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St. Paul's Hospital Millennium Medical College

SCHOOL OF NURSING

DEPARTMENT OF EMERGENCY AND CRITICAL CARE NURSING

TIME TO DEATH AND PREDICTORS AMONG PATIENTS ADMITTED TO ADULT
INTENSIVE CARE UNIT AT SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL
COLLEGE; SURVIVAL RETROSPECTIVE COHORTS STUDY

INVESTIGATOR: - AKELE TEGEGNE GIZAW

FEBRUARY, 2022

ADDIS ABABA, ETHIOPIA



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ABSTRACT

Background: An intensive care unit serves for extremely ill patients manage by using life saving intervention. Many developing countries continue to experience high mortality of patients admitted to intensive care unit. Ethiopia has several hospitals with intensive care unit and the rate of mortality is varied from institution to institution.

Objectives: To estimate median time to death and predictors among patients admitted to adult intensive care unit at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2022.

Methods: A retrospective cohort study was conducted among 359 patients admitted to adult intensive care unit at St.paul's Hospital Millennium College for 60 months. Data were collected from December 10, 2021 and December 30, 2021 by reviewing medical charts of patients who were admitted from July 1st 2016 - June 30th, 2021. EPI data version 4.6 were used for data coding, entering and Exported to STATA version 16 statistical software for analysis. Bivariable and multivariable Cox-proportional hazards regression analysis was used. The association between time to death and predictors verified with 95% confidence interval and P-value < 0.05. Schoenfeld Residuals used to check proportional hazard assumption.

Result: A total of 359 admitted patients to adult intensive care unit were followed 2819 person- day. During the follow up period 155(43.17%) died making incidence rates of 55 (95%CI: 47, 64) per 1000-person day. Median time to death in adult intensive care unit was 13 (IQR: 4, 38). Shock (AHR:2.38(95%CI: 1.48,3.262) ,use of mechanical ventilation as intervention(AHR:0.24(95%CI:0.09,0.61),use of sedation as intervention (AHR:2.17(95%CI: 1.27,3.26) were predictors of admission to death at a P-value < 0.05).

Conclusion: forty-three percent of admitted adult patients in the ICU had died with median time to death 13 days during the entire cohort. Shock, use of mechanical ventilation as intervention, use of sedation as intervention after admission were identified as a predictor of death among patients admitted to adult intensive care unit at St.paul's Hospital Millennium College.

Key words: Time to death, Predictor, Intensive Care Unit

ACRONYMS AND ABBREVIATIONS

ACLS	Advanced Cardiac Life Support
AKI	Acute Kidney Disease
ARDS	Acute Respiratory Distress Syndrome
BLS	Basic Life Support
CHF	Congestive Heart Failure
DKA	Diabetic Keto Acidosis
GCS	Glasgow Coma Scale
ICU	Intensive Care Unit
LOS	Length of Stay
MI	Myocardial Infarction
MOF	multisystem organ failure
MRN	Medical Registration Number
MV	Mechanical Ventilator
PR	Pulse Rate
RR	Respiratory Rate
SaO ₂	Saturation of Oxygen
DBP	Diastolic Blood Pressure
WFSICCM	World Federation of Societies of Intensive and Critical Care Medicine

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1. INTRODUCTION

1.1 Background

Intensive care is a challenging and complex aspect of healthcare delivery. Intensive care unit is the part of the hospital where care is provided to the sickest patient. [1] According to World Federation of Societies of Intensive and Critical Care Medicine, intensive care unit is an organized system for the provision of care to critical ill patients that provides intensive medical and nursing care, enhanced capacity for monitoring to sustain life during a period of life-threatening organ system insufficiency.[2] It classifies as level 1:-parts of hospital where the patient does not require organ support, only to providing oxygen with noninvasive methods, level 2 (High dependency unit):-Patients need single organ support (excluding mechanical ventilation) and level 3(Intensive care):- Patients requiring two or more organ support (or needing mechanical ventilation alone) and Staffed with one nurse per patient and usually with a doctor present in the unit 24 hours per day. [2][3] An ICU needs the presence of well trained and experienced intensive care workers 24-hours-a-day, 7-days-a-week [4],Consists of nurses, specially trained in intensive care, one or more and a variable number of nurse assistants, technicians and cleaners.[5]

Worldwide; intensive care units (ICUs) have significantly improved the quality of care and outcomes of critically ill patients, mostly in developed countries. [6] In sub-Saharan Africa, ICUs have varying qualities and quantities due to low resource availability, hospital setting, infrastructure, political commitment for the provision of proper critical care services.[7] Quality of intensive care unit outcome measures through, mortality, mean duration of stay in ICU, mean duration of stay on mechanical ventilation, optimal pain therapy, patient and relatives satisfaction.[8]

The decision to admit an acutely deteriorating patient to the ICU is complex and wants senior involvement by considering on each patient's presenting symptoms and physical examination to predict outcomes, based on disease process, physiological parameters prior to admission, age and co morbidities, laboratory findings. [9][10] A prime requisite for admission to an ICU is to overcome the life-threatening condition.[3] Patients requiring intensive care require support for instability, airway for ventilator support, acute renal failure for Hemodialysis potentially lethal cardiac arrhythmias or commutative effects of MOF, crucial hours after

major surgery, only offered to those whose condition is potentially reversible and who have a good chance of surviving with intensive care support.[11][12] More than 5 million patients are admitted annually at U.S. in intensive care unit for; support of airway, breathing, circulation; stabilization of life-threatening medical problems; comprehensive management of injury and/or illness; and maximization of comfort for dying patients [13] with admission criteria of respiratory rate <8 BPM or >40BPM, oxygen saturation <90 on >50 % oxygen, pulse rate <40beats per minute or > 140 beats/minute, SBP <90mmHg, GCS< 8(3). The commonest indications for admission to the IUC were head injury [7] stroke [14], shock [15],[16],[17], Cardiac arrest[18], postoperative. [19])

The ICU is the ideal setting for mortality predictive because of the population in ICU is well defined, heterogonous (because of the case-mix of patients),care is well circumscribed, [20] mortality rates in the ICU strongly depend on the severity of illness. [20] [21] The reported mortality rates of patients admitted to ICUs in sub-Saharan Africa vary widely from one population to another.[22][23] Most commonly used outcome measure from critical care has been patient survival and mortality rate. [24] Over four million intensive care unit admissions occur annually in the United States each year, of which 20% were at risk to for death while receiving intensive care services. [25] Intensive care unit around the world, admit critically ill patients for advanced organ support with the goal of improving patient mortality outcomes. [26]

patients admitted to an ICU have a higher risk of hospital-acquired infections and the incidence of sepsis in intensive care units continues to rise and being a strong independent predictor for mortality.[27][28][29] Financial restraints due to severe logistic and educational problems account for high morbidity and mortality rates in ICUs of low developed countries. [30] Progressive decisions regarding appropriate levels of critically ill patient care were become necessary in low developed countries and provide reasonable aid to improve the care of the most severely ill patients.[31] This is best achieved through a multidisciplinary team approach, with shared responsibility. [21]

1.2 Statement of the problem

Globally ICU admissions varies across continents from 4 million per year in the United States with 20% of deaths occur in the intensive care units which is highest mortality compared to any other sections of a hospital.[13][25] In developing countries including Africa the prevalence of mortality in intensive care unit roughly ranges from 30-50%.[32][33] Ethiopia is in a similar situation ranges 27% to 50.4%.[34][35] One of the most important challenges of the health care system is to improve the quality of life, reduce the length of stay and reduce mortality.[36]

Nowadays, Mortality of critical ill patients is high. Do to Easy access to the ICU and increased facilities have caused people to be taken to ICU before death. However, the mortality is closely associated with ICU facilities and medical equipment, services and the quality of medical and nursing care, the number of medical personnel and nurses, different wards, characteristics of patients and types and severity of diseases. [37][38] Major progress has been advances to reduce mortality in intensive care unit[18],like development of new technologies.[24][39] Improvement of this outcome parameter in critical care is expected not to come from new technologies or treatment, but from delivering the right care at the right moment.[40] It has several advantages when compared to other sources of health information such as morbidity data in that death is a unique event, because of its finality and cause of death are useful in explaining trends and differentials in overall mortality; guiding priorities for intervention program; monitoring of intensive care program; allocating and distribution of resources within the hospital. [41]

ICU serves for extremely ill a patient and its impact on mortality is high [24]. Many predicting variables contribute to death after the patient is admitted in ICU. Investigating the factors associated with mortality of critical ill patients, admitted to ICU will help to evaluate the prognosis and find optimal management. Early studies done in Ethiopia Several factors that led to death were identified, including age, use of mechanical ventilator, diagnoses at admission of ARDS, patients with vasopressor drug, patients having co- morbidity.

To the level of this search Research conducted on the survival of patients admitted to an intensive care unit, and the causes and the timing of death admitted in ICU have been poorly reported. Therefore, further investigation is needed to knowing timing of death of critical illness patients after intensive care unit admission to identify the group of patients when they have higher probability of death and to recognize the factors associated with mortality.

Considering all these burdens and lack of local data, this study is intended to fill the gap, there has been ample interest to study on time to death and predictors on hospital based, particularly intensive care unit to obtain reliable data to determine median time to death and the cause of deaths, when most death is occurred in intensive care unit after admission. Therefore, the aim of this study was estimated the median times to death after admitted to intensive care unit and determine the Predictors of mortality.

