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OUTCOMES AND ASSOCIATED FACTORS OF PATIENTS ADMITTED TO MEDICAL INTENSIVE CARE UNIT IN FELEGE HIWOT REFERRAL HOSPITAL, BAHIR DAR, ETHIOPIA

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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES, SCHOOL OF
MEDICINE, DEPARTMENT OF INTERNAL MEDICINE

OUTCOMES AND ASSOCIATED FACTORS OF PATIENTS
ADMITTED TO MEDICAL INTENSIVE CARE UNIT IN FELEGE
HIWOT REFERRAL HOSPITAL, BAHIR DAR, ETHIOPIA

A THESIS RESEARCH SUBMITTED TO THE DEPARTMENT OF INTERNAL
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ACRONYMS

AKI.....	Acute Kidney Injury
FHRH.....	Felege Hiwot Referral Hospital
CMHS.....	College of Medicine and Health Science
CHF.....	Congestive Heart Failure
DKA.....	Diabetic Ketoacidosis
MV.....	Mechanical Ventilator
HIV.....	Human Immunodeficiency Virus
TB.....	Tuberculosis
AMI.....	Acute Myocardial Infarction
ACS.....	Acute Coronary Syndrome
GCS.....	Glasgow Coma Scale
GI.....	Gastro Intestinal
VAP.....	Ventilator Associated Pneumonia
HAP.....	Hospital Acquired Pneumonia
RF.....	Respiratory Failure
HMIS.....	Health Management Information System
IRB.....	Institutional Review Board
G.C.....	Gregorian calendar

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Abstract

Background: Intensive Care Units are specialized inpatient units providing care for critically ill patients who may require support for hemodynamic, airway or other compromise. There is little information about such patients' outcome especially in the developing countries including the study setting.

Objectives: The objective was to assess the outcomes and associated factors of Intensive Care Unit admissions in Felege Hiwot Referral Hospital, Northwest Ethiopia.

Methods: Institution based cross-sectional study by including all patients admitted to the Intensive Care Unit during the period September 2017 to August 31/ 2018, fulfilling the inclusion criterias were recruited, data collected with well settled checklists ant entered to EpiData version 3. Finally it was analyzed using SPSS Version 23.

Results: 545 patients were included in the analysis. Males account for 51.2% and the most common cause of admission was due to infectious diseases, 32.1%.The overall mortality rate was 39.8% and 11.2% left the hospital against medical advice. The most common causes of death were infectious diseases (41.9%) followed by cardiac disorders (20.3%), majorly caused by those diseases other than ACS (63.55%). Multivariate analysis showed that age >40 years (adjusted odds ratio=1.68; 95%CI, 1.5-1.9) and vasopressor requirement (adjusted odds ratio=1.7; 95%CI, 1.6-1.95) were significantly associated with mortality.

Conclusion: Infectious diseases were the most common causes of death accounting for 41.9% (sepsis, 47% followed by sever community acquired pneumonia, 38.46%). Age >40 years and vasopressor requirement were strongly associated with mortality.

Key words: ICU, admission, ACS, causes of death, Infectious diseases, and outcome

CHAPTER1. INTRODUCTION

1.1 Background

Intensive care units (ICUs) are specialized inpatient units that provide care for the most critically ill patients. The modern concept of intensive care unit have been innovated by an anesthetist in Denmark over half a century ago during the polio pandemic(1). Since then, worldwide, ICUs have significantly improved the quality of care and outcomes of critically ill patients, mostly in developed countries/high-resource settings/(2).

Patients requiring intensive care may require support for instability (hypertension/ hypotension), airway or respiratory compromise (such as ventilator support), AKI, potentially lethal cardiac arrhythmias, or the cumulative effects of multiple organ failure, more commonly referred to now as multiple organ dysfunction syndrome. They may also be admitted for intensive/invasive monitoring, such as the critical hours after major invasive surgery when deemed too unstable to transfer to a less intensively monitored unit. Intensive care is usually only offered to those whose condition is potentially reversible, those patients who are at risk of complications that would require immediate intervention and who have a good chance of surviving with intensive care support. A prime requisite for admission to an ICU is that the underlying condition can be overcome(3).

The ICU is the ideal setting for mortality predictive scoring systems because of the population in ICU is well defined, patient care is well circumscribed, and there is a lot of evidence that the severity of illness in the ICU is the major determinant of hospital mortality(4).

1.2 Statement of the problem

Unlike that of developed countries, where data regarding admission patterns and outcomes in the Medical Intensive Care Unit (MICU) are well documented, there is no adequate information in developing countries(5-7).

