



ARSI UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

Admission pattern, treatment outcomes, and associated factors of patients admitted to the intensive care unit of Asella Teaching and Referral Hospital. A cross-sectional study

By

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ACRONYMS/ABBREVIATION

ARTH	Asella Referral and Teaching Hospital
CHF	Congestive Heart Failure
CVA	Cardiovascular Accident
ED	Emergency Department
ICU	Intensive Care Unit
ICON	Intensive Care over Nations
LOS	Length of Stay
MICU	Medical Intensive Care Unit
MVA	Motor Vehicular Accident
PE	Pulmonary Edema
SICU	Surgical Intensive Care Unit
TBI	Traumatic Brain Injury

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Abstract

Background: It is imperative to evaluate the admission patterns and treatment outcomes of critically ill patients admitted to intensive care units in developing nations. The availability of expertise, admission patterns, and the facilities of the intensive care unit all affect the mortality rate in these units, which varies worldwide.

Objective: The main aim of this study is to assess the admission pattern, treatment outcomes, and associated factors for patients admitted to the intensive care unit of Asella Referral and Teaching Hospital.

Methods: A institutional-based cross-sectional study design was conducted among 314 patients admitted to ICUs of Asella Referral and Teaching Hospital from November 1-30 2023 using a systematic random sampling technique. A data abstraction form designed for data collection was used to collect data from medical records. Collected data entered into Epi Info 7 and exported to SPSS version 25 for analysis. Bivariate and multivariate logistic regression analyses were used to determine the association of an independent variable with the outcome variable. Factors with a p-value of less than 0.25 in bivariate logistic regression analysis was exported to multivariate analysis to see if they are independent factors for the outcome variable. The adjusted odds ratio with a 95% confidence interval and a p-value of less than 0.05 was taken as statistical significance.

Result: From the total 314 admitted patients to the ICU, 219(69.7%) of them discharged alive while the rest 95(30.3%, 95% CI 25.28-35.71%) of them were dead. From the total 95 death in the ICU, 41 (43.2%) of the death was related to shock followed by acute respiratory disease syndrome which accounts 24(25.3%) of death. patients admitted with a pulse rate of >100 bpm were 2.1 times higher odds of death (AOR 95% CI: 1.18, 3.75) as compared to those who have <100 bpm. Additionally, patients admitted with peripheral oxygen saturation of <90% were 1.89 times higher odds of death (AOR 95% CI: 1.08, 3.29) as compared to those who have >90% saturation. Similarly, patients with an unconscious mental status were found to be 3.32 times higher odds of death (AOR 95% CI: 1.84, 5.98) as compared to those who are conscious

Conclusions and Recommendations:

Significant number of patients admitted to the ICU were discharged alive, while a notable proportion did not survive their ICU stay. Factors like oxygen saturation, pulse rate, level of consciousness and Inotropes used were significantly associated with ICU mortality. Implement targeted interventions focusing on early detection and management of critical conditions to reduce mortality rates among patients in the ICU is required.

1. Introduction

1.1 Background

Around fifty years ago, during the polio pandemic in Denmark, an anaesthetist invented the modern concept of intensive care units (1). In a hospital, an intensive care unit (ICU) is a separate room designated for treating patients with life-threatening illnesses. Critically ill patients receive a 24 hours a day monitoring and care from doctors and nurses in this unit. These have improved critically ill patients' outcomes and quality of care considerably on a global scale; these improvements have primarily occurred in developed nations with abundant resources. Intensive care units in sub-Saharan Africa vary in terms of the types and amounts of infrastructure required to provide adequate critical care services. There is significant variation among the populations in sub-Saharan Africa with regard to the reported disease characteristics and mortality rates of patients admitted to intensive care units, which require expensive resources and highly equipped infrastructures. However, the Growing demand may force progressive decisions about the right levels of care for critically ill patients (2-4). For decades, most ICUs were either medical, mostly treating acute respiratory failure, or surgical (SICU), primarily treating postoperative surgical (pediatric or gynecological) patients (5, 6).

Today, many ICUs in smaller centers are combined with medical-surgical ICUs, although the separation of care by patient diagnosis persists in large medical centers. The modern ICU has developed from the combination of lessons learned from respiratory and coronary care with continued motion provided by the clinical and technological development in resuscitation, pharmacological and mechanical circulatory support, and advances in renal replacement therapy, respiratory failure, cerebral oedema and multi-organ failure(2, 7). The result of ICU outcomes such as “death” or “survival” in critical care medicine can be assessed using indicators such as mortality rates (8, 9). However, the severity of the condition, patient age, comorbidities, the degree of severity of pre-hospital and emergency trauma care, level of consciousness, and complications during ICU stay, such as circulatory and ventilator-related respiratory complications, all influenced the ICU outcomes(10, 11).

1.2 Statement of the problem

Intensive Care Units have become a separate field of study over time, with a variety of applications, including burn, trauma, general, medical, surgical, neuro-surgical,

cardiothoracic, neonatal, and pediatric ICUs. However, In many developing countries, the capability of ICU is limited. There are between 5 to 30 intensive care unit beds per 100,000 people in high-income countries, but there are only 0.1 to 2.5 ICU beds per 100,000 people in developing countries (12, 13).

Globally, ICUs need to use a lot of modern resources, such as sophisticated monitors, organ support equipment, and highly qualified personnel. However, even in developed countries, this frequently requires the strongest healthcare system. However, ICUs are relatively young for the provision of adequate and equitable care for patients in developing regions, particularly Sub-Saharan(3, 14). In developing countries, the lack of qualified staff, supplies, and equipment poses a significant challenge, which frequently results in high death rates for critically ill patients receiving care in ICUs with limited resources. For instance, in the United States, the volume of critically ill patients who transferred from the emergency department (ED) to ICU has increased significantly to 50 % whereas, in Pakistan, around 20.7% of patients transferred to ICU face hospital mortality(15, 16). Besides, in Ethiopia, where access to critical care is limited, mortality and morbidity of critically ill patients were high due to the poor healthcare system. In Ethiopia, 67.5% of critically ill patients have more than 6 hours of LOS and 32.3% of patients requiring ICU admission died before transferring to the ICU due to a shortage of critical care beds, delays in radiology and laboratory services, and limited resources(17, 18). In addition, delays in transferring patients from departments to the ICU can harm patient outcomes, including increased hospital mortality and ICU length of stay as well as increased mechanical ventilation requirements during ICU stay(19, 20). This brings a huge burden on the economy of the country as well as financial hardship on the health facilities where there is limited infrastructure for ICUs (21). So in resource-limited countries like Ethiopia with only limited beds, like the case of ours where there are only six beds available for ICU and the high number of patients, it's important to have a basic understanding of what patients are admitted, treated and the outcome of treatment and associated factors. Unfortunately, no study exists in the ARTH ICU that identifies the pattern of admission, treatment outcome of ICU admission, and what factors affect the outcomes of ICUs admissions. These affect the planning of resources more effectively to address the most common medical and surgical conditions that were admitted to the ICU among the populations that the hospitals serve. Therefore, this study will aim to determine the admission pattern, treatment outcomes, and associated factors for patients admitted to the intensive care unit of Asella Referral and Teaching Hospital.

1.3 Justification of the study

Critically ill patients with different diagnoses are admitted to the intensive care unit for close monitoring and follow-up. Of these critically ill patients who were admitted to ICU, the mortality rate was high in different facilities. Data regarding patterns of admission and outcomes in the ICU are well documented in developed countries, but limited in developing countries like Ethiopia. Assessment of the patterns of admission, outcomes, and associated factors for critically ill patients admitted to ICUs in low-income countries may help with the identification of priorities and resources required to improve care for patients who are likely become critically ill.

Therefore, the primary intent of this study is to assess the patterns of admission, outcomes, and associated factors of patients admitted in the ICU of ARTH, Asella, Ethiopia, and the results will be used as a baseline to improve the quality of service and may add General knowledge for clinicians on understanding of the magnitude morbidity and causes of mortality.