1.3 Significance of the study

Estimation of mortality among patients admitted in intensive care unit is a cornerstone for tracking progress towards survival goal and identifying causes that leads to death in ICU. Improvement in survival is good indicator of quality care in ICU as the same way determine the Predictors of mortality. Studying survival of intensive care unit admitted patients has important practical implications for health care professional to know how prognosis of the patient is changing overtime, to provide an essential initiation for early treatment modalities and improve quality of care.

As researches are few on in this topic in the area in particular and Ethiopia in general, this study will be important for health care providers to provide effective high quality based care to ICU patients, to select the best care to be given for the patients and to provide precise decision to clinicians and patients and may stimulate and motivate researchers to do more detailed research in the field in the future.

Moreover, the study can be an important input to policymakers, ICU program managers, and health professionals in order to implement early detection, prioritize intervention, estimate survival rate of patients, to support the planning systems for better intensive care service. Finding from this study, will enable for the identification of factor that may predict mortality in ICU that is currently in place and appropriate recommendations will also be made.

Lastly, it can be used as source of reference for future research and educational purpose, this encourage researchers in the area of field to undertake future research project about time to death and its predictors of patient admitted in the intensive care unit.

2. LITERATURE REVIEW

This chapter focuses on the time to death and predictor's regarding patient's admitted in intensive care unit. The literature covers an overview of mortality, predictors of mortality. There were several studies conducted on survival and predictors mortality in intensive care unit admissions in the world, Africa and Ethiopia only those that are found to be relevant to this study were included. The different literatures found were summarized as follow.

2.1 Prevalence of ICU mortality

Mortality in ICU is a global burden. It varies across the world depend on ICU infrastructure, staff availability, and training, pattern, and cause of ICU admission. Intensive care unit mortality rates vary according to the study population, the underlying disease process, with death rates as low as 1 in 20 for patients admitted following surgery, and as high as 1 in 4 for patients with respiratory diseases.[42] A multi-country, study conducted in developed countries like North America, Oceania, Asia and Europe in ICU mortality relatively low with the rate of 9.3%, 10.3, 13.7% and 18.7% respectively, while in the rest of the world such as South America, and the Middle East the mortality found to be 21.7% and 26.2 %.[6][16] An intensive care multicentre European cohort study recruiting 10,069 participants from ICUs patients in Europe (5445(54.1%)), Asia (1928 (19.2%)), America (1723(17.1%)), Oceania (439(4.4%)), the Middle East (393(3.9%)), and Africa (141(1.4%)) revealed that the prevalence of mortality in ICU was 16.2% across the whole population.[21] Other observational multicenter cohort study performed in 96 intensive care units at French revealed ICU mortality was 20%.[43]

In Africa studies done in different countries indicated that the overall intensive care unit (ICU) mortality remains high. For example, the overall ICU mortality was 24% in Sudan[7],32.9% in Nigeria [44], 41.4% % in Tanzania[14], 43.7% in Uganda [30], 63.6% in Burkina Faso. [45] Five year analysis study conducted at Tertiary Care Center of a Developing Country in West Africa shows that out of 647 patients admission into the ICU, 38.7% survived, out of which 97.6% transferred to ward from the ICU, 2% were discharged home, 0.2% was left against medical advice while 61.4% of total admissions died. [46]

A sixteen years prospective case series study was done at Black Lion Specialized Hospital ICU shows that overall mortality of ICU was 1117 from 3548 ICU admissions, which was 32% with mean length of stay in the ICU was 4.2. [35]

2.2 Associated factors of ICU mortality

The cause of death can be approximated by evaluating the severity of a patient's illness as determined by important physiologic, clinical, and demographic determinants. Evidence revealed that the outcomes of patients in ICU is greatly related to different factors including but not limited to the source of admission, pattern of diseases, the severity of the disease, infrastructure, trained medical staff, nursing care, medical supplies, age of patient, sex of the patient, presence of co-morbidities and multi organ failure, pre-hospital care, emergency care, mechanical ventilation, length of ICU stay, dissemination of antimicrobial-resistant microorganisms and inappropriate use of antibiotics.[47][15][16][17][18][35]

2.2.1 Socio-demographic factors

A study conducted in USA on Association of gender with outcomes in critically ill patients indicated that ICU mortality was statistically significant interaction between gender and age [48]. ICU mortality increased with increasing age (27.4%, 32.1% and 35.5%) for those less than 25, 25 to 50 and greater than 50 years of age respectively. [35] In Kenya age greater than 60 years was four times higher ICU mortality, [49] Female sex was statistically associated with higher mortality. [23]

2.2.2 Clinical factors

Study conducted in Brazil on Mortality Predictors and Associated Factors in Patients in the Intensive Care Unit indicated that dehydration, tube feeding, and the use of anticonvulsant drugs increase the prevalence of death.[13] Other multicenter cohort study performed in 96 intensive care units at French revealed mortality among medical admission and surgical admission were 59.6% and 37.4% respectively.[43] Another study of medical neurological and obstetric patients admitted to ICU in Enugu, the mortality rates were Neurological (43%) and critical care obstetric (33.3%).[23]

Other Studies indicated that ICU mortality because of infection, sepsis, and septic shock was among the main factors contributing to mortality in intensive care units.[29][31][50] and at the time of death (84%) patients had one or more co morbidities, and required at least one organ support.[43] Compared with those in general wards, patients admitted to an ICU have a higher risk of hospital-acquired infections and the incidence of sepsis in intensive care units continues to rise and being a strong independent predictor for mortality.[21][29][28]

In Ethiopia study done at Jimma University Specialized Hospital shows from regarding 370 ICU admission 50% accounts as a diagnosis medical case, 43.2% surgical, 5.8% obstetrics and their corresponding mortality rate were 53.6%, 48%, and 42.9% respectively, with mortality rate was 50.4%, with average length of stay was 3 days.[34] A study conducted by Gonder University hospitals ICU shows from regarding 503 ICU admission diagnoses problems with cardiovascular 36.1%, respiratory 17.9%, infection (13.1%), neurological (8.7%) with overall ICU mortality rate was 38.7%, and average length of stay of 4 days.[16]

2.2.3 Interventional factors

Since Patients with life-threatening conditions are treated in the intensive care unit, it's; treatment success and mortality rates in the ICU depend on the adequate utilization of human and technological sources.[39] Study at intensive care unit indicates use of mechanical ventilator greater than 2 weeks, stay in ICU greater than 2 weeks were factors that associated for ICU death.[45] In Ethiopia studies have been conducted to identify the factors increasing the risk of mortality in ICU mortality has been associated with the length of hospitalization, patients' clinical condition at admission, having GCS<8, needs of mechanical ventilation, use of vasopressor drugs, and Socio-demographic characteristics.[14][15][16][17][18][51]

Study conducted in southern part of Ethiopia shows that patients with cardiac arrest, patient's candidate for MV, length of ICU stay greater than 14 days and Glasgow coma scale less than 8 at admission were an independent predictor for mortality.[52] [18]

2.2.4 Time factors

A study conducted around the world revealed that from the total 9258 admission (22.3%) died and 77.7 survive during the study period. Of 2062 death 52% of death occurred in the first 5 days of admission and 39% died after 6-28 days of admission and 9% died after 28 days of admission with median length of stay was 5 (IQR 2-13) days.[13] ICU mortality with mean hospital stay for those who died was 2.61 days and 50% of those who died stayed 2 days in the ICU.[35] Other study conducted in TASH ICU shown that patients with very short stay in ICU appear to have high mortality rate with the mean hospital stay for those who died was 2.61 days and 50% of those who died stayed two days in the intensive care unit[53] with admission duration less than 6 days had higher mortality. [23]

Summary

The overall ICU mortality rate were vary in different region of Ethiopia ranges from 27%-50.4%. length of stay in intensive care unit greater than 14 days, use of mechanical ventilator, age >60 years, diagnoses at admission of ARDS, patients with vasopressor drug support, patients having co morbidity were identified as predictors of death in ICU admission.

2.2.5 Conceptual frame work

The following abstract frameworks figure shows the interaction of different variables with outcome variables of the study that contains demographic factors, time factors, clinical factors and interventional factors of patients admitted to ICU factors which is adapted from different articles and to some extent modified.[14][15][16][17][18][51]