A study conducted worldwide including 84 countries showed that the ICU mortality rates were 16.2% across the whole population and 25.8% in patients with sepsis and was associated the socioeconomic status of the involved countries. It is also associated with the development of complications like AKI after admission(8).

A Cohort, multiple-center, observational study was done in 24 European countries involving 198 ICU centers to better define the incidence of sepsis and the characteristics of critically ill patients in European intensive care units showed the overall ICU mortality rate was 18.5% and that of sepsis in particular is 27%. Factors associated to the high mortality were female gender, older age, comorbid diseases on admission, the occurrence of septic shock, invasive mechanical ventilation or hemodialysis, the maximum number of concomitant organ failure(9).

A twelve month retrospective study conducted in Nigeria to audit the indications and outcome of patients admitted into the ICU of the Federal Medical Centre, Gombe indicated that the major causes of admission were severe head injury, respiratory infections and sepsis and the general mortality rate was 35.1%. The severity of illness before ICU admission, presence of co-morbid conditions, older age and the duration of stay in the ICU were inversely proportional to survival(10).

In Ethiopia also, done in Jimma University Specialized Hospital, showed that the major reasons of admission were noncommunicable diseases mainly cardiogenic shock followed by surgical interventions and traumatic brain injuries with mortality rate of 37.7%(11).

As expected from a medical ICU of a developing country, the main causes of admission and deaths remain infectious diseases. Epidemiologic transition from infectious diseases to acute/chronic non-communicable diseases is not that much expected to occur to an appreciable degree in the low and middle income countries like Ethiopia's. but there are evidences which suggest that there is significant segment of the urban community in major cities of the country undergoing the first or middle phase of an epidemiologic transition to acute and chronic non-communicable diseases(12).

In any hospital, the ICU has the highest mortality rate of any other unit. For this reason, there has been ample interest in measuring ICU outcomes and patterns of admission both in terms of mortality and resource utilization.

There is great difference regarding admissions and outcomes of ICU admitted patient in different set ups. But we did not have information about this issue in the study setting since the beginning of ICU service before. Therefore, this study is the first to assess outcomes of patients admitted in the MICU of FHRH.

1.3 Significance of the study

The study gives some information on the outcomes of patients in this care center which lack any data on this area and will provide some back ground for further researches. It can help clinicians by showing which types of patients in the ICU had good outcome so that they should be given priority, what additional care should be added so that there will be better outcome.

1.4 Literature review

Several recent reports have called attention to the process of health transition in the developing world. The aging of the population, reduction in fertility, improved preventive and therapeutic control of infectious diseases, and the westernization of life styles may all contribute to a decrease in the disease burden attributable to communicable disease and to an increase in that attributable to degenerative and manmade diseases(13).

Over four million intensive care unit (ICU) admissions occur annually in the United States each year (13). These patients are often at high risk of death (mortality) for critical illness syndromes such as lung injury and sepsis ranges from 25% to 50% and 20% of Americans die with intensive care services. Intensive care unit around the world, admit critically ill patients for advanced organ support with the goal of improving patient outcomes. Early identification and management of patients having the highest risk of death may contribute to better understanding of these injuries and their outcome(14, 15).

A study which was conducted in 84 countries involving 730 ICU centers and recruiting a total of 10,069 patients [Europe (54.1%), Asia (19.2%), the Americas (17.1%), Oceania (4.4%), the Middle East (3.9%), and Africa (1.4%)] showed that 29.5% of patients had sepsis on admission or during the ICU stay and ICU mortality rates were 16.2% (95% CI 15.5–16.9) across the whole population and 25.8% (24.2–27.4) in patients with sepsis(8).

A study done in USA representing 991,571 patients admitted in 160 adult ICUs during 2009 to 2013, showed that the average age at admission was 62.8 years and males account 53.7%, the most frequent primary admission diagnoses were sepsis (8.5%), respiratory failure (6.9%), acute coronary syndrome (ACS) (6.9%), cardiac arrest (6.5%), cerebrovascular accident (6.3%), GI bleeding (5.4%), pneumonia (4.2%), trauma (4.1%) and CHF (4.0%); the rate of use of vasoactive agent was 19.12% (single=11.69%, double= 4.87% triple= 1.94%, more than 3=

0.69%) and the most commonly used one was norepinephrine (11.66%) followed by dopamine (5.39%); the rate of RRT was 2.55% for average of 2.66 days, the rate of intubation was 26.93% for average of 3.82 days and the mortality rate was 5.62%(16).

