are critical environments where the health of severely ill children is managed. Understanding the factors associated with high mortality in these settings is essential for improving outcomes. However, research focusing on these factors in developing countries, including at St. Paul Hospital Millennium Medical College (SPHMMC), remains limited. This gap presents a unique opportunity for investigation.

2.3 Conceptual framework

The conceptual framework was developed after reviewing different literatures [8-10, 14, 15, 22].

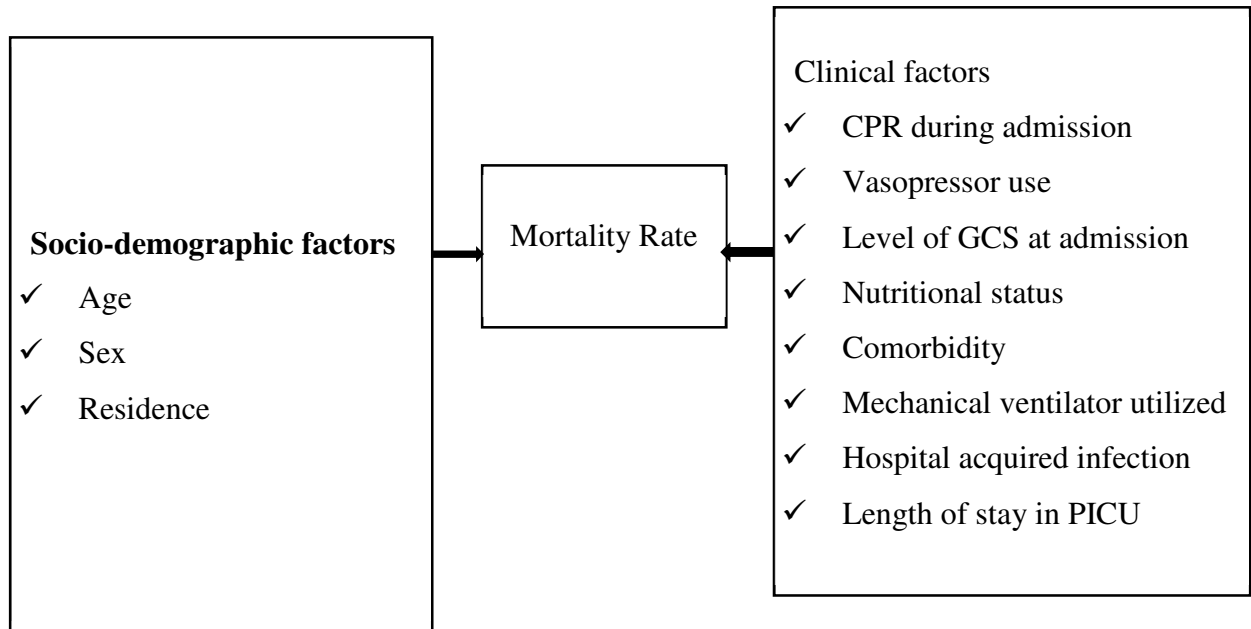


Figure 1: Schematic representation of conceptual framework to assess mortality rate of pediatrics patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia

3. Objectives

3.1.General objective

To assess mortality rate and its associated factors among pediatric patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.

3.2.Specific Objectives

- ✓ To determine mortality among pediatric patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.
- ✓ To identify factors associated with mortality rate among pediatric patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.

4. Method and Materials

4.1. Study setting and Study period

This study was conducted at Saint Paul's Hospital Millennium Medical College Pediatric Intensive Care Unit from April 1/2023 to May 30/2024. Saint Paul's Hospital, founded in 1968 by Emperor Haile Selassie, is a prominent teaching and referral hospital located in Addis Ababa, Ethiopia. It boasts a comprehensive range of postgraduate and sub-specialty programs and employs over 2,800 clinical, academic, and administrative staff. With a capacity of over 700 beds, the hospital caters to a substantial number of inpatient cases, while also serving more than 1,200 outpatient and emergency clients daily.

The Pediatric Intensive Care Unit (PICU) at Saint Paul's Hospital Millennium Medical College (SPHMMC) was established in 2016. The Department of Pediatrics and Child Health oversees the operations of the PICU, which has a capacity of seven beds and is equipped with seven mechanical ventilators. The PICU is staffed by two intensivists, two pulmonologists, rotating pediatric residents, rotating emergency and critical care medicine residents, and one, year two pulmonology and critical care fellow and three, year one pulmonology and critical care fellow doctors. The nurse-to-patient ratio in the PICU is 1:2.