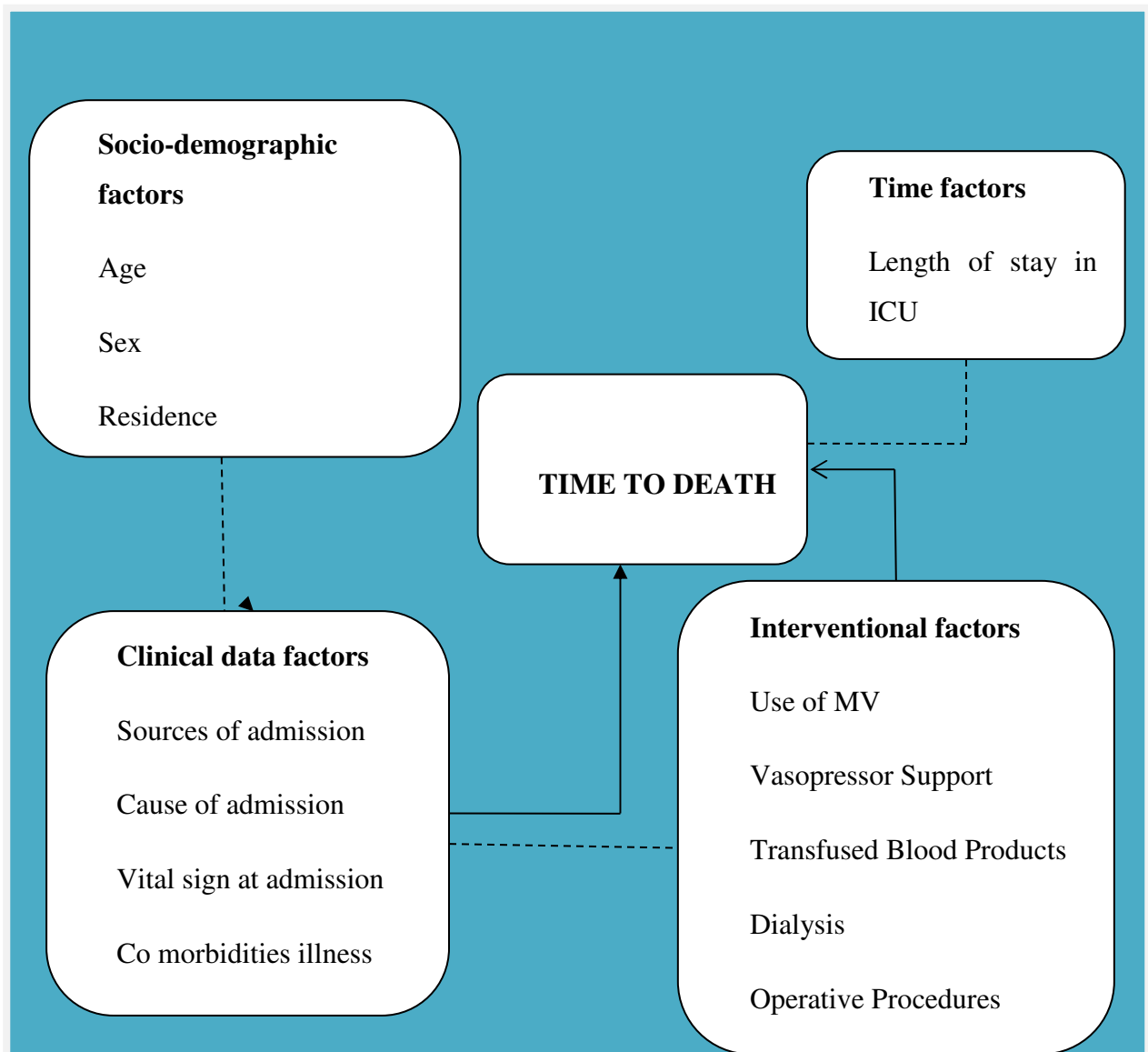


Figure 1: Conceptual framework of time to death and its predictors among patients admitted to intensive care unit at Saint Paul's hospital millennium medical college, from 2016-2021 Addis Ababa, Ethiopia, 202

3. OBJECTIVES

3.1 General objectives

To determine time to death and predictors among patients admitted to adult intensive care unit at Saint Paul's Hospital Millennium Medical College from 2016 to 2021, Addis Ababa, Ethiopia, 2022.

3.2. Specific Objectives

To estimate median time to death among patients admitted to adult intensive care unit at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2022.

To identify predictors of mortality among patients admitted to adult intensive care unit at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2022.

4. METHODS AND MATERIALS

4.1 Study area

This study was conducted at SPHMMC administered by the Federal Ministry of health and ministry education found in Addis Ababa, Ethiopia. The Hospital was established in 1947 around Mercato presently known as regional bus terminal and shifted in the current place in 1969 (was named St Paul's General Specialized Hospital until 2008) by Emperor HaileSelassie in collaboration with the help of the German evangelical church, as a source of medical care for underserved populations. Currently, it has over 480 beds, with an annual average of 300,000 patients and catchment populations of more than 5 million. Approximately 75% of the patients receive medical services free of charge. There is over 2000 clinical and non-clinical staff in over 20 departments. It serves as training and teaching center for undergraduate, postgraduate and subspecialty programs for health and related professionals, who tackle the health problems of the community and the country at large. The ICU service of SPHMMC was started in 2006 with six bed and updated in 2019 as a capacity of 14 beds with 14 mechanical ventilator, two defibrillators, 14 non invasive hemodynamic patient monitoring, one ultrasound, one portable x ray, one portable Echo, and one ABG machine run under the department of ICU directorate. The services offered include mechanical ventilation support, post operative care, inotropes support using infusion pump, intensive nursing care, Hemodialysis, ACLS and BLS. Currently the ICU is staffed by 46 nurses who works on three shifts, intensivists (one), pulmonologist and critical (four), anesthesiologist (one), gynecologist (one), cardiologist (one), surgeons (one), residents (two up to three), runners, cleaners.

4.2 Study design and period

The study was employed a hospital based retrospective cohort study. The data was retrieved between, December 10, 2021 to January 10, 2022

4.3 Population

4.3.1 Source population

Source population was all patients admitted at adult ICU in SPHMMC.

4.3.2 Study population

The study population was selected patients admitted to adult intensive care unit in SPHMMC from 2016-2021.

4.3.3 Study unit

Each selected Patient's chart admitted to adult intensive care unit at SPHMMC, from 2016-2021 and fulfill the inclusion criteria was included in the study.

4.3.4 Eligibility criteria

4.3.4.1 Inclusion criteria

All records of patients who were admitted to adult ICU at SPHMMC from 2016-2021.

4.3.4.2 Exclusion criteria

Patients who were admitted to adult ICU at SPHMMC from 2016-2021, but whose records lack admission date, discharge date, treatment outcome and Patients' whom cards are not available in card room at the time of data collection.

4.4 Sample size determination

The minimum sample size for the first objective, death as an outcome of ICU patients, was determined by Single population proportion formula with the following assumptions were considered:-

P = proportion of mortality of admitted patients in ICU, 32%, from study conducted in TASH [35].

$Z_{\alpha/2}$ = Z-score of 95% (Confidence level 95%)

d= is a tolerable margin of error (5%)

n= minimum sample size required for the study

Contingency for non-response rate 10%

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

$$n = (1.96 * 1.96) * 0.32(1-0.32) / 0.005 * 0.005 = 335$$

$$n = (1.96)^2 * 0.468 * 0.532 / (0.05)^2 = 335$$

The ultimate sample size of records to review was 368 with 10% compensation for possible Non response rate according to the above formula.

For the second objective, the sample size was determined by using EPI info version 7.2.4.0 statistical package by considering cardiac arrest and use of mechanical ventilation as predictor variables of ICU death based on study done in Southern Ethiopia[18]. It is calculated by taking two-sided significant level (α) of 5 %, power (ZB) 80 % and 1:1 ratio of non-exposed to expose parameters: -

P1- %of death outcome among exposed patients

P2- % of death outcome among unexposed patients

Table 1: Sample Size calculated based on some predictor variables of death from different studies done in Southern Ethiopia.

Variables	Proportions (%outcome)	Total sample size	After adding 10%
cardiac arrest	P1=19% P2= 56%	62	69
Use of MV (yes/no)	P1= 33% P2= 63%	98	108

The sample size calculated for the first objective was larger than second objective, so the highest sample size calculated for the first objective 368 taken as the final sample size.

4.5 Sampling Procedure

The sampling frame was records of all patients admitted in adult ICU at SPHMMC from July 1st 2016 - June 30th 2021, for consecutive five years. According to the data obtained from SPHMMC adult intensive care unit admission / discharge registration log books from July 1st 2016 - June 30th, 2021, total numbers of patients admitted to intensive care unit in five years were 1195. The study subject has been taken from each year to proportionate allocation formula by: - dividing the admission number of patients in each year to the total number of admission in the five years multiplied by the final sample size as shown below:

Proportional to size allocation formula = $\frac{n_i}{N} \times n_f$

Where:

n_i - number of admission in each year

n_f - final sample of the study (368)

N- Total number of admission in five consecutive years (N= 1195).

Then medical registration number (MRN) of all admitted patients was sorted. Then using Patient medical registration number their charts were selected by computer generated random sampling technique. Finally the selected medical registration number was picked out the medical card of each admitted patient.