2. Literature review

2.1 A patter of ICU Admission

A study on the assessment of the worldwide burden of critical illness audit from different ICUs in different countries indicates that 2973(29.5%) of patients had sepsis on admission to ICU. In this study, it was also noted that ICU mortality rates were 16.2% across the whole population and 25.8% in patients with sepsis (22). In addition, a study conducted in Pakistan, reported that Hepatic diseases,12.9%, Congestive heart failure (CHF) and Pulmonary edema (PE), 6.2%, Cerebral Vascular Accident (CVA),11.6%, Hypertensive Crisis,4.1%, Diabetes with complication 2.5%, 2.1% Tuberculosis with complication, Respiratory issues 9.5%, Acute coronary syndrome 5.4%, Kidney diseases 5.4%, Sepsis 10.4%, Gastrointestinal bleed 3.3%, Central nervous system infection,7.9%, Poisoning 3.3%, Shock 1.2%, Acute gastroenteritis with complication 5.8%, Surgical 5.4% and Gynecological issues 0.4% were the common causes of admission to ICU (23). Besides, a study conducted in South Africa showed that the majority of admissions (73.7%) occurred on an emergency basis, with approximately half for non-communicable diseases (49.6%), followed by trauma (29.0%) and infectious disease(21.5%) (24). A 5-year review study conducted in Nigeria indicated that the most common cause of ICU admission was due to severe traumatic brain injury (TBI), with 92.4% of admissions for severe TBI due to motor vehicular accident (MVA) (25).

According to a study conducted in Tanzania, 22.2% of the patients were admitted to ICU due to trauma followed by infectious disease (19.7%) and traumatic brain injury (12.5%) in all age groups whereas pneumonia (11.7%), was the leading diagnosis in pediatric patients (<18 years)(26). Moreover, a study conducted in the Tigray region indicated that cardiovascular diseases (26%), infectious diseases (20%), neurological diseases (19.8%), diabetic ketoacidosis, 16% and heart failure, 16%, and stroke (15.2%) were the commonest admission diagnoses for patients admitted to ICUs(11). A five year review conducted in St. Paulus Hospital Millennium Medical College, Addis Ababa, also showed that Diabetic ketoacidosis was the leading cause of admission, accounting for (14.9%), followed by all Strokes (8.2%), with 12.2% of total deaths in ICU attributed for Strokes(27).

2.2 The outcome of ICU Admission

According to a study conducted in India, 49.6% of patients were shifted out of the ICU in stable condition while 21.8% of patients left the ICU against medical advice, with an overall ICU mortality of 28.6% (28). Another study conducted in Bangladesh also indicated that the frequency of admission to the ICU was more in medical disciplines (59.92%) than in other disciplines like surgical (37.52%), gynecological, obstetric, and other disciplines (2.55%). In the same study, mortality was 46.14%, 31%, and 15.62%, respectively from these departments (7). A one-year retrospective study conducted in Malawi revealed that among

patients admitted to ICUs, 60.9% died, 0.4% were referred to another facility, and 35.6% of patients were discharged from the ICU to either a high-dependency unit or general ward. The commonest cause of death was sepsis and it accounts for 39.6%, of the total deaths (29). In addition, a study conducted at Jimma University Specialized Hospital found that about 50.4% of cases admitted to ICUs died, with 53.6% among Medical diagnoses followed by surgery cases, 48.0%, and among obstetrics, 42.9% (30).

2.3 Factors associated with ICU outcome

A study on the assessment of the worldwide burden of critical illness by Intensive Care Nations (ICON) audit indicates that there is a significant association between country variation and hospital variations in the individual risk of in-hospital death. It also indicates that there was a stepwise increase in the adjusted risk of in-hospital death according to a decrease in global national income (22).

A study conducted in the USA on the association of gender with outcomes in critically ill patients indicated that a statistically significant interaction exists between gender and age, that is, for patients <50 years of age, women had lower mortality compared to men but among patients >50 years of age there was no statistically significant difference in ICU mortality between men and women (31).

A study in Malawi indicates that being younger age of less than 40 years and increasing patients' length of stay in the unit were factors found to be significantly associated with mortality (29).

A study conducted at Moi Teaching and Referral Hospital, Kenya, indicates that; ages younger than 10 years, ages 35–49 years, and age above 50 years, compared to ages 10–24 years; the presence of sepsis; acute stroke; acute respiratory failure on mechanical ventilation; and vasopressor support were significantly associated with ICU mortality; while drug/alcohol poisoning was associated with lower adjusted odds of mortality (32).

A study conducted at Jimma University Specialized Hospital indicates that the main cause of death for surgical ICU admission was head injury carrying a mortality of 52.1% (30). A study conducted on clinical outcomes of patients admitted to the intensive care unit of Nigist Eleni Mohammed Memorial Hospital of Hosanna, Southern Ethiopia, indicates; that a patient with a head injury is about six times more likely to die in the intensive care unit than patients with small bowel obstruction (33).

Conceptual framework

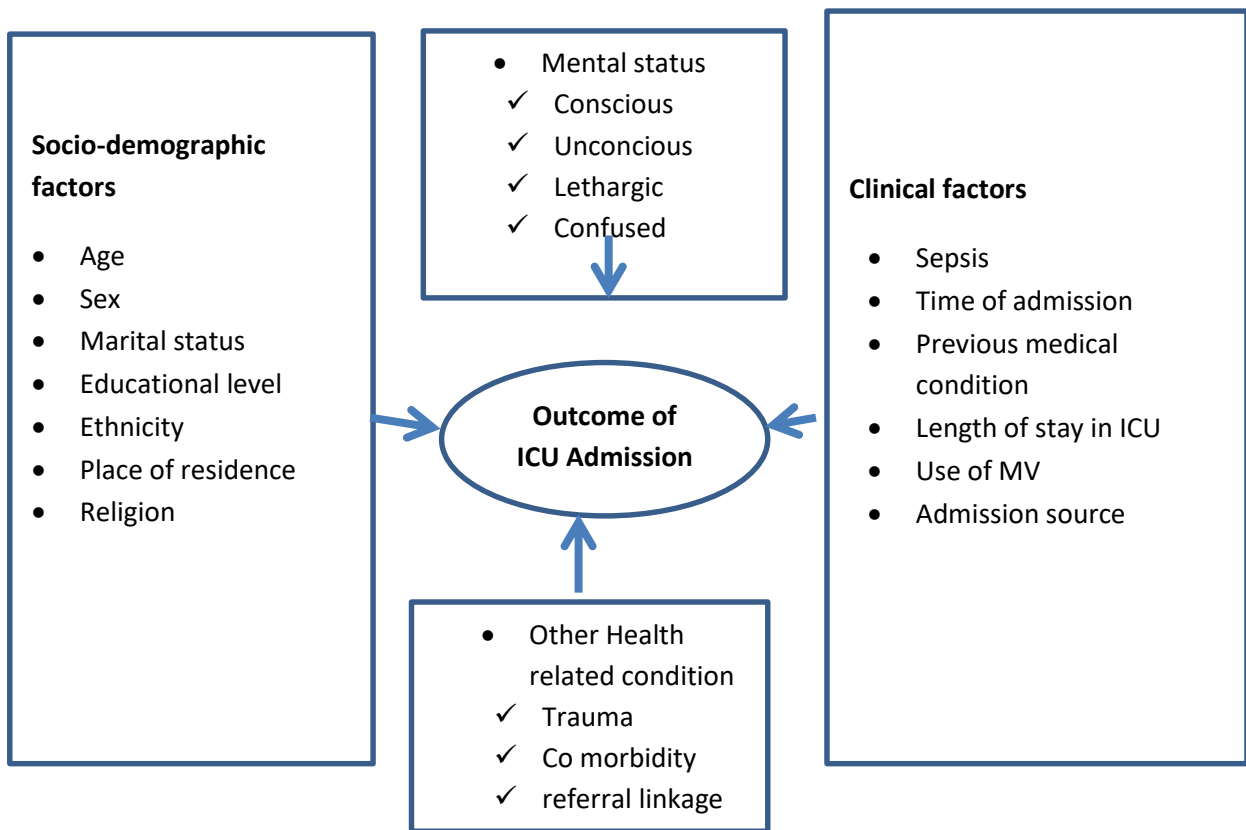


Figure 1: Conceptual framework developed from literature review to assess admission pattern, outcome and factors associated with patients admitted to ICU in Asella teaching and referral Hospital (26, 33)

3. Objectives

3.1 General Objective

To assess admission patterns, outcomes, and associated factors for patients admitted to the intensive care unit of Asella Teaching and Referral Hospital from January 1, 2018, to December 30, 2022.