4.2. Study design

A retrospective cross sectional study design was employed among pediatric patients admitted to Saint Paul's Hospital Millennium Medical College PICU from April 1/2023 to May 30/2024.

4.3. Source population

All pediatrics patients admitted to Saint Paul's Hospital Millennium Medical College PICU.

4.4. Study population

All pediatrics patients admitted to Saint Paul's Hospital Millennium Medical College PICU during the study period fulfilling the inclusion criteria.

4.5. Eligibility criteria

4.5.1. Inclusion criteria

All patients admitted to Saint Paul's Hospital Millennium Medical College PICU during the study period whose age is less than 16 years and greater than 1 month were included in the study.

4.5.2. Exclusion criteria

Patients with incomplete medical records were excluded from the study.

Patients who discontinued their management and those transferred to other hospitals were excluded.

4.6.Sample size and Sampling procedure

The sample size was calculated using single population proportion formula

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

Where: n=Sample size

$Z_{\alpha/2}$ = critical value for normal distribution at 95% confidence interval is 1.96

P= proportion/prevalence

d= margin of error (0.05)

a proportion (p) of 21.1 % which is taken from a study done in St Paul Specialized Hospital) [25].

$$n = \frac{(1.96)^2 \times 0.211(1 - 0.211)}{(0.05)^2} = 256$$

By adding a 10% non-response rate, the final sample size becomes 282

4.7.Sampling Technique

Simple random sampling technique was used. Card numbers of St. Paul hospital's PICU admitted cases from April 1/2023 to May 30/2024 fulfilling inclusion criteria were used from registration log book. The card numbers were coded from 1 to the end in order. Then random numbers table were generated by a computer. From the generated random number, the first sample was marked by pencil anywhere in the table by looking away . Subsequent samples were selected by going down the column and continuing on to the next column in the table until the 282 samples were obtained.

4.8.Study variables

Dependent variable

Mortality of PICU admitted patients.

Independent variables

 **Sociodemographic variables:** Age, sex, address

🚦 **Clinical related variables:** CPR during admission, vasopressor use, level of GCS at admission, nutritional status, comorbidity, mechanical ventilator utilized, hospital acquired infection, length of stay in PICU.

4.9.Data collection and procedures

Data collection tool were prepared by reviewing different literatures to explore the objectives of the study. A structured and standardized questionnaire which is developed in English language was used. The data collection instrument was pre-tested for necessary modifications in the questionnaire. Data were collected by trained data collectors from patient medical records and HMIS registry book at PICU.

4.10. Data quality control and management

All data were checked for clarity, completeness and correct recording of all the necessary information by principal investigator. The quality of data was also further ascertained during data entry and cleaning process.

4.11. Data analysis and procedures

First, data were checked manually for completeness and consistency. Collected data were compiled, cleaned, coded and entered into Epi Data-4.6 software. SPSS-27.0 was used for statistical data analysis. Errors, missing values and outliers were checked and treated accordingly. Presence of statistical association between independent and dependent variables was observed by Bivariable binary logistic regression. During bivariable analysis, candidate variables with $P < 0.25$ were included into multivariable binary logistic regression. In multivariable regression, variables with a P-value of less than 0.05 with a 95% CI were considered statistically significant. Finally, results were presented in text, tables, charts, and graphs.

4.12. Operational definitions

A pediatric intensive-care unit (PICU): is a specialized unit within the hospital that is dedicated to the care of critically ill pediatric patients. It provides advanced medical interventions, including airway management, hemodynamic support, and organ support to ensure better outcomes for these patients compared to other units of the hospital [1, 2].

Length of stay: LOS for each patient is calculated as day of discharge – day of admission [26].

Mortality rate: is a parameter that measures the proportion of patients who were discharged as death, divided by the total number of patients who were admitted to PICU that excludes patients with Do Not Resuscitate (DNR) orders from both the numerator and denominator [26].

CPR: Cardio-Pulmonary Resuscitation (CPR) is an urgent life-saving procedure conducted in cases where the heart ceases to beat.

Vasopressor: Vasopressor is a medication administered by healthcare professionals to induce constriction or narrowing blood vessels in individuals experiencing low blood pressure. Typically, this treatment is employed for patients in shock who are unable to adequately supply blood to their essential organs.