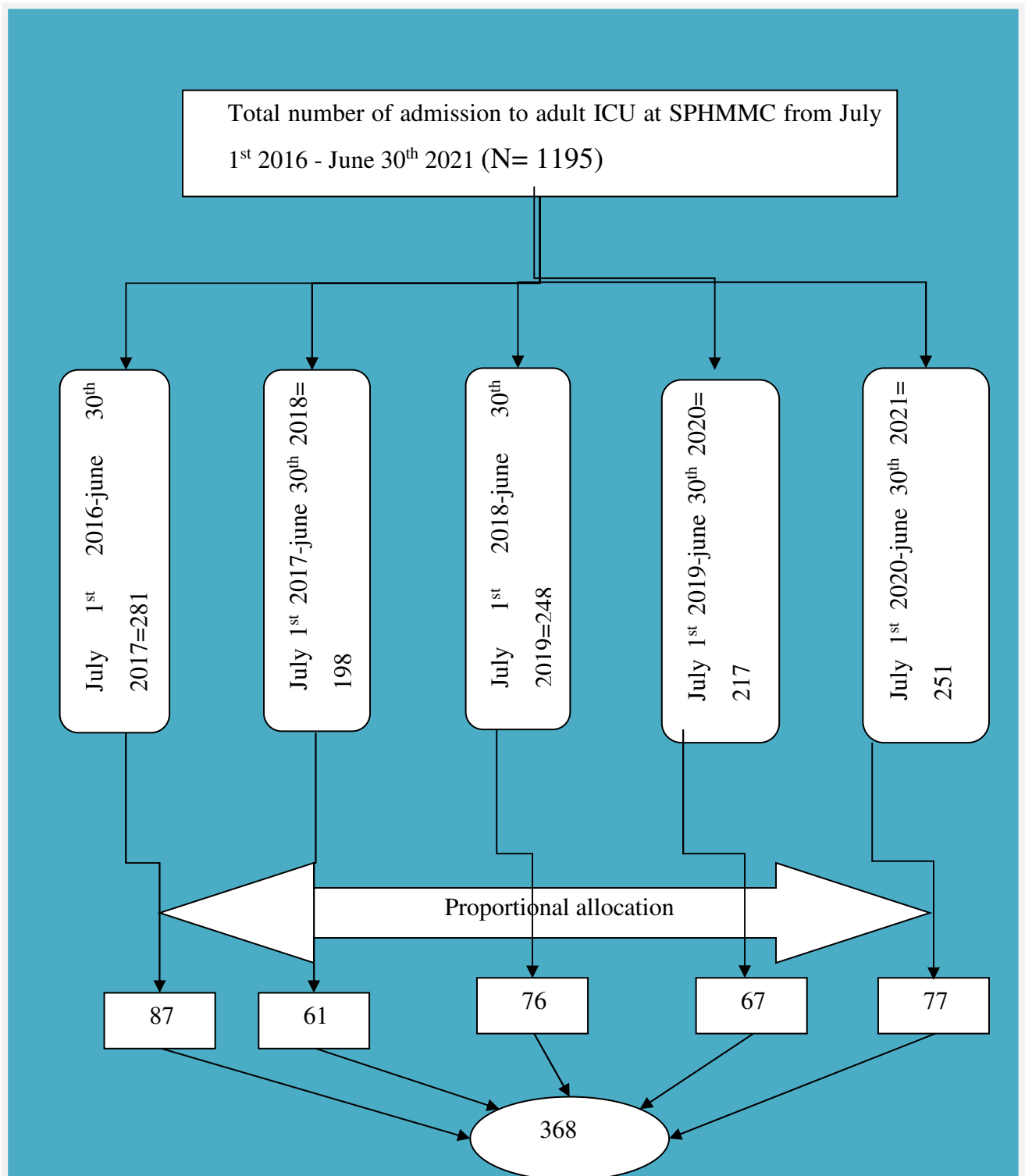


Figure 2 : Schematic presentation sampling procedure to estimate time to death and its predictors among patients admitted to intensive care unit at Saint Paul's hospital millennium medical college, from 2016-2021 Addis Ababa, Ethiopia, 2022

4.6 Variables

4.6.1 Dependent variable

Time to death

4.6.2 Independent variables

Independent variables including, age, sex, address, source of admission, cause of admission, vital sign on admission, use of mechanical ventilator, co-morbidities, interventions during ICU

4.7 Operational definition

Censored: patients who were referred, against medical advice, improve at the end of follow up or patients who didn't develop the event

Event: The state of being died among patients admitted to adult intensive care unit during the study period at specific time measured by number of day.

Survival status: the outcome of patients admitted in ICU which classified in to censor or death from patients' data.

Survival time: Measures the follow-up of time from starting point/from admission in ICU up to the occurrence of the event.

Time of origin: the first date of admission in intensive care unit.

Time scale: both event and censored is counted and measured in days.

Time to event: Time from the first admission date in ICU up to death.

4.8 Data collection tools and procedure

The sources of data for this study were patients' chart in those admitted in adult ICU at SPHMMC. Data was collect using data extraction tool, adapted and modified from different related studies.[14][15][16][17][18][51] This data extraction format consists of socio-demographic characteristics (age, sex, address), admission diagnosis, date of admission and discharge, vital sign during admission (temperature ,respiratory rate, pulse rate ,systolic blood pressure, saturation of oxygen ,Glasgow coma scale), co-morbidities, source of admission (Emergency, Medical war, Surgical ward ,Operation theatre, obstetrics and Obstetric

Gynecology) intervention given during admission (mechanical ventilator support , vasopressor support ,intravenous sedation, blood transfusion, operative) and outcome of the patient.

Four data collectors (BSC nurse) and two supervisors (BSC) who are not employee in the study hospital was be recruiting in order to reduce bias. One day training was given for data collectors and supervisors to ensure common understanding regarding the aims of the study, contents of the checklist, methods of extract the needed data from the chart, data collection process and ethical aspects of the extracted data from SPHMMC adult intensive care unit admission / discharge registration log books and patient medical record.

4.9 Data quality control

To keep data quality supervisor and data collectors were trained on how and what information, collect from the targeted data sources. Data was collected by BSC nurse who are not employee at the study hospital after one days training on the techniques of data collection.

The prepared data extraction tool was pre-tested on 5% (18 samples) of the total sample size at SPHMMC intensive care unit prior to two weeks from the actual data collection periods and the results was not reported in the actual study. Therefore, marital status, religions were made and unrecorded variables added or reduced from the abstraction tool after the pretest results.

To make sure data quality during the data collection time the data was evaluated daily for completeness, data consistency and encounter difficulties by principal investigators and supervisors. Lastly, the investigator was checked & gathered data consistency and completeness during the data management, storage, and analysis, randomly select cards and check for gathered data quality.

4.10 Data process and analysis

Before data entry, the abstraction checklist was checked for completeness. Cleaned and coded data entered in to EPI-data 4.4.2 Software and exported to STATA Version 16 for analysis. Descriptive characteristics were reported as medians with interquartile range (IQR), proportions , frequency and percent using different charts like table, graphs (both excel and STATA form).

Participant's outcome was dichotomized in to censor and death. The Kaplan-Meier estimator with log rank tests was used to estimate median time to develop the event during the study period and to compare survival curves after ICU admission. Predictors of mortality were analyzed by Cox proportional hazard model. Accordingly those variables having p-value < 0.25 in the Bivariable analysis were fixed to the multivariable Cox- proportional hazards regression model with 95% CI to control confounders.

Finally P-value of < 0.05 was considered as a statistical significant and Hazard ratio with 95% CI and P-value were used to measure the strength of association and statistical significance. Goodness of fit of proportional hazard assumptions was checked by Schoenfeld Residuals tests.

4.11 Ethical consideration

Prior to the study, ethical approval was obtained from SPHMMC Institutional Review Board with reference number pm23/482/2021. Permission letters were also sought from vice provost of SPHMMC. Consents were also obtained from intensive care unit head and card room head. There was no direct contact with patients as such, informed consent from the patients /parents of the patient was not obtain; however, all the necessary measures were taken to maintain and assure the privacy, confidentiality and all benefits of the patients. To keep the confidentiality all collected data was coded and names excluded from data extraction format.

4.12 Dissemination of the result

Result of this study will present to SPHMMC, school of nursing, department of emergency and critical care nursing as a partial fulfillment of masters in critical care nursing practitioner and in local or internationally hold seminars and workshops. This thesis document will submitted to St. Paul millennium medical college and ICU directorate. Efforts will be made to publish the findings on peer-reviewed scientific journals.

5. RESULTS

5.1 Socio-demographic characteristics of patients admitted in adult ICU

Totally, three hundred fifty nine charts were met enrollment criteria and reviewed in the final analysis reviewed which accounts 97% response rate, of which, about 155 (43.1 %) were males and majority of 203(56.5%) participants came from Addis Ababa town. The median age of the cohort was 35 years (IQR: 26,50years) with range of 15 to 94 years old. The majority of patients were in the age range of 19–39 years 207(57.7%) and the list is in the age range of < 19 years 18(5%).

5.2 Admission characteristics of patients admitted in adult ICU

The majority sources of Admissions were came from the emergency department (47.6%) while the lowest were from surgical ward (5%). (Figure 3)