3.2 Specific Objectives

- To assess ICU admission patterns among patients admitted to the ICU of ARTH
- To determine ICU admission outcomes among patients admitted to the ICU of ARTH
- To assess factors associated with ICU admission outcomes among patients admitted to the ICU of ARTH

4. Methods and Materials

4.1 Study area

The study was employed as a retrospective cross-sectional study design at Asella Teaching and Referral Hospital from January 2018 to December 2022. ATRH is one governmental hospital in Ethiopia which is found in Asella town. Asella town is an administrative city of Arsi zone and it is located at a distance of 175 km to the southeast of Addis Ababa, the capital city of Ethiopia. The hospital has 4 wards. The intensive care unit was considered as it has been providing services for all critically ill patients admitted from different departments. The hospital has a total of 268 inpatient beds and 6 ICU beds.

4.2 Study design and period

A facility cross-sectional study was conducted using retrospective data from November 1-30, 2023.

4.3 Source and Study Population

4.3.1 Source population

All charts of patients admitted to the intensive care unit of Asella Teaching and Referral Hospital.

4.3.2 Study population

Systematically selected charts of patients admitted to the intensive care unit of Asella Teaching and Referral Hospital from January 2018 to December 2022.

Inclusion criteria: All charts with complete data during the study period were included.

Exclusion: Patients' charts with incomplete data during the study period were excluded.

4.3.4 Sample size and sampling procedures

4.4.1 Sample size determination

The Sample size was calculated using a single proportion formula by considering 95% CI, 5% margin of error, and 51.98% ICU mortality from a previous study (34).

$$n = Z^2 p(1-p)/d^2 = (1.96)^2 \times 0.5198(1-0.5198)/(0.05)^2 \\ = 384$$

Where:

n=sample size

P= ICU mortality (51.98%).

d=marginal error 5%.

Z $\alpha/2$ = critical value at 95% confidence interval (1.96).

Adding the non-response rate (10%), the final sample size was 314.

Finite population correction, since the number of ICU admission in the last five year was 1119

$n=(N-n)/(N-1)$ and the final sample size was 314

For the second objective, the sample size was calculated by Epi Info StatCalc using pre-referral care variables from previous studies with the assumption of a ratio of exposed to unexposed of 1, proportion of outcome among an unexposed group of 2.2%, proportion of outcome among exposed group of 18.2% and odds ratio of 9.91 (21). Then the sample size was 134 medical records using the Fleiss w/CC method. Since the sample size for the first objective is large compared to the second objective, the final sample size for this study was 314 medical records of patients.

4.4.2 Sampling procedures

After examining the five-year report of the ICU department, a systematic random sampling method was used to select charts of patients from the ICU, with sampling intervals of $k=3$. The first chart from each unit was selected by lottery method using their registration number.

4.5 Variables of the study

4.5.1 Dependent variable

Intensive Care Unit Outcome (Death vs Survived)

4.5.2 Independent variables

Socio-demographic characteristics: age, sex, place of residence, religion,

Clinical information: medical condition on admission, length of stay, level of consciousness, machine,

Others: referral linkage

4.6 Operational definition

ICU outcome: it will be measured as either dead or discharged alive/transferred out to each other facilities

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

Death: Patients who are not alive at the time of discharge and don't include death on arrival to the ICU department

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

4.7 Data collection procedures (Instruments, personnel, measurements)

Data was collected using pretested data abstraction forms purposely designed for this study. The data on the medical charts include socio-demographic characteristics of patients, clinical characteristics of patients, and treatment outcomes of the patients. Data was collected by two BSc anesthetists and supervised by one MSc holder anesthetist. Patients' charts were

reviewed during data collection and they were replaced in their original place properly at the end of data collection daily.

4.8 Data quality assurance

The data abstraction forms were purposely designed for this study in English initially and translated to the local language (i.e., Afan Oromo), and again translated back to English to ensure consistency. A pre-test was done on 5% of the sample population admitted to the ICU of ARTH during 2016 and 2017. Data collectors and supervisors were trained on each item included in the study tools, objectives of the study, and confidentiality for two days. During data collection, regular supervision and follow-up was made. Investigators were cross-check for completeness and consistency of the data daily.

4.9 Data processing and analysis

The data was entered into Epi info version 7 and was exported to the SPSS version 25 for analysis. Descriptive statistics was used to summarize the data, tables, and figures to display results. Bivariate and multivariate logistic regression analyses were used to determine the effect of the independent variables on the outcome variables. Variables that were significant in bivariate logistic regression analysis at a p-value less than 0.25 were taken to multivariate logistic regression analysis. In multivariate logistic regression analysis, an odds ratio with a 95% confidence interval and a p-value of less than 0.05 was used as a cut point for the presence of association.

4.10 Ethical considerations

Ethical clearance and approval was obtained from the ethical review committee, Public Health Department, Arsi University College of Health Sciences. Permission to conduct was obtained from the Asella Hospital. Confidentiality of the information obtained was maintained.

4.11 Dissemination of results

The results of the study will be disseminated to Arsi University Health Science College, all clinical departments, public health, and other bodies who need the research accordingly.

5. Result

Socio-demographic characteristics

These statistics provide an overview of the socio-demographic characteristics of the study participants, including their age distribution, gender composition, and residence distribution.

The mean and the Standard deviation of the age of study participants were 34.7 and 24.4 respectively and on the other hand, the minimum and the maximum age of the study participants were 0.1 and 90 respectively. From the total participants 162(51.6%) were male and the rest 152(48.4%) were female. Regarding the residence of study participants, majority of the study participants 258 (82.2%) were from the rural while the rest 56 (17.8%) were from the Urban (Table 1).

Table 1: Socio-demographic characteristics of study participants in ICU of Asella Teaching and Referral Hospital 2023

Variables	Category	Frequency	Percent
Gender	Male	162	51.6%
	Female	152	48.4%
Residence	Urban	56	17.8%
	Rural	258	82.2%

Source of Admission to ICU

From the total participants, 100(31.8%) were admitted from medical ward, 57(18.2%) were from surgical ward, 65(20.7%) were from the emergency department and the rest 29(9.2%) and 63(20.1%) were from the Gynaecology-Obstetrics and Paediatrics ward respectively (Figure 2)

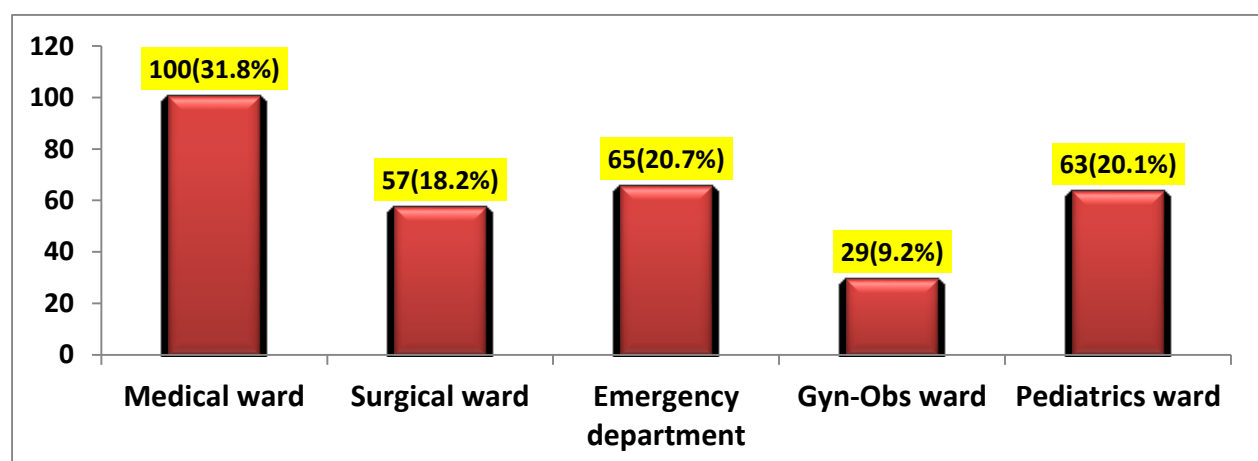


Figure 2: The source of cases admitted to ICU in Asella Teaching and Referral Hospital 2023

Regarding type of admission, majority of the cases 308(98.1%, 95% CI 95.68, 99.22%) were newly admitted while the rest 6(1.9%, 95% CI 0.78, 4.32%) were re-admitted to the ICU (Figure 3)