SAM: Severe acute malnutrition (SAM) is identified by edema in both feet and severe wasting, indicated by a weight-for-height/length measurement below -3 standard deviations or a mid-upper arm circumference of less than 115 mm. Current guidelines do not distinguish between kwashiorkor and severe wasting, as their treatment methods are similar [27].

4.13. Ethical consideration

The study was conducted after obtaining ethical approval from the ethical board review of SPHMMC. To ensure confidentiality name and other personal identities were not used during data collection.

5. RESULT

5.1.Socio-demographic factors

A total of 282 charts were reviewed. Out of which, majority 153 (54.3%) were on the age group of < 2 years followed by 2-12 years 94 (33.3%). Nearly half 144 (51.1%) of the study subjects were male and about one-third of the study participants were from urban areas.

Table 1: Socio-demographic characteristics of pediatrics patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.

Variables	Category	Frequency	Percentage
Age	<2 years	153	54.3
	2-12 years	94	33.3
	≥13years	35	12.4
Sex	Male	144	51.1
	Female	138	48.9
Residence	Urban	97	34.4
	Rural	185	65.6

5.2.Clinical factors

About one-fourth 73 (25.9%) of pediatrics patients admitted to St. Paul hospital millennium medical college PICU had severe acute malnutrition and more than one-third 105 (37.2%) of the participants had comorbid illnesses. Of the study subjects, more than half 151 (53.5%) were on mechanical ventilators and 47 (16.7%) were with a GCS level of 3 to 8. Nearly one-third 88 (31.2%) of pediatric patients in the PICU of SPHMMC had developed hospital acquired infections (**Table-2**).

Table 2: Clinical characteristics of pediatric patients admitted to SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.

Variables	Category	Frequency	Percentage
Nutritional status	Normal	151	53.5
	Moderate acute malnutrition	58	20.6
	Severe acute malnutrition	73	25.9
CRP during admission	Yes	71	25.2
	No	211	74.8
Comorbidity	Yes	105	37.2
	No	177	62.8

GCS level at admission	Fully conscious	134	47.5
	GCS of 13-14	42	14.9
	GCS of 9-12	59	20.9
	GCS of 3-8	47	16.7
Vasopressor use	Yes	114	40.8
	No	166	59.2
Mechanical ventilator used	Yes	151	53.5
	No	131	46.5
Hospital acquired infection	Yes	88	31.2
	No	194	68.8
Length of stay in PICU	1-6 days	179	63.5
	7-13 days	54	19.1
	14-20 days	20	7.1
	≥ 21 days	29	10.3

5.3.Mortality rate among pediatrics patients at PICU of SPHMMC

The proportion of death among pediatric patients admitted to SPHMMC was found to be 28.4% (80).