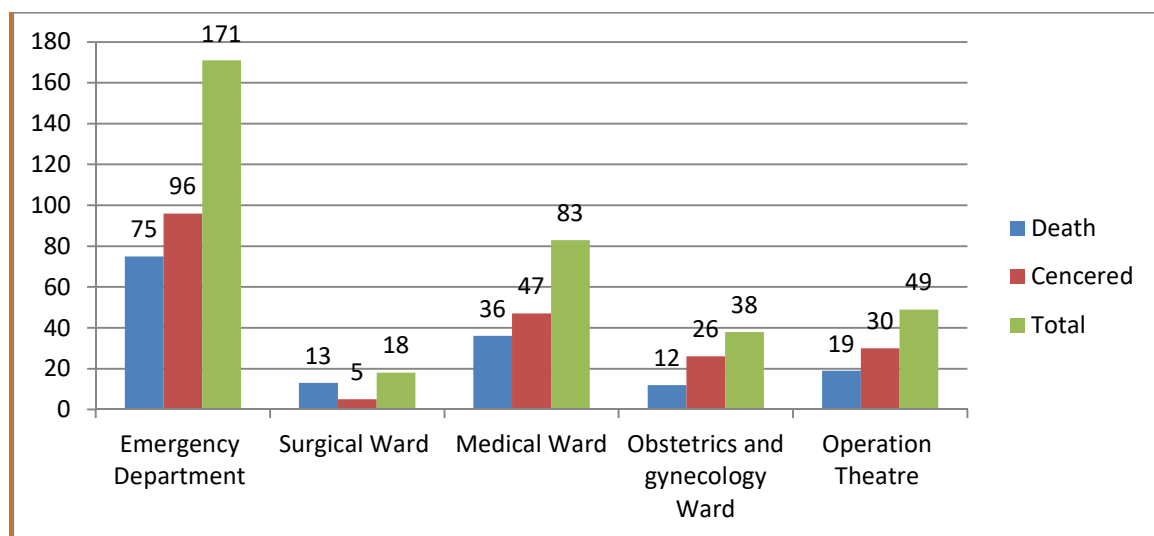
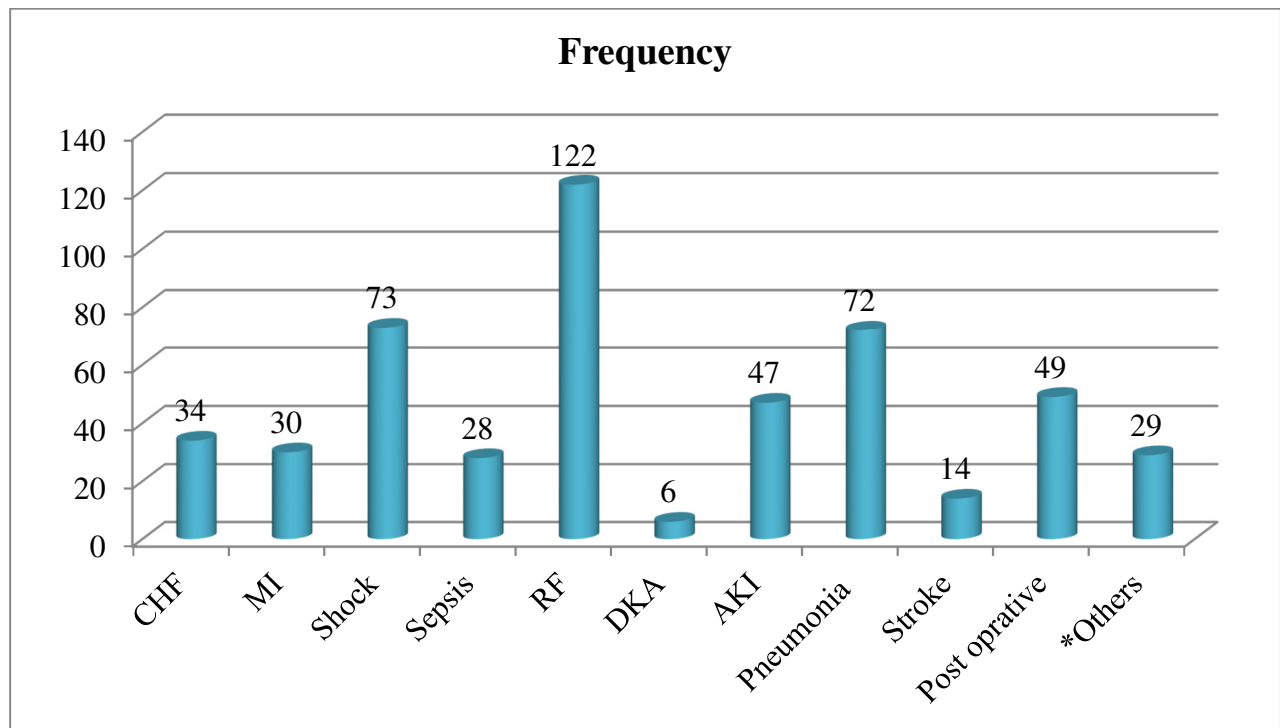


Figure 3: Distribution of patients based on sources of admission and outcomes among patients admitted in adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

This study also identifies different admission causes among 359 cohorts. The commonest causes of ICU admissions were respiratory failure while the list was DKA. (Figure 4)



***Others:** ARDS, Eclampsia, Poisoning, Trauma, Meningitis, Myasthenia gravis, Asthma, Tetanus

Figure 4: Distribution of patients based on causes of admission among patients admitted in adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

At admission More than half 189(52.65) of patients had a pulse rate greater than a hundred beats per minute while 105 (29.24%) patients had pulse rate less than sixty beats per minute. At admission 188 (52.3%) of the patients had a respiratory rate greater than twenty breaths per minute while 84(23.3%) of patients had a respiratory rate less than twelve. at admission 149(41.5%) of the patients were hypoxemic (oxygen saturation less than 90%) while 132(36.8) of patients had a GCS score of less than eight at admission. (Table 3)

Table 2 : Distribution of patients based on vital sign on admission of patients admitted to adult ICU at SHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

Variables	All admissions (n, %)	Death (n %)	Censored (n %)
	(n=359)	(n=155)	(n= 204)
Vital sign on admission			
Pulse rate			
<60bpm	105(29.2)	53(34.2)	52(25.5)
60-100bpm	65(18.1)	21(13.5)	44(21.5)
>100bpm	189(52.7)	81(52.3)	108(53.0)
Respiratory rate			
<12rpm	86(24.0)	49(31.6)	37(18.1)
12-20rpm	85(23.7)	30(19.4)	55(27.0)
> 20 rpm	188(52.3)	76(49.0)	112(54.9)
Blood pressure (Diastolic)			
<60 mmHg	131(36.5)	69(44.5)	62(30.4)
60-90 mmHg	96(26.7)	33(21.3)	63(30.9)
>90mmhg	132(36.8)	53(34.2)	79(38.7)
oxygen Saturation			
<90 %	149(41.5)	68(43.9)	81(39.7)
90%-95%	199(55.4)	85(54.8)	114(55.9)
>95%	11(3.1)	2(1.3)	9(4.4)
Temperature			
<36.5 °c	68(18.9)	36(23.2)	32(15.7)
36.5-37.5 °c	207(57.7)	81(52.3)	126(61.8)
>37.5 °c	84(23.4)	38(24.5)	46(22.5)
Glasgow coma scale			
<8	132(36.8)	71(45.8)	61(29.9)
8-12	169(47.1)	64(41.3)	105(51.5)
>12	58(16.1)	20(12.9)	38(18.6)

5.3 Co- morbidity and Intervention

Two hundred fifty one (69.9%) Patients admitted to ICU had one or more co morbidity. The respiratory disorders were the commonest co morbidity 81(32.27%) followed by cardiovascular disorders 72(28.68%), infectious disorders 71(28.28%), neurological disorders 54(21.51%) and renal disorders 54 (21.51%). (Figure 5)

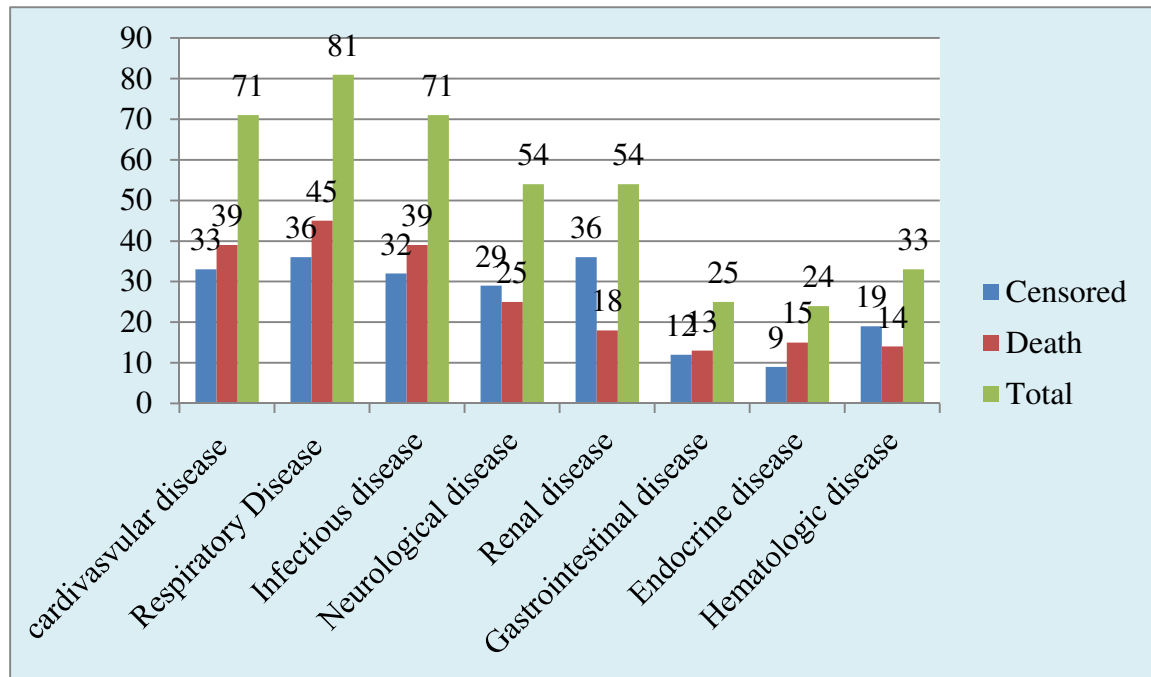


Figure 5: Distribution of patients based on patterns of death and censored based on co morbidity of patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

The majority of 288(80.22%) of patients admitted to ICU were used a mechanical ventilator as an interventions in intensive care unit, of them 148(51.38%) died during follow up. 149 patients were used vasopressor as an intervention and 84 patients were died. while 113(31.47%) of them were on sedation, of them 59 died during the follow up. (Table 4)

Table 3: Distribution of patients based on Interventions taken by patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

Variables (Intervention)		All admissions (n, %)	Death (n, %)	Censored (n, %)
		(n=359)	(n=155)	(n=204)
Mechanical ventilation	Yes	288(80.22)	148(95.5)	140(68.6)
	No	71(19.88)	7(4.5)	64(31.4)
Vasopressor support	Yes	149(41.5)	84(54.2)	65(31.9)
	No	210(58.5)	71(45.8)	139(68.1)
sedation	Yes	113(31.4)	59(35.1)	54(26.5)
	No	246(68.6)	96(61.9)	150(73.5)
Blood transfusion	Yes	58(16.2)	35(22.6)	23(11.3)
	No	301(83.8)	120(77.4)	181(88.7)
Operative procedure	Yes	11(3.1)	5(3.2)	6(3)
	No	348(96.9)	150(96.8)	198(97)
Dialysis	Yes	9(2.5)	2(1.3)	7(3.4)
	No	350(97.5)	153(98.7)	197(96.6)

5.4 survival status of admitted adult ICU patients

This study revealed that, during follow up time from the total admitted patients, 155 (43.17 %) died, and 204 (56.83) were censored (from which, 193 (94.30%) were improved, 9 (4.41%) referred and 2 (0.98%) of them discharged against medical advice) upon completion of the study. A total of 359 patients were followed for different periods; a minimum of 1 day and a maximum of 64 days with median follow up period of 13 (IQR: 4,38) days which gives 2819 person-day of observation.