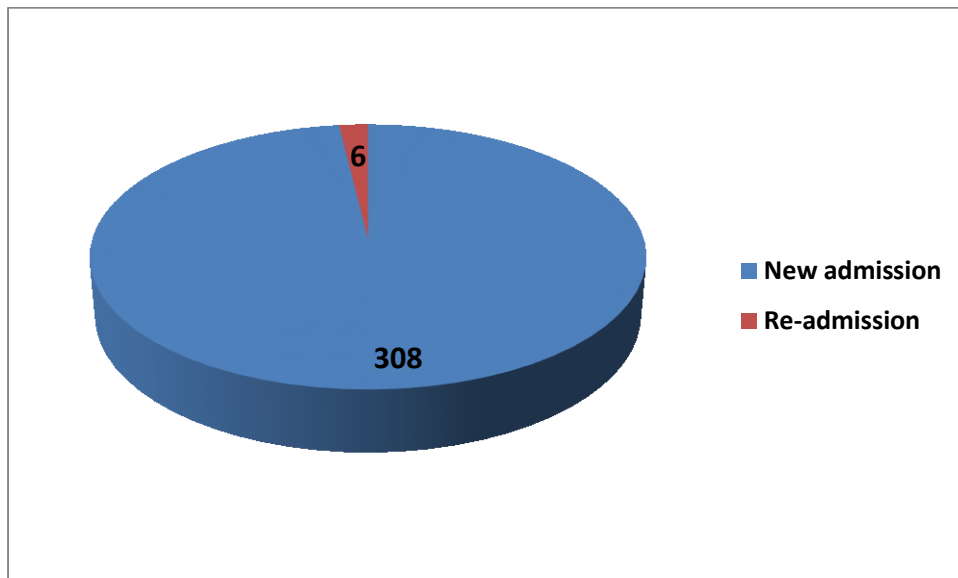


Figure 3: Types of admission to ICU in Asella Teaching and Referral Hospital 2023

Regarding the system wise diagnosis during admission, majority of the cases 96(30.6%) were diagnosed with respiratory disease, 83(26.4%) were diagnosed with infectious disease, 61(19.4%) of them were diagnosed with cardiovascular disease, 34(10.8%) of the cases were diagnosed with trauma and the rest 28(8.9%) and 12(3.8%) of the cases were diagnosed with neurologic and other types of disease respectively (Table 2)

Table 2: System wise diagnosis during admission of patients to the ICU in Asella Teaching and Referral Hospital 2023.

System wise diagnosis during admission	Frequency	Percentage
Cardiovascular disease	61	19.4%
Respiratory disease	96	30.6%
Trauma	34	10.8%
Infectious disease	83	26.4%
Neurologic	28	8.9%
Others	12	3.8%

Distribution of patients admitted to ICU per year

In 2018, about 60 patients were admitted to ICU, in 2019 about 34 patients, in 2020,74 patients, in 2021 about 86 patients and in 2022,56 patients were admitted to ICU (Figure 4)

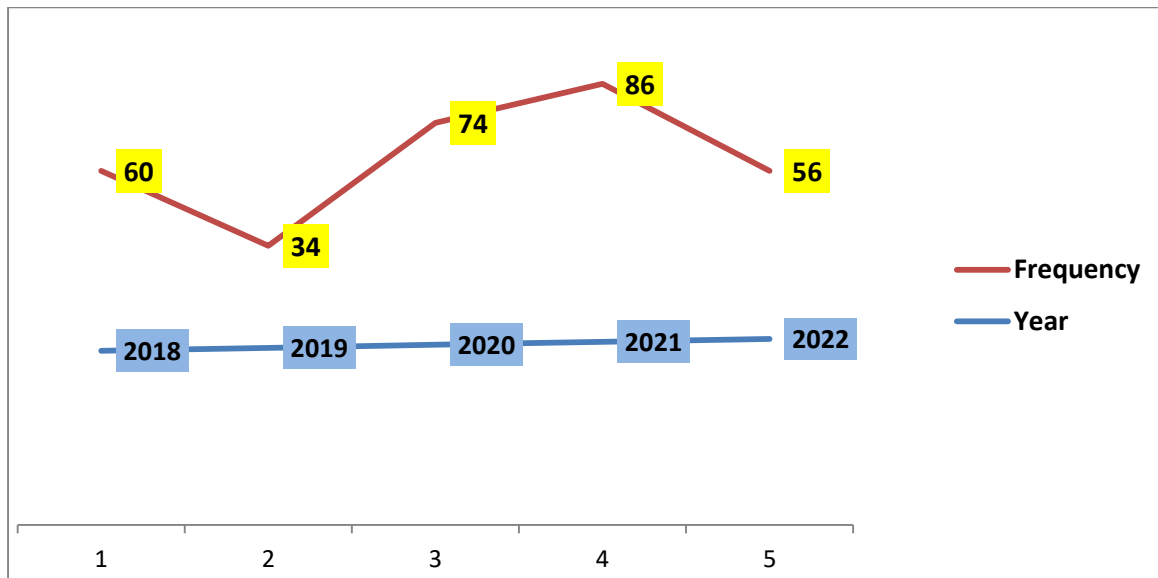


Figure 4: Distribution of patients admitted to ICU per year in Asella Teaching and Referral Hospital 2023

The vital signs of study participants

Regarding the pulse rate of the study participants, majority of them which is 189(60.2%), their pulse rate was >100 while the rest 102(32.5%), 8(2.5%) and 15(4.8%) their pulse rate was 60—100, <60 and have no pulse rate respectively. On the other hand pertaining to their temperature, 109(34.7%) of them revealed body temperature < 36.5 and 175(55.7%) of them their temperature was >37.5 . About 174(55.4%) of them their peripheral oxygen saturation was <90 and the rest of them 136(43.3%) showed peripheral oxygen saturation of 90--100 (Table 3).

Table 3: The vital signs of patients admitted to ICU in Asella teaching and Referral Hospital 2023.

Variables	Category	Frequency	Percent
Pulse rate <60	No	306	97.5%
	Yes	8	2.5%
Pulse rate 60--100	No	212	67.5%
	Yes	102	32.5%
Pulse rate >100	No	125	39.8%
	Yes	189	60.2%
No pulse rate	No	299	95.2%
	Yes	15	4.8%
Respiratory rate 12--20	No	260	82.8%
	Yes	54	17.2%
Respiratory rate >20	No	60	19.1%
	Yes	254	80.9%
Apnea	No	310	98.7%
	Yes	4	1.3%
Temperature <36.5	No	205	65.3%
	Yes	109	34.7%
Temperature 36.5—37.5	No	175	55.7%
	Yes	139	44.3%
Temperature >37.5	No	250	79.6%
	Yes	64	20.4%
Peripheral oxygen saturation <90	No	140	44.6%
	Yes	174	55.4%
Peripheral oxygen saturation 90--100	No	178	56.7%
	Yes	136	43.3%

The mental status of study participants

Pertaining to mental status of the study participants, about 145(46.2%) their mental status were conscious, 46(14.6%) of them had confused mental status and the rest 39(12.4%) and 84(26.8%) of them had lethargic and unconscious mental status respectively (Table 4)

Table 4: The mental status of the study participants admitted to ICU in Asella Teaching and Referral Hospital 2023.

Variables	Category	Frequency	Percent
Conscious mental status	No	169	53.8%
	Yes	145	46.2%
Confused mental status	No	268	85.4%
	Yes	46	14.6%
Lethargic mental status	No	275	87.6%
	Yes	39	12.4%
Unconscious mental status	No	230	73.2%
	Yes	84	26.8%

Cause of Admission to ICU

Pertaining to the cause of admission to ICU, 53(16.9%),41(13%), 38(12.1%) and 28(8.9%) were Acute respiratory disease syndrome, Pneumonia, Septic shock and Congestive heart failure respectively. The rest cause of admission to ICU grouped under other category which includes endocrine disease, renal disease, hematologic disease, chronic kidney disease, malaria, GBS, bullet injury and burning (Table 5).

Table 5: The cause of patient admission to ICU in Asella Teaching and Referral Hospital 2023

Cause of Admission to ICU	Frequency	Percentage
Acute respiratory disease syndrome	53	16.9%
Pneumonia	41	13%
Septic shock	38	12.1%
Congestive heart failure	28	8.9%
Miscellaneous condition	25	8%
Traumatic injury	22	7%
Cardiogenic shock	19	6%
Stroke	13	4%
Poisoning	12	3.8%
Others	56	17.8%

Length of patient stay in the ICU

The mean, median and standard deviation of the patients' length of stay in the ICU were 6,4 and 7.8 respectively. It is observed that the majority of patients, 265 out of the total, which accounts for 84.4%, stayed in the ICU for a duration between 1 and 10 days. However, there were a few cases where study participants stayed in the ICU for more than 31 days (Table 6).