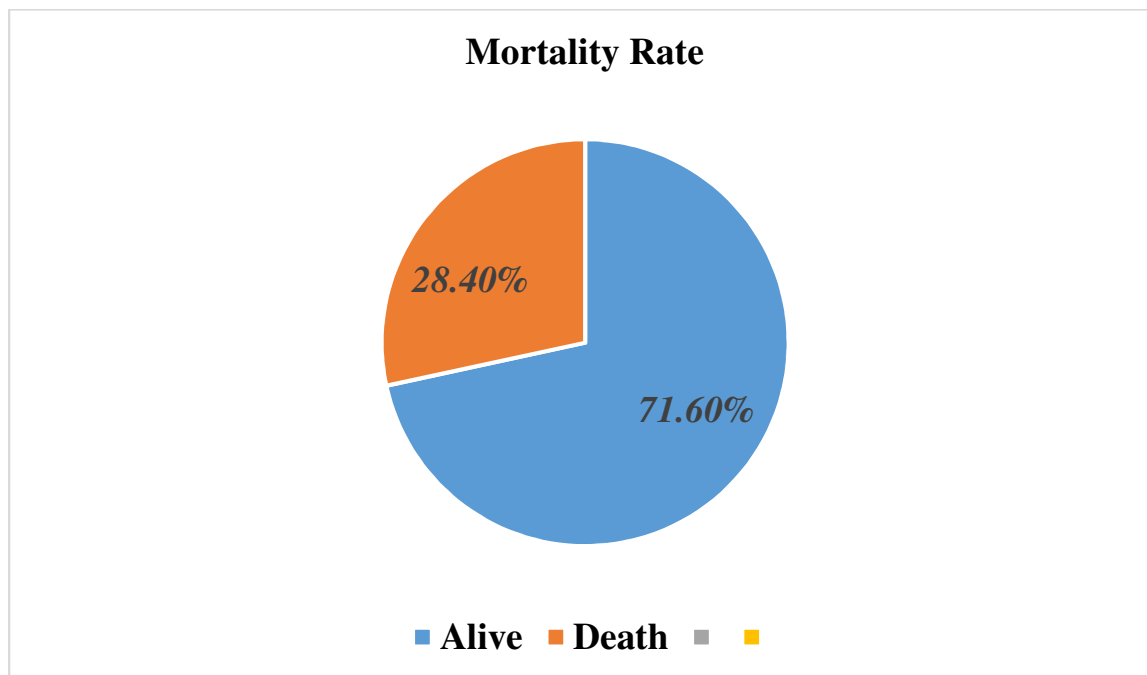


Figure 2: Mortality rate of pediatric patients admitted at SPHMMC PICU from April1/2023 to May 30/2024, Ethiopia.

5.4.Factors associated with mortality rate of pediatric patients

In the bivariable binary logistic regression, a total of eleven (11) variables were included, and only eight (8) became candidates for the multivariable binary logistic regression analysis. In the final model, six (6) variables (age of the child, nutritional status of the child, comorbidity, GCS level, length of stay in PICU, and being on mechanical ventilation) become significantly associated with mortality rate among pediatric patients.

Age of the child was found to be a significantly associated with the mortality rate among children admitted to PICU of SPHMMC. The probability of death was nearly 3.71 times (AOR-3.71 with 95% CI: 1.18, 11.68) higher among pediatric patients with the age of less than two (2) years as compared to that of children with the age of greater than thirteen (13) years. Nutritional status was another factor that was found to have a statistically significant relation with mortality rate among pediatric patients admitted to PICU of SPHMMC. The risk of death was nearly 3 times (AOR-2.97 with 95% CI: 1.409, 2.263) higher among children with Severe acute malnutrition as compared to those with normal nutritional status.

Comorbidity was also another factor that was found to have a statistically significant association with mortality rate in which pediatric patients with comorbid conditions had nearly 2 times (AOR-2.077 with 95% CI: 1.087, 3.970) higher mortality rate as compared to those without comorbidity. On the other hand, length of stay in PICU was another significant factor to the mortality rate among pediatric patients at the PICU of SPHMMC, in which children who stayed 14-20 days and more than 21 days had a higher tendency of death rate as compared to those who stayed only 1-6 days in PICU (AOR-3.504 with 95% CI: 1.079, 11.377) and (AOR-4.180 with 95% CI: 1.641, 10.643) respectively.

GCS level of the child was another significant variable in which children with a GCS level of 3-8 during admission had 2.6 times (AOR-2.612 with 95% CI: 1.169, 5.833) higher risk of death as compared to children who were fully conscious. Being on mechanical ventilation was the other significant factor for the death of pediatric patients who were admitted to PICU of SPHMMC in which children who were on MV had nearly 2.3 times (AOR-2.235 with 95% CI: 1.139, 4.386) higher probability of death as compared to those without MV.

Table 3: Bivariable and Multi-variable binary logistic regression analysis to factors associated with mortality rate of pediatric patients admitted to SPHMMC PICU from April 1/2023 to May 30/2024, Ethiopia

Variables	Category	Outcome		COR (95%CI)	AOR (95%CI)	p-value
		A	D			
Age	<2 years	99	54	3.273(1.200,8.924)	3.71(1.18,11.68)	0.025*
	2-12 years	73	21	1.726(0.596,5.001)	2.35(0.698,7.901)	0.168
	≥13years	30	5	1	1	
Nutritional status	Normal	117	34	1	1	
	Moderate acute malnutrition	38	20	1.811(0.934,3.513)	1.250(0.549,2.846)	0.595
	Severe acute malnutrition	47	26	1.904(1.302,3.513)	2.970(1.409,2.263)	0.004*
Comorbidity	Yes	67	38	1.823(1.076,3.090)	2.077(1.087,3.970)	0.027*
	No	135	42	1	1	
Length of PICU stay	1-6 days	141	38	1	1	
	7-13 days	42	12	1.060(0.508,2.210)	0.801(0.348,1.847)	0.603
	14-20 days	7	13	6.891(2.570,18.48)	3.504(1.079,11.37)	0.037*
	≥ 21 days	12	17	5.257(2.312,11.95)	4.180(1.641,10.64)	0.003*
GCS	Fully conscious	108	26	1	1	
	GCS of 13-14	30	12	1.662(0.751,3.678)	1.994(0.812,4.899)	0.132
	GCS of 9-12	38	21	2.296(1.159,4.548)	1.885(0.799,4.451)	0.148
	GCS of 3-8	26	21	3.355(1.638,6.872)	2.612(1.169,5.833)	0.019*
CPR during admission	Yes	37	34	3.296(1.866,5.822)	1.459(0.721,1.955)	0.294
	No	165	46	1	1	
Nosocomial infection	Yes	52	36	2.360(1.373,4.057)	1.943(0.969,3.894)	0.061
	No	150	44	1	1	
MV applied	Yes	98	53	2.083(1.215,3.572)	2.235(1.139,4.386)	0.019*
	No	104	27	1	1	