The incidence rate found to be 55 death per 1000 person day observation (95%CI: 0.047, 0.064) with total follow up extent of 2819 person-day.

The rate of adult ICU death during the follow-up time from date of admission was presented by the Kaplan Meier failure estimate curve. During the first twenty days, the graph went up

increasingly showing a higher probability of death. After 20 days, the probability of death continued and the graph moved upward up to 40 days. In the remaining days of the follow-up period, the graph became straight in the admission-to death indicating the likelihood of death remained stable with virtually no deaths occurring. (Figure 7)

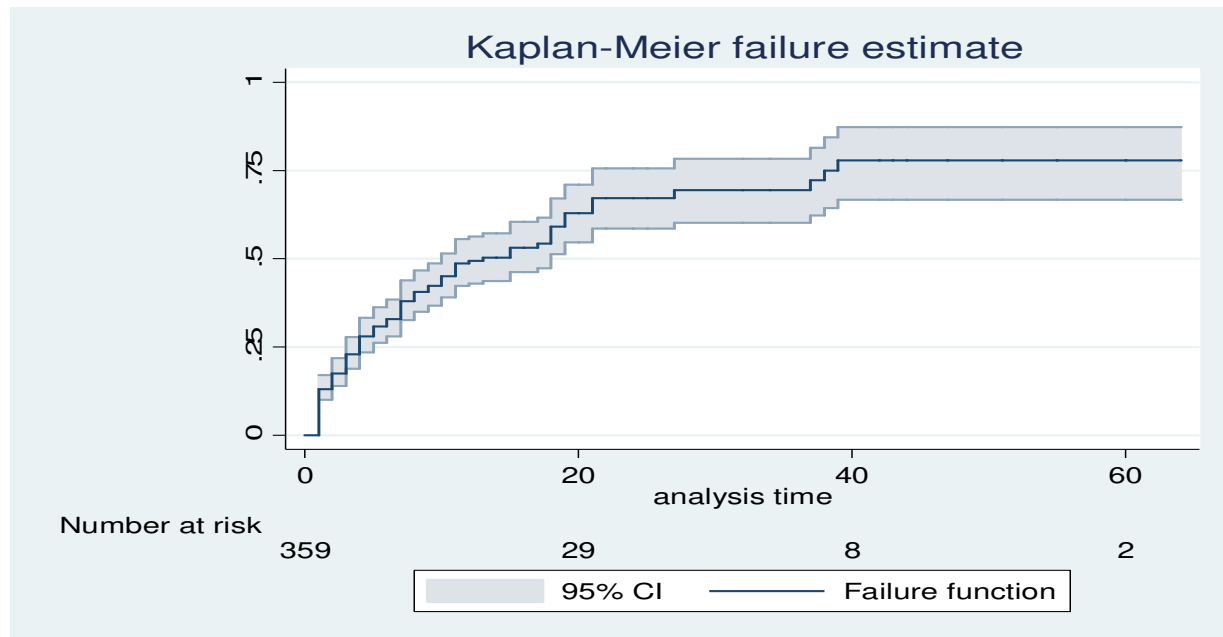


Figure 6: Overall Kaplan-Meier estimation of failure estimation of patients admitted to intensive care unit at Saint Paul's hospital millennium medical college, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022

5.5 Time to death among different groups of ICU admitted adult patients

Log-rank test was conducted to assess the existence of any significant difference in survival time among different categories of explanatory variables. According to this study, the median time to death for a patient with shock was much faster than their counterparts (3 days (0.4, 5) Vs 15 days (11, 18)). The median time to death for patients with neurological co morbidities was delayed death than their counterparts (15 (7, 23) vs 11(5, 18)). (Table 5)

Table 4: Survival time, and log-rank test for the study population according to patient related characteristics during five -year of follow-up (Kaplan-Meier method) of patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2021

Predictors	Category	Survival median (95% CI)	Log rank test χ^2	p> χ^2
Residence	Rural	18(12,23)	2.391	0.122
	Urban	10(7,12)		
Myocardial infarction	Yes	11(6,15)	6.219	0.013
	No	12(7, 16)		
Shock	Yes	3(0.4, 5)	13.033	0.000
	No	15(11 , 18)		
Blood pressure systolic	< 90	10(7,13)	6.356	0.042
	90-139	21(16,26)		
	>139	13(8,18)		
Glasgow coma scale	< 8	10(8,11)	4.371	0.112
	8-12	19(11,28)		
	>13	21(12,29)		
Co-morbidity	Yes	11(6,15)	4.112	0.043
	No	16(13,21)		
Respiratory diseases	Yes	8(4,12)	2.519	0.112
	No	15(9,21)		
Neurological	Yes	15(7,23)	1.797	0.180
	No	11(5,18)		
Renal	Yes	21(8,33)	4.197	0.041
	No	10(7,13)		
Endocrine	Yes	7(5,10)	2.334	0.127
	No	12(7,17)		
Use of mechanical ventilator	Yes	11(8,17)	5.112	0.024
	No	37(29,42)		
Use of Vasopressor	Yes	11(8,14)	2.161	0.142
	No	21(13,29)		
Use of Sedations	Yes	15(10,20)	1.648	0.199
	No	15(8,22)		

5.6 Factors Associated with the Death of the patients

In unadjusted analysis, thirteen variables showed , Scio-demographic factor (residence of the participant), clinical factors (myocardial infarction, shock, systolic Blood pressure, Glasgow coma scale, presence of co morbidity, respiratory disease, neurological disease, endocrine disease, renal disease) and, intentional factors (use of mechanical ventilator, vasopressor, sedation drugs showed statistically significant association with the risk of ICU death at a p-value ≤ 0.25 in admission to death analysis.

However, after controlling confounders in multivariable analysis, shock (AHR:2.38(95%CI: 1.48,3.262)) use of mechanical ventilation as an intervention(AHR:0.24(95%CI: 0.09,0.61)), use of sedation as an intervention(AHR:2.17(95%CI: 1.27,3.26)) were significant predictors of ICU admission to death analysis at a P-value ≤ 0.05).(Table 6)

The study found that median death time of ICU admission having shock condition had shorter time than patients have-not shock conditions 4 days (95% CI 3, 7) as shown by statistical significance with p- value=0.000. Multivariate analysis result shows that patients admitted in adult ICU Patients who admitted with shock were 2.375 times more likely to die as compared to those who did not, AHR=2.375 (95%CI 1.48,3.62).(figure 8)

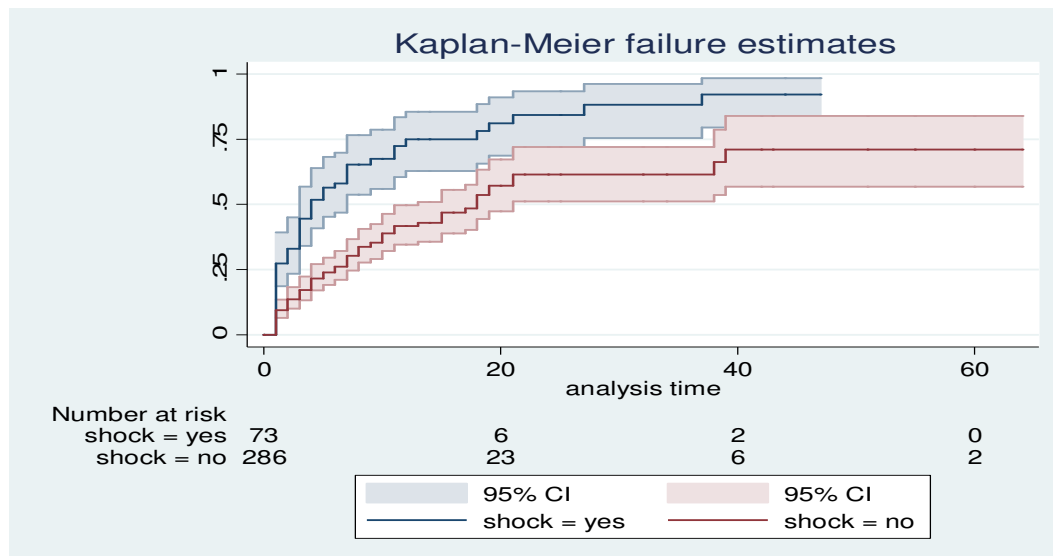


Figure 7 : shock Kaplan Meier failure estimate curve of patients admitted to intensive care unit at Saint Paul's hospital millennium medical college, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2021