Table 6: The length of patients stay in the ICU in Asella Teaching and Referral Hospital 2023.

Length of stay in the ICU	Frequency	Percent
1--10 days	265	84.4%
11--20 days	36	11.5%
21--30 days	7	2.2%
>31 days	6	1.9%

The patient outcome among different age group of patients admitted to ICU

It is observed that the majority of patients, 265 out of the total, which accounts for 84.4%, stayed in the ICU for duration between 1 and 10 days (Figure 5).

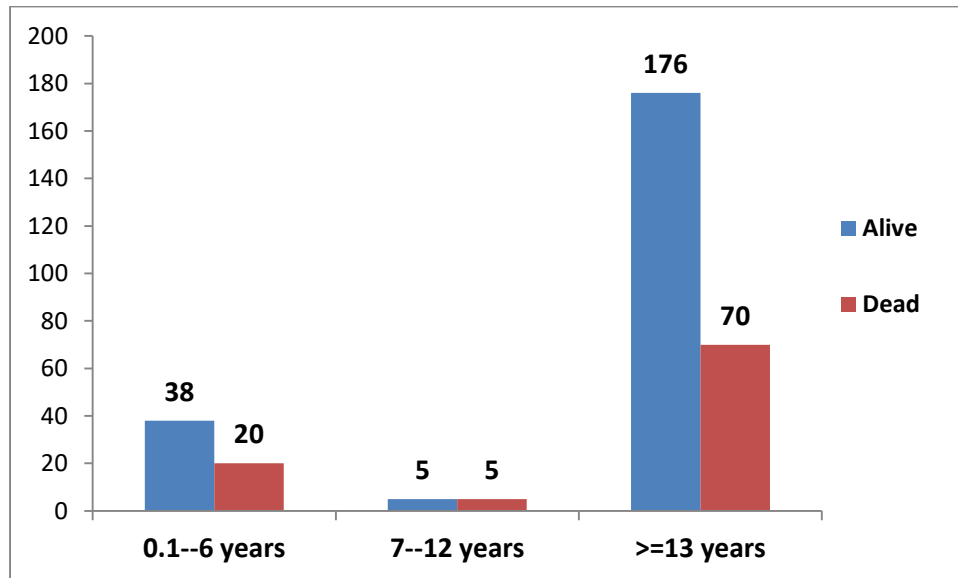


Figure 5: The outcome of patients among different age group admitted to ICU in Asella Teaching and Referral Hospital 2023.

In terms of the respiratory status of the study participants, approximately 47 patients aged 13 years and older had a respiratory rate ranging from 12 to 20 breaths per minute. Conversely, patients between the ages of 0.1 and 6 years had a respiratory rate exceeding 20 breaths per minute. (Table 7)

Table 7: The respiratory status among different age groups of patients admitted to ICU in Asella Teaching and Referral Hospital 2023.

Respiratory status	Category	01.—6 years	7—12 years	>= 13 years
Respiratory <12	No	58	10	246
	Yes	5	2	47
Respiratory 12--20	No	53	8	199
	Yes	5	2	47
Respiratory >20	No	7	2	51
	Yes	51	8	195
Apnea	No	56	10	244
	Yes	2	0	2

Service provided for the patients in the ICU during treatment course

Regarding the services provided to the patients admitted to the ICU, the data shows the following:

Out of the total patients admitted to the ICU, 207 (65.9%) received mechanical ventilation. Additionally, 201 (64.1%) of the patients were provided with antibiotics. Furthermore, 86 (27.4%) of the patients were given anticoagulant therapy.

These figures indicate the percentage of patients who received each respective service during their ICU stay. (Table 8)

Table 8: Service provided for the patients admitted to ICU during treatment course in Asella Teaching and Referral Hospital 2023.

Services	Category	Frequency	Percent
Mechanical ventilation	No	107	34.1
	Yes	207	65.9
Antibiotics	No	113	36.0
	Yes	201	64.0
Anticoagulant	No	228	72.6
	Yes	86	27.4
Patients received inotrope support	No	253	80.6
	Yes	61	19.4
Facemask	No	307	97.8
	Yes	7	2.2
INO2	No	307	97.8
	Yes	7	2.2
Antidote	No	312	99.4
	Yes	2	0.6
Diazepam	No	313	99.7
	Yes	1	0.3
Cimetidine	No	312	99.4
	Yes	2	.6
Others	No	313	99.7
	Yes	1	.3

From the total 314 admitted patients to the ICU, 219(69.75%, 95% CI 64.29-74.72%) of them discharged alive while the rest 95(30.3%, 95% CI 25.3-35.7%) of them were dead (Figure 6).

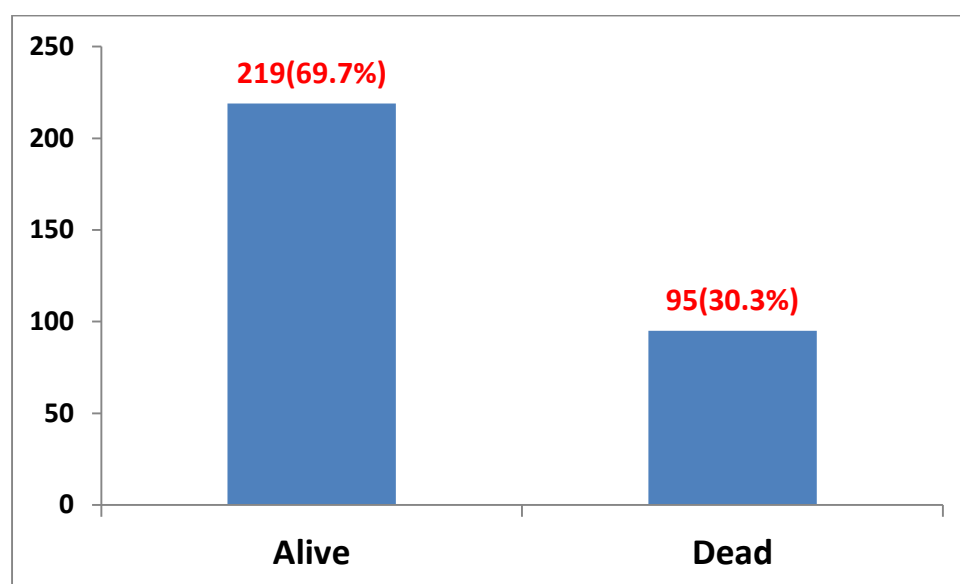


Figure 6: The outcome of patients during discharge at ICU in Asella Teaching and Referral Hospital 2023

Cause of death patients admitted to ICU

From the total 95 death in the ICU, 41(43.16%, 95% CI 33.17-53.71%) of the death was related to shock followed by acute respiratory disease syndrome which accounts 24(25.26%, 95% CI 17.15-35.4%) of death. Meningitis, stroke and multiple organ failure accounts 5.3%, 4.2% of death respectively. But the rest 17.9% of death was related to other category of disease such as pneumonia, PUD perforation, chronic liver disease and traumatic brain injury (Table 9)

Table 9: The cause of death among patients admitted to ICU in Asella Teaching and Referral Hospital

Cause of death	Frequency	Percentage	95% CI
Shock	41	43.2%	43.16(33.17, 53.71)
Acute respiratory distress syndrome	24	25.3%	25.26(17.15, 35.4)
Menengitis	5	5.3%	5.26(1.95, 12.42)
Stroke	4	4.2%	4.21(1.36, 11.04)
Multiple organ failure(MOF)	4	4.2%	4.21(1.36, 11.04)
Others like pneumonia, PUD perforation, chronic liver disease, traumatic brain injury etc	17	17.9	

Among the total of 162 male patients admitted to the ICU, 115 (70.9%) were discharged alive, while 47 (29.1%) died. Similarly, out of the total of 152 female patients admitted to the ICU, 104 (68.4%) were discharged alive, while 48 (31.6%) died.

Regarding the residence of the patients, 37 (66.1%) patients from urban areas were discharged alive, while 19 (33.9%) died. From rural areas, 182 (70.5%) patients were discharged alive, while 76 (29.5%) died. Among patients admitted from the surgical ward, 45 (78.9%) were discharged alive, while 12 (21%) died (Table 10).