*A-Alive, D-Death, CI-Confidence Interval, COR-Crude Odds Ratio, AOR-Adjusted Odds Ratio

6. DISCUSSION

The study indicated that the proportion of death among pediatric patients admitted to SPHMMC was found to be 28.4%(80) with a 95%CI [0.234, 0.337]. This finding was consistent with studies carried out in in SPHMMC (29.4%)[21], Gondar (32.6%) [14], in selected tertiary hospitals in Ethiopia (28.6%) [28], and a systematic and meta-analytic study conducted in Europe (27.8%) [26]. However, it was lower than the studies conducted in Black Lion hospital of Addis Ababa (43.8%) [15], and Sweden (57%) [27].

The gap could be explained by the difference in sample size, in which the sample in the previous studies was higher than the current study. The discrepancy could also be explained by the difference in the study setting in which the study subjects in Sweden were pediatrics in three different hospital whereas, the current study was conducted in a single set up.

It is higher than the studies conducted in Iran (7.14%) [29], India (2.1%) [30], and Argentina (3.56%) [31]. The possible discrepancy could probably attributed to the difference in the setting in which settings in the previous studies had advanced equipment required for the care of critically ill patients. In other words, inadequate medical equipment greatly affects the outcomes of children admitted to PICU [32].

Age of the child was one of the factors that had a significant relation with the mortality rate among pediatrics patients admitted to PICU. The probability of death among children admitted to PICU was nearly 3.71 times higher among pediatrics with the age of less than two (2) years as compared to that of children with the age of greater than thirteen (13) years which is consistent with studies at SPHMMC[21],Iran[22]. The possible reason could be attributed to the fact that younger children, especially those who are less than five years age are at great risk for several critical illnesses as compared to the older children which could be the result of immature immunity [8].

Child's nutritional status was found to be an important and significant factor associated with mortality rate among pediatrics patients admitted to critical care unit. The risk of death among children with severe acute malnutrition was nearly 3 times as compared to those with normal nutritional status which is consistent with studies in south africa[17],India[23]. The possible reason could be due to increased vulnerability of those children to infections like aspiration pneumonia and nosocomial infection that aggravate their illnesses and make their treatment too difficult. On

the other hand, severe acute malnutrition impairs the immunity status of the children that makes them susceptible to several infections and makes their progress more difficult [33]. In addition, severely malnourished children need mechanical ventilation and a prolonged stay in ICU that increases their mortality rate [23, 34].

Comorbidity was also another factor that was found to have a statistically significant association with mortality rate. Pediatrics patients with comorbid conditions at PICU had nearly 2 times a higher mortality rate as compared to those without comorbidity which is consistent in studies done at Ayder[9], Tikur anbesa hospital[15]. This could probably be due to the fact that children with comorbid conditions experience more severe illnesses and disturbance of several physiological functions which increases the likelihood of death [35]. On the other hand, children with comorbidity usually require advanced treatments including mechanical ventilations that increase the probability of death due to ventilator associated infections like pneumonia [15].

Length of stay in PICU is another significant factor to the mortality rate among pediatric patients at the PICU of SPHMMC. Children who stayed more than 14 (fourteen) days had a higher tendency of death when compared to those who stayed only 1-6 days in PICU consistent with studies done in Ayder [9]. This could occur because children who stay for an extended period of time in critical care unit often presented with more complicated medical conditions often with multiple physiologic dysfunctions that increase their risk of mortality [36].