Those admitted patients admitted and being used mechanical ventilator had median time to deaths 11 days (95% CI 8, 17)) with statically difference of ($p=0.002$). The hazard ratio for patients admitted in adult ICU uses mechanical ventilator were 0.24 times to die less likely when compared to patients admitted in adult ICU to compare not used mechanical ventilator other intervention is not given (AHR:0.24(95%CI0.09,0.61).(Figure 9)

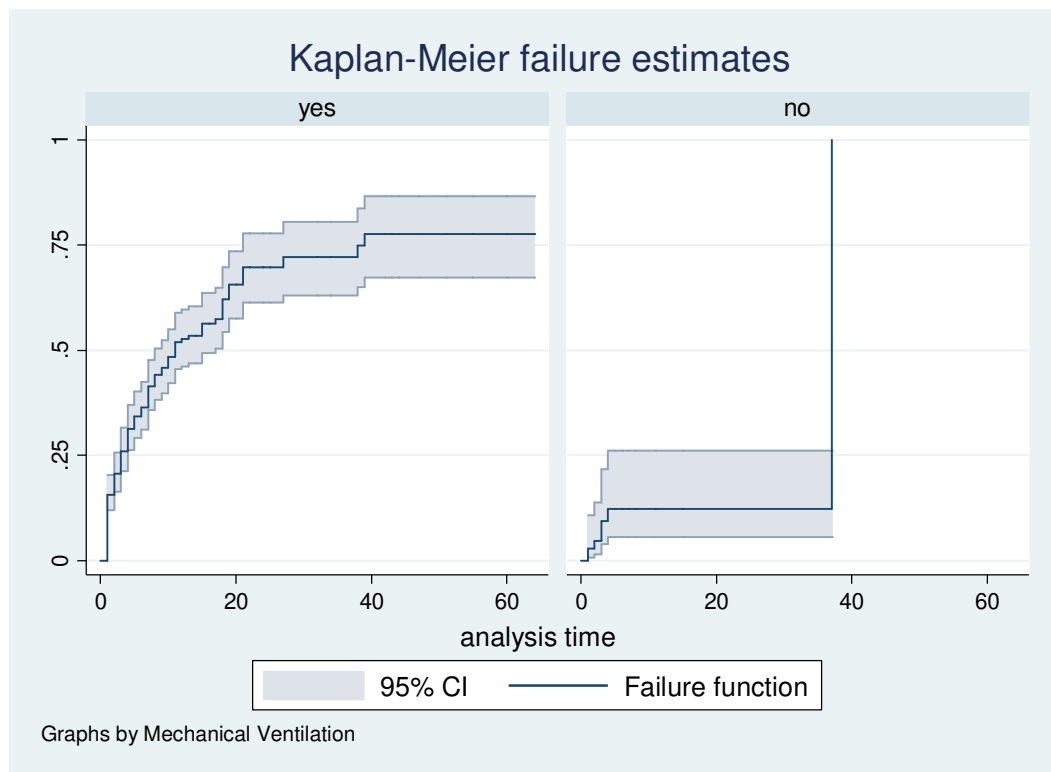


Figure 8 : Mechanical ventilator intervention Kaplan Meier failure estimate curve of patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2021

Patients admitted in intensive care unit and intervene with sedation had median time of 15 days (95% CI 10, 19). Hazard ratio for death was 2.16 times (AHR: 2.16 (95%CI 1.27, 3.26) higher in patients with given sedation when compared to patients not given sedation after ICU admission (Figure10).

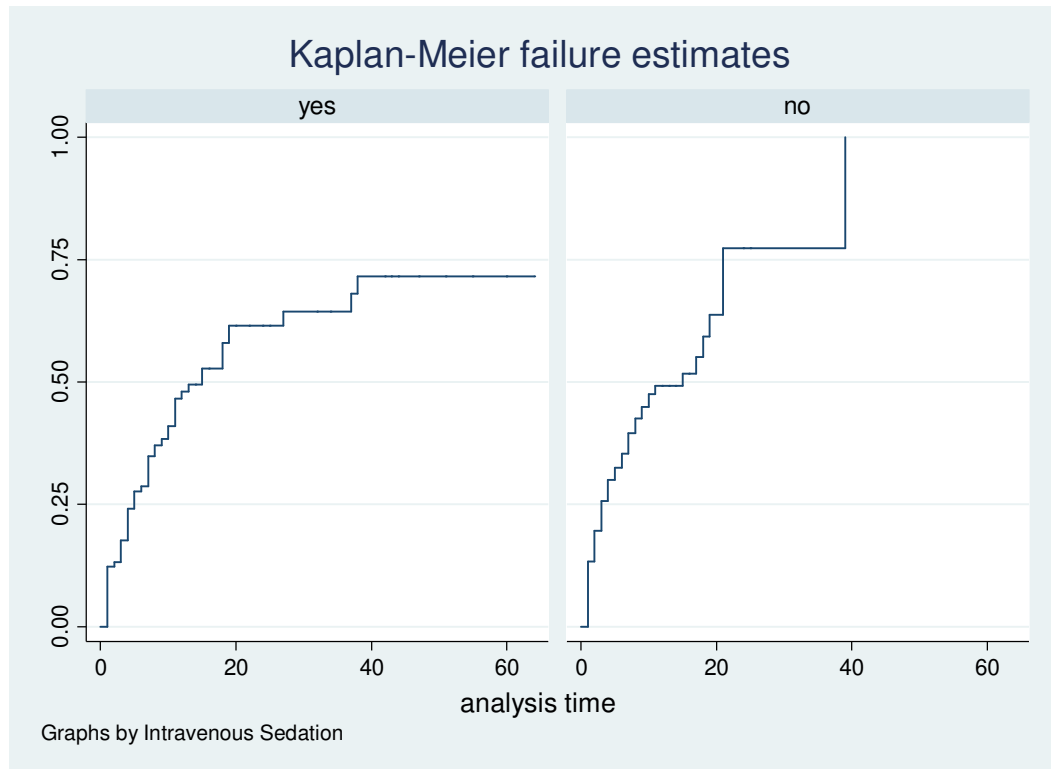


Figure 9 : sedation intervention Kaplan Meier failure estimate curve of patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2021

Table 5:Results of the bivariable and multivariable cox regression analysis of patients admitted to intensive care unit at Saint Paul's hospital millennium medical college, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022 (n= 359)

Covariant	Category	CHR,(95% CI)	P -value	AHR,(95 % CI)	P- value
Residency	urban	1.22,(0.89,1.68)	0.212	1.38,(0.96,1.99)	0.081
	rural	1		1	
Myocardial infarction	Yes	1.42,(0.41,12)	0.199	1.37,(0.385,1.38)	0.340
	No	1		1	
Shock	Yes	2.39,(0.30,5.8)	< 0.001	2.38,(1.48,3.62)	< 0.001*
	No	1		1	
Diastolic Bp	<60 mmHg	1.58,(0.71,1.04)	0.124	1.07,(0.85,1.38)	0.534
	<60-90 mmHg	1		1	
GCS	>12	1		1	
	<8	1.29,(0.64,1.04)	0.107	1.02,(0.74,1.27)	0.847
Co morbidity	Yes	1.48,(0.45,1.00)	0.053	2.50,(0.55,2.91)	0.366
	No	1		1	
Respiratory disease	Yes	1.33,(0.52,1.08)	0.130	1.10,(0.05,2.91)	0.629
	No	1		1	
Neurological disease	Yes	1.33,(0.85,2.07)	0.200	1.49,(0.65,1.34)	0.092
	No	1		1	
Renal disease	Yes	1.46,(0.99,2.70)	0.052	1.72,(0.93,2.34)	0.025
	No	1		1	
Endocrine	Yes	1.49,(0.30,1.15)	0.147	1.57,(1.07,3.05)	0.117
	No	1		1	
Mechanical ventilator	Yes	1.87,(0.14,0.66)	0.033	0.24,(0.09, 0.61)	0.002*
	No	1		1	
Vasopressor	Yes	1.26,(0.57,1.09)	0.158	0.63,(0.41,1.07)	0.094
	No	1		1	
Sedation	Yes	1.24,(0.88,1.73)	0.217	2.17,(1.27,3.26)	0.003*
	No	1		1	

1: indicates reference category, * significance at p- value < 0.05

CHR: Crude Hazard Ratio, AHR: Adjusted Hazard Ratio

5.8 Test of proportional hazard assumption

Testing the proportional hazard assumption is vital for interpretation and use of fitted proportional hazard models. Therefore, in this study goodness-of-fit (GOF) particularly the Schoenfeld residuals proportional hazard assumption test for the individual covariates and global tests was used. From Table below, each covariate (P-Value > 0.05) and all of covariates simultaneously (Global test for Cox proportional hazard P-Value=0.9050 > 0.05) met the proportional hazard assumption.

Table 6 Results of test of proportional hazard assumption in patients admitted to adult ICU at SPHMMC, from July 1st 2016 - June 30th 2021 Addis Ababa, Ethiopia, 2022.