Table 10: Cross tabulation of variables versus treatment out come in the ICU in Asella Teaching and Referral Hospital 2023

Variables	Category	Patient outcome during discharge	
		Alive	Dead
Gender of participant	Male	115(70.9%)	47(29.1%)
	Female	104(68.4%)	48(31.6%)
Residence of participant	Urban	37(66.1%)	19(33.9%)
	Rural	182(70.5%)	76(29.5%)
Source of admission	Medical ward	69(69%)	31(31%)
	Surgical ward	45(78.9%)	12(21%)
	Emergency department	42(64.6%)	23(35.4%)
	Obstetrics and Gynecology ward	23(79.3%)	6(20.1%)
	Pediatrics ward	40(63.4%)	23(36.5%)
Type of admission	New admission	214(69.5%)	94(30.5%)
	Re-admission	5(83.3%)	1(16.7%)
Oxygen saturation<90	No	111(79.3%)	29(20.7%)
	Yes	108(62.1%)	66(37.9%)
Oxygen saturation 90-100	No	112(62.9%)	66(37.1%)
	Yes	107(78.7%)	29(21.3%)
Lethargic mental status	No	194(70.5%)	81(29.5%)
	Yes	25(64.1%)	14(35.9%)
Unconscious mental status	No	174(75.7%)	56(24.3%)
	Yes	45(53.6%)	39(46.4%)

Bivariate Logistic Analysis result

In the bivariate logistic regression analysis, variables with a p-value less than 0.25 were selected as candidates for the multivariable logistic regression analysis. The following variables were considered as candidates: gender of the participants, residence, source of admission (specifically being from the paediatric ward), types of admission, pulse rate, temperature, and mental status of the patients. These variables were chosen based on their statistical significance in the bivariate analysis and their potential impact on the outcome of interest.

In bivariate analysis the odds of death was 1.90 times higher (95% CI 1.14, 3.19) for patients having a pulse rate of >100 beats per minute (bpm) as compared to those who have a pulse rate of ≤100 bpm (Table 11).

Table 11: Bivariate and multivariate logistic regression for patients admitted to ICU in Asella Teaching and Referral Hospital 2023.

Variables	Category	Out come		COR 95%CI	AOR 95% CI
		Dead	Alive		
Gender of the participants	Male	47	115	1	1
	Female	48	104	1.13(0.70, 1.83)	1.34(0.75, 2.37)
Residence of participants	Urban	19	37	1	1
	Rural	76	182	0.813(0.44, 1.50)	0.67(0.33, 1.34)
Source of admission	Medical ward	31	69	0.78(0.40, 1.52)	1.12(0.28, 5.23)
	Surgical ward	12	45	0.46(0.20, 1.05)	1.13(0.24, 5.43)
	Emergency	23	42	0.95(0.46, 1.96)	1.23(0.29, 5.20)
	Gyn-Obs ward	6	23	0.45(0.16, 1.27)	0.52(0.09, 3.13)
	Pediatrics ward	23	40	1	1
Pulse rate >100	No	28	97	1	1
	Yes	67	122	1.90(1.14, 3.19)*	2.16(1.16, 4.03)*
Respiratory >20	No	12	48	1	1
	Yes	83	171	1.94(0.98, 3.90)	1.50(0.70, 3.30)
Temperature >37.5	No	73	177	1	1
	Yes	22	42	1.27(0.71, 2.28)	0.90(0.42, 1.80)
Confused mental status	No	89	179	1	1
	Yes	6	40	0.30(0.12, 0.74)	0.40(0.13, 1.03)
Lethargic mental status	No	81	194	1	1
	Yes	14	25	1.34(0.66, 2.71)	1.90(0.80, 4.60)
Unconscious mental status	No	56	174	1	1
	Yes	39	45	2.70(1.60, 4.55)*	2.96(1.43, 6.14)*
Mechanical Ventilator	No	21	86	1	1
	Yes	74	133	2.28(1.31, 3.97)	1.65(0.85, 3.22)
Peripheral O ₂ Saturation	No	29	111	1	1
	Yes	66	108	2.34(1.40, 3.90)*	1.85(1.03, 3.31)*
Inotrope use	No	64	189	1	1
	Yes	31	30	3.05(1.72, 5.43)*	4.41(2.21, 8.81)*
Age category	Pediatric	27	45	1	1
	Adult	68	174	0.65(0.38, 1.13)	0.93(0.23, 3.70)

Multivariable Logistic regression Analysis

In the multivariable logistic regression analysis, several variables were found to be statistically significant in predicting the outcome of patients admitted to the ICU. These variables include pulse rate >100 bpm, unconsciousness, peripheral oxygen saturation <90% and Inotropes use

Based on the results, patients admitted with a pulse rate of >100 bpm were 2.1 times higher odds of death (AOR 95% CI: 1.18, 3.75) as compared to those who have <100 bpm. Additionally, patients admitted with peripheral oxygen saturation of <90% were 1.89 times higher odds of death (AOR 95% CI: 1.08, 3.29) as compared to those who have >90% saturation. Similarly, patients with an unconscious mental status were found to be 3.32 times higher odds of death (AOR 95% CI: 1.84, 5.98) as compared to those who are conscious (Table 12).

Table 12: Multivariable logistic regression for patients admitted to ICU in Asella Teaching and Referral Hospital 2023.

Variables	Category	Out come		COR 95%CI	AOR 95%CI
		Dead	Alive		
Pulse rate >100	No	28	97	1	1
	Yes	67	122	1.90(1.14, 3.19)*	2.10(1.18, 3.75)*
Peripheral oxygen saturation < 90%	No	29	111	1	1
	Yes	66	108	2.34(1.40, 3.90)*	1.89(1.08-3.29)*
Received Inotrope support	No	64	189	1	1
	Yes	31	30	3.05(1.72, 5.43)*	3.68(1.96-6.89)*
Unconscious mental status	No	56	174	1	1
	Yes	39	45	2.70(1.60, 4.55)*	3.32(1.84-5.98)*

***= Significant at P-value < 0.05**

6. Discussion

This study assesses the admission pattern, treatment outcomes, and associated factors of patients admitted to the intensive care unit of Asella Teaching and Referral Hospital.

Regarding the system wise diagnosis during admission, majority of the cases 96(30.6%) were diagnosed with respiratory disease, 83(26.4%) were diagnosed with infectious disease, 61(19.4%) of them were diagnosed with cardiovascular disease, 34(10.8%) of the cases were diagnosed with trauma and the rest 28(8.9%) and 12(3.8%) of the cases were diagnosed with neurologic and other types of disease respectively. Acute respiratory disease syndrome was the commonest cause of admission to ICU. Unlike our study the most common reasons for admission to the ICU at AeBET ICU were Trauma 163 (53.4%), followed by Medical 66 (24.6%), Non-traumatic neurosurgical conditions 22 (8.2%), and Burn 17 (6.3%) respectively were the leading causes of ICU admission (21). The difference may be due to the fact that AaBET hospital is trauma center that is why trauma patient mainly admitted.

Regarding type of admission, in our study, majority of the cases 308(98.1%) were newly admitted while the rest 6(1.9%) were re-admitted to the ICU.

Pertaining to the cause of admission to ICU, 53(16.9%), 41(13%), 38(12.1%) and 28(8.9%) were Acute respiratory disease syndrome, Pneumonia, Septic shock and Congestive heart failure respectively were leading cause of ICU admission. Unlike our study result, in a study conducted at St Paul, diabetic ketoacidosis; 187 (14.9%), was the leading cause of admission, followed by all Strokes; 103 (8.2%) (27). Possible justification for the pattern of admission could be related to demographic characteristics of patients admitted to national referral hospitals; where majority of them could be aged population.

It is observed that the majority of patients, 265 out of the total, which accounts for 84.4%, - (95% CI 79.79, 88.13%) stayed in the ICU for duration between 1 and 10 days. This is comparable with study conducted at Jimma university which showed ICU LOS was 1-7 days (30). This finding is similar with our study.