Child's GCS level was found to be a significantly associated factor with mortality rate among pediatric patients admitted to PICU of SPHMMC. Children with a GCS level of 3-8 during admission had 2.6 times higher tendency of death as compared to children who were fully conscious, consistent with studies done in Ayder[9], Tikur Anbesa hospital[15], Iran[22]. Children with severe impairment of level of consciousness known to have critical underlying conditions that is associated with a lower tendency to recover [37]. In addition, those children with severely impaired level of consciousness are more susceptible to several complications like respiratory failure, infections and multiple organ dysfunctions which in turn increase the risk of death among children admitted to pediatrics critical care units [36]. Furthermore, children with low level of GCS are also susceptible to neurological impairment that significantly increases their mortality rate [37].

Being on mechanical ventilation was the other significant factor for the death of pediatric patients admitted to PICU of SPHMMC. Children who were on MV had nearly 2.3 times higher risk of death compared to those without mechanical ventilation which is consistent with studies done in Ayder[9], Gonder [14],Tikur Anbessa hospital[15],SPHMMC [16],Iran[22]. This could be due to children on MV typically suffer from severe respiratory and cardiovascular complications. Mechanical ventilation often indicated when there is respiratory failure which is associated with higher mortality rate [38, 39]. Furthermore, despite MV has a life-saving importance, it is also associated with different ventilation-related complications like pneumonia which greatly increases the mortality rate [12, 38].

7. Limitations of the Study

Since the study was conducted on secondary data, certain parameters were not fully recorded so that this study couldn't bring whether there is relation between mortality rate and associated factors.

8. Conclusion

This study indicated that the overall mortality rate among pediatric patients admitted to PICU of SPMMC was high, i.e. nearly one-fourth of children in PICU were died. There were a significant association between mortality rate and certain variables including age of the child, nutritional status of the child, comorbidity, child's GCS level, mechanical ventilator utilization, and length of stay in PICU.

9. Recommendation

For healthcare providers

Healthcare providers need to focus on treating pediatric patients who are admitted to intensive and critical care unit by considering their age, nutritional status, and underlying comorbidity. Furthermore, they also need to provide a strictly close follow up for children with low GCS, those on MV, and who stayed for extended period of time in PICU.

For researchers

It would provide more reliable result if future researchers undergo a prospective follow up studies because secondary data sometimes may not necessarily be as complete as it needs to be.

10. References

1. Randolph, A.G., et al., Growth of pediatric intensive care units in the United States from 1995 to 2001. *The Journal of pediatrics*, 2004. **144**(6): p. 792-798.
2. Embu, H.Y., et al., Paediatric admissions and outcome in a general intensive care unit. *African Journal of Paediatric Surgery*, 2011. **8**(1): p. 57-61.
3. Fowler, R.A., N.K. Adhikari, and S. Bhagwanjee, Clinical review: critical care in the global context—disparities in burden of illness, access, and economics. *Critical Care*, 2008. **12**: p. 1-6.
4. Dünser, M.W., I. Baelani, and L. Ganbold, A review and analysis of intensive care medicine in the least developed countries. *Critical care medicine*, 2006. **34**(4): p. 1234-1242.
5. Jones, S., et al., Outcome at 6 months after admission for pediatric intensive care: a report of a national study of pediatric intensive care units in the United kingdom. *Pediatrics*, 2006. **118**(5): p. 2101-2108.
6. Abdelatif, R.G., et al., Characterization and outcome of two pediatric intensive care units with different resources. *Critical care research and practice*, 2020. **2020**(1): p. 5171790.
7. Slusher, T.M., et al., Pediatric critical care in resource-limited settings—overview and lessons learned. *Frontiers in pediatrics*, 2018. **6**: p. 49.
8. Ashraf, Z., H. Jurair, and A. Haque, Mortality patterns among critically ill children in a Pediatric Intensive Care Unit of a developing country. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*, 2015. **19**(3): p. 147.
9. Haftu, H., et al., Assessment of pattern and treatment outcome of patients admitted to pediatric intensive care unit, Ayder Referral Hospital, Tigray, Ethiopia, 2015. *BMC research notes*, 2018. **11**: p. 1-6.
10. Abebe, T., et al., The epidemiological profile of pediatric patients admitted to the general intensive care unit in an ethiopian university hospital. *International journal of general medicine*, 2015: p. 63-67.
11. Tazebew, A.A., B. Cahkilu, and T. Bacha, Admission pattern and outcome in a pediatric intensive care unit of Gondar university hospital. *Ethiopian Medical Journal*, 2019. **57**(2).