Covariates	Rho	Chi 2	Df	P
Residence	0.02645	0.10	1	0.7548
Myocardial infarction	0.0955	0.11	1	0.7362
Shock	0.02295	0.08	1	0.7751
Diastolic Blood pressure	-0.03137	0.15	1	0.6986
Glasgow coma scale	-0.12618	2.05	1	0.1518
Co-morbidity	-0.02222	0.06	1	0.7006
Respiratory disease	0.02679	0.10	1	0.7499
Neurological disease	0.06717	0.57	1	0.4509
Renal disease	-0.02552	0.09	1	0.7885
Endocrine disease	-0.06988	0.62	1	0.4303
Use of mechanical ventilator	0.12679	1.92	1	0.1654
Use of vasopressor	0.02970	0.13	1	0.7210
Use of sedation	0.06129	0.54	1	0.4634
Global test		6.9	13	0.9050

6. DISCUSSION

Time to death and predictors among patients admitted to intensive care unit was the intention of this study. The finding of this study revealed that Proportion of ICU mortality was (43.18 %). This rate is higher than studies conducted in Ethiopia like Addis Ababa ,Gondar ,Jimma and Mekele.[16][17][35][39] Other studies conducted in Africa namely: Nigeria, and Tanzania.[45][15]. On the contrary the finding is lower than studies conducted in southern parts of Ethiopia , Burkina Faso, Uganda [18] [46][31]. This discrepancy may be due to the hospital received patient from country side as a referral system, the place where patients in my study probably came very late with serious disease condition. Other might be ICU staffing workload, availability of medical supplies, and lack of specialized care. In Addition, the discrepancy might be due to study design difference.

In this retrospective follow up study, the incidence rate of death was 55 death per 1000 person – day, (which means if we were to follow 1000 patients admitted to ICU for one day, 55 patients would be died per day from the ICU) with overall median time to death of patients admitted to adult ICU found to be 13.00 (IQR: 4, 38). This study median time to death was higher than study conducted in Nigeria was 4 days. [44] Several factors may have contributed to this difference. First, it is possible that there was a delay in providing therapy for some patients. Second, no co-morbidities were recorded for some of the cohort; admitted to the ICU with less severe conditions, and takes higher time to death. The latter possibility is patients with ongoing critical conditions requiring continued ICU. [23] [35] [53] Even if, the exact reason for this median time to death was unclear when the patient stay in intensive care unit for long time because patient's without recovery they lost resource, profession, material.

According to this study Patients admitted with shock were 2.32 times more likely to die as compared to those who did not which are similar to studies conducted in China and British. [29][31] [50].This could be explained by the fact that shock is a serious condition, which is fatal if not managed timely, properly ,and it leads to decreased organ perfusion, with inadequate delivery of oxygenated blood to tissues and result end-organ dysfunction. Additionally this might be shock leads to cardiopulmonary arrest due to sepsis, hypotension, major physical and physiologic sequelae of prolonged immobilization time and metabolic response to the disease, and organ dysfunction. [13] [54]

The risk of death was reduced by 76% Patients who use mechanical ventilator as compared to those who did not. This finding is contrast with other previous studies conducted in southern parts of Ethiopia[17],Gonder[19] ,Kenya[13] Brazil.[5] This might be the current study conducted where high level of care is provided with presence well-trained ICU staffs, well-equipped integrated monitors. Additionally the fact that this machine uses as breathing device, that uses pressure to blow oxygen to the lungs, takes over work of breathing and continues life for long period of time. [52]

This study also revealed patients who received sedation as an intervention were 2.17 times more likely to die compared to those who did not. In this regard, I did not find that sedative drugs had a detrimental effect on time to death. It is important to highlight that use sedatives in patients receiving mechanical ventilation is to reduce the physiological stress of respiratory failure and improve the tolerance of invasive life support. One can, therefore, argue that these measures would not have been implemented for long enough to have a positive clinical impact.[55], [56] This might be due to sedation drugs slow body functions to cause unconsciousness, respiratory failure.[53][54][55] More studies are needed to clarify the mechanisms between the association of sedation and time to death.

7. LIMITATION AND STRENGTH OF THE STUDY

Strengths

- ✓ The data was collected and crosschecked through different records (ICU log book, patient card)
- ✓ The follow up study conducted was fairly longer; this makes the possibility of developing an event.

Limitations

Despite the above strength this study has the following potential limitations:

- ✚ Since this study was conducted retrospectively and relied on a medical chart of the patient leads to missed important predictors like, nutritional status
- ✚ The limitations of this study were mainly that it being retrospective it relied on accuracy of written record and some of the data required was missing
- ✚ Lack of reference hindered to compare with others and discuss well.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

In the current findings, forty-three percent of admitted adult patients in the ICU had died during the entire cohort, which was a significant death. Hence responsible bodies' (physicians, nurses and other concerned bodies) need to seek for possible ways to reduce the mortality in ICU by determining the causes of it. Shock, use of mechanical ventilation as an intervention, use of sedation as an intervention after admission were identified as a predictor of death admitted adult patients in St. Paul's Hospital Millennium Medical College.

8.2 Recommendations

According to the study finding, the following recommendations could be forwarded to:

Minister of Health

- ✚ Better focus on making guidelines on sedative drugs for intensive care units.

SPHMMC Health care providers

- ✚ Able to focus on shock patients, identification of gaps on shock management, staff empowerment on standards of shock management
- ✚ Clinicians must strive to balance the necessity and benefit of sedative pharmacotherapy
By incorporating into practice as general principle
- ✚ All staff involved in organizing and delivering care to patients who admitted in ICU and take sedatives need to examine standards of sedative drug.

For researchers

- ✚ Further prospective studies are important to strengthen this finding
- ✚ The findings of the present study regarding sedation drugs and mechanical ventilation are antagonist as predictors of mortality. However, these findings must be confirmed in well powered studies.

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ANNEX

Information sheet

Title of the Research Project: Time to Death and Predictors among Patients Admitted to adult Intensive Care Unit at Saint Paul's Hospital Millennium Medical College, from 2016-2021 Addis Ababa, Ethiopia, 2022

Name of Investigator: Akelee Tegegn Gizaw (BSc, MSC candidate)

Name of the Organization: SPHMMC School of nursing, department of emergency and critical care nursing

Introduction: The aim of this information sheet is to make SPHMMC administrators and ICU coordinating office clear about the purpose of research, data collection procedures and get permission to conduct the research.

Purpose of the Research Project: To estimate time to death and predictors among patients admitted to adult intensive care unit at Saint Paul's Hospital Millennium Medical College, from 2016-2021 Addis Ababa, Ethiopia, 2022

Procedure: Information necessary for the study, taken from patients' chart.

Risk: Source of information will be medical charts and it will not harm patients. The information retrieved only used for the study purpose.

Benefits: The research have no direct benefit for one whose record is included in this research. In all, the research work has a paramount direct benefit for health care planners and managers.

Confidentiality: The collected data by this study will use a code number in the entry and the result represent as a general finding of all participant.

Person to contact: If you have any question, you can contact

Akele Tegegne (SPHMMC): principal investigator

Cell phone: +251910377222, E-mail akele9081@gmail.com With regards!!

Data abstraction format

This data abstraction format is prepared for collecting information on Time to Death and Predictors among Patients Admitted to adult Intensive Care Unit at Saint Paul's Hospital Millennium Medical College, from 2016-2021 Addis Ababa, Ethiopia, 2022. All information will be retrieved from the SPHMMC adult ICU admission/discharge registration books and individual patient card without mentioning the name of the patient.

Instruction: Fill Up, circle or tick ((x) or (✓)) mark appropriately.

Code:	_____				
1. Sex	Male	Female			
2. Age	_____ Years.				
3. place of residence	A.A town	Out of A.A			
4. Date of ICU admission	/DD/_____	/MM/_____	YY_____		
5. Source of ICU admission	Emergency	Medical Ward	Surgical Ward		
	Department				
	Gynecological	Operation Theatre	Others		
	Ward				
6. Causes of ICU admission	CHF	MI	Respiratory failure		
	Sepsis	Shock	DKA		
	AKI	Stroke	Severe pneumonia		
	Post operative	Others ,Specify _____			
7. Vital signs on admission					
7.1 PR	< 60 BPM	60-100 BPM	> 100 BPM	No pulse	
7.2 RR	<12 RPM	12-20 RPM	>20 RPM		

- | | | | | |
|-----|-------------------|-----------------------|--------------------------|--|
| 7.3 | DBP | 60mmHg | 60-89mmHg | >90 mmHg |
| 7.4 | SPO ₂ | <89 | 60-89mmHg | > 95% |
| 7.5 | TO ⁰ c | < 36.5 ⁰ c | 36.5-37.5 ⁰ c | >37.5 ⁰ c Unrecordable |
| 7.6 | GCS: | < 8 | 8-12 | 12-15 |
8. Did the patient have other problems other than cause of admission (co-morbidities)? Yes No
- 8.1 If say “yes” (Question No. 8) what are there? (Can be choose more than one)
- | | | |
|------------------------|---------------------|--------------------------|
| Cardiovascular Disease | Respiratory Disease | Infectious Disease |
| Neurological Disease | Renal Disease | Gastrointestinal Disease |
| Endocrine Disease | Hematologic Disease | Others Specify |
9. outcome of the patient who are admitted in ICU Improved Death Referred Against Medical Advice
10. Date of censored from ICU /DD/____ /MM/____ /YY/____
11. Date of death /DD/____ /MM/____ /YY/____
12. Length of stay in ICU (days) _____
13. Intervention given during ICU admission (can be choose more than one)
- | | | |
|-----------------------|---------------------|----------------|
| Mechanical ventilator | Vasopressor | Sedation |
| Blood transfusion | Operative procedure | Others specify |