From the total 314 admitted patients to the ICU, 219(69.7%) of them discharged alive while the rest 95(30.3%) of them were dead. According to study done in university of Nigeria teaching hospital Enugu ICU Mortality rate was 34.6% which is comparable with our finding (25%). While a study conducted in public ICU of Kenya, Tanzania, Jimma University Specialized hospital and St. paul's hospital millennium medical college showed ICU

mortality rate of 53.6% (32), 41.4% (26), 50.4% (30) and 39% (27) respectively. Possible justification for the higher mortality rates in these studies could be related to the type of disease for admission and difference in population characteristics for the studies conducted in Kenya and Tanzania while it could be related with high catchment area population for studies conducted in Jimma University Specialized Hospital and St. Paul Millennium Medical College.

In this study patients admitted with a pulse rate of >100 bpm were 2.1 times higher odds of death as compared to those who have <100 bpm. A study conducted in Hacettepe University indicates patients admitted with heart rate >100/minutes were found to have higher ICU mortality (35).

Additionally, patients admitted with peripheral oxygen saturation of <90% were 1.89 -times higher odds of death as compared to those who have >90% saturation. A study conducted in 10 French ICU hospitals indicates low central venous oxygen saturation is associated with higher mortalities (36).

Patients who received inotropes were 3.68 times higher odds of death as compared to those who didn't receive Inotropes. A multi-center study conducted among ICU patients in France and Belgium indicates Inotropes use was associated with increased mortality rate (37).

7. Strength and limitations of the study

7.1 Strength of the study

Maximum sample size was used for the study. The duration of participant selection was not dated back to longer period which might not be subjected to change in case definition of most of the causes of ICU admission.

7.2 Limitations of the study

As with all cross-sectional studies, its hard to establish cause effect relationship between the factors and outcome variables.

8. Conclusion and recommendations

8.1 Conclusion

The proportion of ICU admission related death is high. Acute respiratory disease syndrome and shock were the leading cause of ICU admission and death respectively in the study area.

The predictors of ICU mortality in the study area were; peripheral oxygen saturation of <90%, pulse rate of >100 bpm, unconsciousness and Inotropes use.

8.2 Recommendations

1. Early evaluation, identification of critical patients and admission to intensive care units
2. Enhanced Monitoring and Care: Strengthen monitoring and care protocols for patients with reduced oxygen saturation, increased pulse rate; to reduce mortality rates, emphasizing early intervention and specialized care for this vulnerable patients.
3. Mental Status Assessment: Implement comprehensive mental status assessments for all ICU patients, with a particular focus on patients with an unconscious mental status, to ensure timely interventions and improved outcomes.
4. Further Research and Analysis: Conduct further research using case control or follow-up study to explore the underlying factors contributing to the increased likelihood of death among patients admitted to ICU.

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10. ANNEXES

10.1 ANNEXES I : Patient information sheet English version participant information sheet

Description of the Study

Title of the study: Pattern of admission, outcome, and its associated factor among patients admitted to ICUs in ARTH.

Introduction: To effectively care for patients with critical illnesses and attain favorable outcomes, a broad spectrum of knowledge is necessary in the intensive care unit (ICU), a specialized unit. Access to critical care is a crucial component of the health care system; hence, critically ill patients are admitted to the ICU to reduce mortality and morbidity. However, the morbidity and mortality rate reduction for all diseases set by WHO is not attained by many countries due to different factors according to many studies conducted.

The rationale of the study and its benefit

Different factors affect the outcome of the patients admitted to ICUs which in turn results in a high economic burden on countries. Moreover, no study has assessed the pattern of admission or the outcome of ICU admission in the area where this research will be conducted except few studies in the country. Therefore availing scientific data on the aforementioned gap will have indispensable importance for evaluation of the program and differentiated approach to designing the way to improve ICUs infrastructures. This study is designed to assess the outcome of ICU admission and its associated factors data will be collected from the medical records of patients in ARTH and no data expressing the identity of the patient will be recorded on the data collection form. Data collectors will be recruited from the health professionals giving treatment in the setup to keep confidentiality and the data collected will be used up only for the intended research.

Waraqaa odeeffannoo hirmaattotaa

Mata duree qorannoo –Akkaataa seensaa, Bu’aa dhibamtoota ICU seenan fi wantoota milkaa’uu isaa irratti dhiibbaa fidan

Seensa

Dhukkubsattoota dhukkuba cimaa qaban haala bu’a qabeessa ta’een kunuunsuu fi bu’aa gaarii argachuuf, kutaa kunuunsa cimaa (ICU), kutaa addaa keessatti beekumsi bal’aan barbaachisaadha. Kunuunsa murteessaa argachuun sirna eegumsa fayyaa keessatti qaama murteessaadha; kanaaf dhukkubsattoonni haala yaadessaa ta’an du’aa fi dhukkubbii hir’isuuf gara ICU seenu. aa ta’u malee, hir’inni dhukkubbii fi du’a dhukkuboota hundaaf WHOn kaa’e akka qorannoowwan hedduun gaggeeffamanitti sababoota adda addaatiin biyyoota hedduu biratti kan hin argamne ta’uu ibsameera

Faayida Qorannoo kana

Qabxiileen adda addaa bu’aa dhukkubsattoota ICU seenan irratti dhiibbaa kan geessisan yoo ta’u kunis dabaree isaatiin biyyoota irratti ba’aa dinagdee olaanaa fida. Kana malees, qorannoowwan biyyattii keessatti argaman muraasa malee naannoo qorannoon kun itti gaggeeffamutti akkaataa galmee ykn bu’aa galmee ICU madaale hin jiru. Kana malees, qorannoowwan biyyattii keessatti argaman muraasa malee naannoo qorannoon kun itti gaggeeffamutti akkaataa galmee ykn bu’aa galmee ICU madaale hin jiru. Qorannoon kun bu’aa seensa ICU fi sababoota isaa waliin walqabatan madaaluuf kan qophaa’e yoo ta’u, ragaan galmee yaalaa dhukkubsattoota ARTH keessa jiran irraa kan walitti qabamu yoo ta’u, odeeffannoon eenyummaa dhukkubsataa ibsu tokkollee unka odeeffannoo walitti qabuu irratti hin galmaa’u. Iccitii eeguuf ogeessota fayyaa dhabbaticha keessatti wal’aansa kennan irraa odeeffannoo walitti qabamtoonni kan qacaramanii fi odeeffannoon walitti qabame qorannoo yaadameef qofa kan oolu ta’a.

10.3 Annexes III Informed consent

My name is _____, I am an Anesthetist working here in the ARTH. I am now collecting data from patient Charts for the research being conducted to determine the pattern of admission, outcome, and associated factors among patients admitted to ICUs of ARTH of TB, by Dr Dida Batu Who is a Public Health candidate at Arsi University. The Hospital is selected as one of the study areas. The researcher employed me for this data collection to maintain your data strictly confidential, I am not to let others outside of me access your name and other identifiers. We believe that the findings of this study will have paramount importance for the evaluation of the pattern of admission, outcome of ICUs, and its associated factors. The information that is necessary for the study will be taken from your medical chart. As the study will be conducted through a review of medical records alone, it will not inflict any harm as far as confidentiality is kept. The information will be taken when you give permission and your willingness for medical record information to be utilized in this study will help us achieve the stated benefits of the study. Name and personal identifiers of the patients will not be recorded on the data collection form and the information that we utilize will be kept confidential and will also be used for this study purpose alone. If you have any questions about this study you may ask me or the principal investigator Dr Dida Batu (Tel: 0911490687 and E-mail: batudidha@gmail.com)

Signature of the interviewer which shows that the Hospital has consented (verbally) to collect data necessary for this study _____