12. Bacha, T., N. Tsegaye, and W. Tuli, Characteristics and outcomes of mechanically ventilated pediatric patients in a tertiary referral hospital, Addis Ababa, Ethiopia: cross sectional study. *Ethiopian Journal of Health Sciences*, 2021. **31**(5).
13. Sangeeth, S., et al., Pattern of Mortality in Pediatric Intensive Care Unit from a Tertiary Care Hospital in South India. *INTERNATIONAL JOURNAL OF SCIENTIFIC STUDY*, 2020. **7**(11): p. 24-26.
14. Teshager, N.W., A.T. Amare, and K.S. Tamirat, Incidence and predictors of mortality among children admitted to the pediatric intensive care unit at the University of Gondar comprehensive specialised hospital, northwest Ethiopia: a prospective observational cohort study. *BMJ open*, 2020. **10**(10): p. e036746.
15. Seifu, A., et al., Admission pattern, treatment outcomes, and associated factors for children admitted to pediatric intensive care unit of Tikur Anbessa specialized hospital, 2021: a retrospective cross-sectional study. *BMC anesthesiology*, 2022. **22**(1): p. 13.
16. Edae, G., et al., Admission pattern and treatment outcome in pediatric intensive care unit, Tertiary Hospital, Addis Ababa, Ethiopia. *Ethiopian journal of health sciences*, 2022. **32**(3).
17. Hendricks, C.L. and N. McKerrow, Factors present on admission associated with increased mortality in children admitted to a paediatric intensive care unit (PICU). *South African Journal of Child Health*, 2016. **10**(1): p. 57-62.
18. de Visser, M.A., et al., Outcome in children admitted to the first PICU in Malawi. *Pediatric Critical Care Medicine*, 2023. **24**(6): p. 473-483.
19. Punchak, M., et al., Epidemiology of disease and mortality from a PICU in Mozambique. *Pediatric Critical Care Medicine*, 2018. **19**(11): p. e603-e610.
20. Burns, J.P., et al., Epidemiology of death in the PICU at five US teaching hospitals. *Critical care medicine*, 2014. **42**(9): p. 2101-2108.
21. Kebede, T. and G. Metaferia, Disease pattern and outcome of patients in the pediatric intensive care unit of St Paul's Hospital Millennium Medical College: a retrospective crosssectional study. *Millennium Journal of Health*, 2024. **3**(2).
22. Valavi, E., et al., The main causes of mortality in pediatric intensive care unit in south west of Iran. *Zahedan Journal of Research in Medical Sciences*, 2018. **20**(4).

23. Patel, M., et al., Nutritional status in patients admitted to pediatric intensive care unit and its corelation with outcome. *International Journal of Contemporary Pediatrics*, 2024. **11**(6): p. 763.
24. Becerra, M.R., et al., Epidemiologic surveillance of nosocomial infections in a Pediatric Intensive Care Unit of a developing country. *BMC pediatrics*, 2010. **10**: p. 1-9.
25. Fasil Sisay , A.A., Sofia Kebede,Girum Sebsibe, Treatment outcome of oncologic patients treated in emergency department at black lion specialized hospital, Ethiopia. *Journal of Integrative Oncology* 2018.
26. Wösten-van Asperen, R.M., et al., PICU mortality of children with cancer admitted to pediatric intensive care unit a systematic review and meta-analysis. *Critical Reviews in Oncology/Hematology*, 2019. **142**: p. 153-163.
27. Larsson Viksten, J., et al., Children aged 0–16 admitted to Swedish intensive care units and paediatric intensive care units showed low mortality rates. *Acta Paediatrica*, 2019. **108**(8): p. 1460-1466.
28. Bacha, A.J., et al., Survival Status and Predictors of Mortality Among Patients Admitted to Pediatric Intensive Care Unit at Selected Tertiary Care Hospitals in Ethiopia: A Prospective Observational Study. *Clinical Medicine Insights: Pediatrics*, 2023. **17**: p. 11795565231169498.
29. Ghaffari, J., A. Abbaskhanian, and Z. Nazari, Mortality rate in pediatric intensive care unit (PICU): a local center experience. *international Journal of Pediatrics*, 2014. **2**(3.2): p. 81-88.
30. Abhulimhen-Iyoha, B.I., S.K. Pooboni, and N.K.K. Vuppali, Morbidity pattern and outcome of patients admitted into a pediatric intensive care unit in India. *Indian journal of clinical medicine*, 2014. **5**: p. IJCM. S13902.
31. Álvarez, J.P., E.N. Vázquez, and P.G. Eulmesekian, Incidence of morbidity and associated factors in a Pediatric Intensive Care Unit. 2021.
32. Hajidavalu, F.S. and A. Sadeghizadeh, Mortality Rate and Risk Factors in Pediatric Intensive Care Unit of Imam Hossein Children's Hospital in Isfahan: A Prospective Cross-Sectional Study. *Advanced Biomedical Research*, 2023. **12**(1): p. 92.
33. Amirjani, S., et al., Undernutrition and 60-day mortality in critically ill children with respiratory failure: a prospective cohort study. *BMC pediatrics*, 2023. **23**(1): p. 271.

34. Bagri, N.K., et al., Impact of malnutrition on the outcome of critically ill children. *The Indian Journal of Pediatrics*, 2015. **82**: p. 601-605.
35. Molla, M.T., et al., The magnitude of pediatric mortality and determinant factors in intensive care units in a low-resource country, Ethiopia: a systematic review and meta-analysis. *Frontiers in Medicine*, 2023. **10**: p. 1117497.
36. Lyimo, R.E., et al., Mortality and associated factors among children admitted to an intensive care unit in Muhimbili National Hospital, from the time of admission to three months after discharge: a prospective cohort study. *BMC Pediatrics*, 2024. **24**(1): p. 170.
37. Leitgeb, J., et al., Glasgow Coma Scale score at intensive care unit discharge predicts the 1-year outcome of patients with severe traumatic brain injury. *European Journal of Trauma and Emergency Surgery*, 2013. **39**: p. 285-292.
38. Durak, C. and K.B. Guvenc, Clinical characteristics of mechanically ventilated children in pediatric intensive care unit: A single-center study. *Northern Clinics of Istanbul*, 2023. **10**(5): p. 597.
39. Sahoo, B., et al., Demographic Profile and Outcome of Mechanically Ventilated Children in a Tertiary Care Hospital of a Developing Country. *Journal of Nepal Paediatric Society*, 2018. **38**(1).

9. Assurance of the principal investigator

I understand that as Principal Investigator, I have responsibility for the conduct of the study, the ethical clearance of the project and the protection of the rights and welfare of study participants.

Name of investigator: Dr Waltenigus Biazen Ambaw(MD)

Signature: _____

Date: _____

Approval of Clinical Advisor

Clinical Advisor - One:Dr. Hayimanot Tesema (MD,MPH)

Signature: _____

Date: _____

Clinical Advisor – two: Dr. Esubalew Gobignew(MD)

Signature: _____

Date: _____

10. Questionnaire

Information sheet:

This is a research to be conducted by Dr Waltenigus Biazen(ECCM 3rd year resident) for Partial Fulfillment of the Requirements of Specialty training in Emergency and Critical care Medicine . Objective of the study is to determine mortality rate and its associated factors among patients admitted to SPHMMC PICU from april1 /2023 to may 30/2024.

I. Sociodemographic data

1. ID/MRN:_____
2. Age in years :_____
3. Sex : A) Male B) Female
4. Address: A) Addis Ababa B) Oromia C) Amhara, D) SNNP
E) Others (mention)_____

II. Clinical Presentation

5. Admission diagnosis _____
6. SAM: A) yes B) No
7. Comorbidity: A) yes B) No
8. If yes for above question mention _____
9. Primary complaint: A) fast breathing/shortness of breath B) fever
C) bleeding D) Vomiting E) diurea
F) Other (mention if any) _____
10. Length of stay in the PICU (hours/days): _____
11. Level of GCS at admission : A)<8 B) 9-12 C) 13-15

12. CPR during admission A) yes B) No

13. Vasopressor use A) yes B) No

14. Hospital acquired infection A) yes B) No

15. Mechanical ventilator applied : A) yes B) No

16.BP

17.PR

18.SPO2

19.Temperature

20.Pupillary reactivity

21.RBS

22.Cr

23.LFT

24.Plt

25.Hg

26.Source of admission

III. Outcome of patients

27.Outcome of patient; A)died B) discharged improved C) transferred to ward

28.If answer is died in above question: what is the immediate cause of death?