10.4 Annexe IV Hayyama odeeffannoo qabu

Maqaan koo _____, Ani Ogeessa Anesthetist as ARTH keessatti hojjedha. Amma dhukkubsattoota ICU ARTH TB seenan gidduutti qorannoo gaggeeffamaa jiruuf Chaartii dhukkubsattoota irraa ragaa walitti qabaa jira, Dr Dida Batu Kan Yuunivarsiitii Arsiitti kaadhimamaa Fayyaa Hawaasaa ta'eef. Hospitaalichi naannoo qorannoo keessaa tokko ta'ee filatameera. Qorataan kun daataa keessan cimsee iccitii akka ta'uuf daataa walitti qabuu kanaaf na qacare, ani namoota biroo naan ala jiran maqaa keessanii fi adda baastoota biroo akka argatan hin hayyamu. Argannoon qorannoo kanaa madaallii akkaataa seensaa, bu'aa ICU fi wantoota kanaan walqabatan irratti barbaachisummaa olaanaa qabaata jennee amanna. Odeeffannoon qorannichaaf barbaachisu chaartii yaalaa keessan irraa ni fudhatama. Qorannoon kun gamaaggama galmee yaalaa qofaan waan gaggeeffamuuf hanga iccitiin eegamutti miidhaa tokkollee hin geessisu. Odeeffannoon kan fudhatamu yeroo hayyama kennitan yoo ta'u, odeeffannoon galmee yaalaa qorannoo kana keessatti akka itti fayyadamuuf fedhii qabaachuun keessan faayidaa qorannichaa ibsame galmaan ga'uuf nu gargaara. Maqaa fi adda baastonni dhuunfaa dhukkubsattootaa unka odeeffannoo walitti qabuu irratti kan hin galmoofne yoo ta'u odeeffannoon nuti itti fayyadamnu iccitii ta'ee kan eegamu yoo ta'u, akkasumas kaayyoo qorannoo kanaaf qofa kan oolu ta'a. Waa'ee qorannoo kanaa gaaffii yoo qabaattan anaas ta'e qorataa muummee dubbisuu (Dr Dida Batu (Tel: 0911490687 fi E-mail: batudidha@gmail.com)

Mallattoo nama gaaffii fi deebii taasise kan Hospitaalichi walitti qabuuf (afaaniin) hayyama kennuu isaa agarsiisu

Mallattoo

10.5 Annexes V English Version data abstraction form

The checklist prepared for Assessment of patterns of admission, outcomes, and associated factors of patients admitted to the intensive care unit of ARTH, Oromia, Ethiopia, 2023

Part one socio-demographic characteristics			
No		socio-demographic characteristics	
	Age in years	_____	
	Gender	1. Male 2. Female	
	Residence area	1. Urban 2. Rural	
	Source of admission	1. Medical ward 2. Surgical Ward 3. Emergency Department 4. Gyn –obs ward	
	Frequency of admission	1. New 2. Readmission(2 and above)	
Part two clinical characteristics of the disease			
	The admission date in the ICU	_____	
	System-wise diagnosis during admission	1. Cardiovascular disease 2. Respiratory disease 3. Trauma 4. Infectious disease 5. Neurologic	
	Common causes of admission by their diagnosis among patients admitted in the ICU	1. Endocrine disease 2. Renal disease 3. Hematologic disease 4. Poisoning 5. Miscellaneous conditions 6. Myocardial Infraction 7. Congestive Heart Failure 8. Acute Respiratory disease syndrome 9. Septic Shock 10. Traumatic Brain Injury 11. Diabetic Ketoacidosis 12. Stroke 13. Pneumonia 14. HIV/AIDS 15. Cardiogenic Shock 16. Pulmonary thromboembolism 17. Others(Specify)_____	
	vital signs during Admission	Pulse rate 1. <60 2. 60-100 3. >100 4. No Pulse Respiratory rate 1. <12 2. 12-20 3. >20 4. Apnea Peripheral oxygen saturation (SPO2) 1. <90 2. 90-100 Temperature (o’c) 1. <36.5 2. 36.5 - 37.5	

		3. >37.5 Mental status 1. Conscious 2. Confused 3. Lethargic 4. Unconscious	
	Length of stay in the ICU	_____	
	Interventions given in the ICU	1. 1. Mechanical 2. facilitation of tracheal intubation 3. 2. Antibiotics 4. 3. Anticoagulants 5. 4. Patients received inotrope support 6. 5.Others(specify)_____	
Part three information at discharge			
	Outcome during discharge	1. 1-Alive 2. 2-Died	
	Causes of death	1. 1. Shock 2. 2. Pneumonia 3. 3. Stroke 4. 4. Acute respiratory distress syndrome 5. 5. Traumatic brain injury 6. 6. Uremic encephalopathy 7. 7. Meningitis 8. 8. Ventricular tachycardia 9. 9. Acute myocardial infarction 10. 10. Cardiopulmonary edema 11. 11.Fulminant hepatitis 12. 12. Chronic liver disease 13. 13.Others(specify)_____	

10.6 Annexes VI Afan oromo version data abstraction checklist

Tarreen sakatta'iinsaa Madaallii akkaataa seensaa, bu'aa, fi wantoota kanaan walqabatan dhukkubsattoota kutaa yaala cimaa ARTH seenan, Oromiyaa, Ethiopia, 2023f qophaa'e

Part one socio-demographic characteristics			
No			
	Umrii	_____	
	Koorniyaa	1. Dhiira 2. Dhalaa	
	Iddoo Jireenyaa	1. Urban 2. Rural	
	Kutaa irraa ciibsame	1. Waardii Meedikaala 2. Waardii Sarjikaalaa 3. Kutaa Balaa Tasaa 4. Waardii Gyn-obs	
	Hamma yeroo ciibsamee	3. Haarawaa 4. Deddeebi'aa(2 and isaa ol)	
Part two clinical characteristics of the disease			
	Guyyaa ICU seene	_____	
	Haala qorannoo yeroo ciibsamuu	1. Dhukkuba onnee fi ujummoolee dhiiga 2. Dhukkuba sirna hargansuu 3. Miidhaa qaamaa 4. Dhukkuba daddarbaa 5. Niwurooloojikaalaa	

	Sababa ijoo yeroo ciibsamu akkaata qorannnootiin	1. Dhukkuba endocrine 2. Dhukkuba tiruu 3. Dhukkuba dhiigaa 4. Summaawwu 5. Haala adda addaa 6. Infraction Maayookaardiyaa 7. Dadhabbii Onnee Dhiigaa (Congestive Heart Failure) 8. Dhukkuba sirna hargansuu cimaa (acute Respiratory disease disease). 9. Shookii Septikii (Septic Shock) 10. Miidhaa Sammuu 11. Traumatic Brain Injury 12. Dhukkuba sukkaaraa Keetoacidosis 13. Stroke 14. Dhukkuba daranyoo sombaa 15. HIV/AIDS 16. Shookii Onnee 17. Dhibee thromboembolism sombaa 18. Kan biroo(Specify)_____	
	mallattoolee barbaachisoo yeroo Seensa	Saffisa dha'annaa onnee 5. <60 6. 60-100 7. >100 8. No Pulse Saffisa sirna hargansuu 5. <12 6. 12-20 7. >20 8. Apnea Saturaashinii oksijiinii naannoo (SPO2) . 3. <90 4. 90-100 Ho'inna Qaamaa (o'c) 4. <36.5 5. 36.5 - 37.5 6. >37.5 Haala sammuu 5. Conscious Kan of beekuu 6. Kan Itti bitaacha'aa 7. Lethargic 8. Kan of wollale	
	Yeroo dheerinna turtii ICU keessatti	_____	
	Yaaloota ICU keessatti kennaman	1. Makaanikaala qilleensaa 2. haala mijeessuun tracheal intubation 3. Antibaayootikii 4. Anticoagulants 5. Dhukkubsattoonni deeggarsa inotrope argatan 6. Kan biroo(ibsi)_____	
Part three information at discharge			
	Bu'aa Yeroo bahiinsa	1. Lubbuun jira 2. Du'eera	
	Sababa Du'aatii	1. Of wollaluu 2. Daranyoo Sombaa 3. Istrookii sammuu 4. Dhibee sirna hargansuu cimaa (acute respiratory distress	

		syndrome). 5. Miidhaa SammuuTraumatic 6. Uremic encephalopathy 7. Dhukkuba meninjaayitii 8. Taakikaardiyaa veentireetaraa 9. Infarkiishinii maayookaardiyaa cimaa 10. Cardiopulmonary edema 11. Dhukkuba tiruu guutuu 12. Dhukkuba kalee yeroo dheeraa 13. Kan biroo(specify)	
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Declaration of Investigator

I, the undersigned student of Master of Public Health, declare that this proposal is my original work in partial fulfillment of the requirement for the degree of Master of Public Health to the best knowledge.

Dr Dida Batu

Signature: _____ Date _____

Declaration of Advisors

We, the undersigned Advisors, declare that this proposal is our original work in partial fulfillment of the requirement for the degree of Master of Public Health for the stated student above to our knowledge. We confirmed that this proposal is ready for defense with our approval as the university advisor(s).

Date of Submission: _____

Name of primary Advisors:	Signatures	Date
1. _____	_____	_____
Name of secondary Advisors:	Signatures	Date
2. _____	_____	_____