Another study done in USA to see the 28 day mortality rate of ICU admitted patients older than 65 years showed that this age group represent 45.7 % of the total ICU admissions and as the mortality rate was high (20.4% for 65–74, 28% for 75–84 and 34.6% for \geq 85 years of age)(17).

A study conducted in China in 2006 on causes of death and determinants of outcome in critically ill patients reported that MICU mortality was 8.7%, and the major immediate causes of death of critically ill patients in the MICU were Acute refractory multiple organ dysfunction syndrome (47%), Refractory cardiovascular failure (17.8%), Chronic refractory multiple organ dysfunction syndrome (11.6%), Central nervous system failure (7.9%), Cardiac arrest (4.2%), End-stage tumor disease (3.4%), Intractable intestinal ischemia (2.5%), Respiratory failure (RF)(1.1%) and Acute or chronic liver failure(0.8%). The independent risk factors for death in the ICU were CNS failure and cardiovascular failure(18).

Another study done in Mainland, China in 2014 on epidemiology and outcome of Severe Sepsis and Septic Shock indicated that severe sepsis and septic shock were among the main factors contributing to mortality in MICU admitted patients being 33.5%(19).

A retrospective cohort study conducted in Europe on Characteristics and outcomes of cancer patients in European MICUs reported that increasing numbers of cancer patients are being admitted to the ICU, either for cancer related complications or treatment-associated side effects and have the highest ICU mortality of 58%(20).

A retrospective study conducted in Uganda to assess the demographic data, admission diagnosis, and ICU length of stay incorporating 1,774 patients in the period January 2003 to December 2009. The mean age was 35.5 years; males accounted for 56.5%; 92.8% were indigenous and 42.9% were referrals from upcountry units. The average mortality rate was 40.1%. Sepsis, ARDS, traumatic brain injuries and HIV related conditions were the most frequent admission diagnoses(21).

A retrospective study done in Lagos University Teaching Hospital, Nigeria, between 2010 & 2015 showed 54.4% to be males and middle aged group (20-59 years) accounted for 66.9% of all the ICU admissions. The study also showed that neurosurgical cases accounted for 32.0% (severe traumatic brain injury accounted for 77.3% of all Neurosurgical admission). The mortality rate was significantly high 61.4%. There was no correlation between the age of patients and number of deaths across the specialty. Patients referred from the specialty of Internal medicine made up 18.5% of the total ICU admissions; while the most common medical indication for admission was Neurological cases 53.8% followed by cardiac illnesses 14.9% and infectious diseases accounting 10%(22).

A case-series study of all admissions in MICU between 1985-2000 was carried out in Addis Ababa University Teaching Hospital to analyze patterns of medical admissions and evaluate for any changes in that pattern over a study period. Demographic variables, specific categories of diagnoses and their outcomes were recorded. A total of 3548 patients (males account 59%, mean age 37.10 +/- 17.29) were admitted during this time. Acute infectious and cardiovascular diseases accounted for half of the entire critical care admissions with infectious diseases accounting for 30%. Among specific diagnoses, DKA was the leading cause of admission followed by acute AMI and severe and complicated malaria, each accounting for 10.7, 9.8 and 9.3% of all admissions respectively. Trends of admissions over the sixteen-year period showed steady increase in relative frequency of acute complications of non-communicable diseases consisting of diabetes, acute myocardial infarction and stroke while infectious diseases showed interspersed peaks of admissions coinciding with epidemics. The overall mortality of the MICU was 32%, with proportionally more female deaths, 34.8 versus 29%. Severe and complicated malaria was the leading cause of death (10.3%) followed by tetanus (6.4%) and acute myocardial infarction (6.3%). The increase in relative and absolute frequency of acute complications of non-communicable diseases most probably heralds an emerging epidemic of non-communicable diseases related to life style changes in the urban well to do in addition to existing problems of infectious diseases of poverty(12).

A longitudinal study was conducted in Jimma University Specialized Hospital in 2011 to assess the reasons and outcomes of ICU admissions. In a period of 9 weeks there were a total of 69 admissions, females accounting for 55.1% and the mean age was 32.87±17.03 years. The major

reasons of admission were cardiovascular origin (30.4%), surgical interventions (18.8%) and respiratory infections (11.6%). Infectious diseases were the commonest (51.7%) co-morbid conditions in patients admitted to the ICU followed by cardiovascular disorders (21.7%). The mortality rate was found to be 37.7%, (26.9% of the death were from patients directly admitted from the emergency department while majority, 73.1% were from those transferred from the wards), majorly contributed by the diseases of the cardiovascular origin. About 59.4% of patients stayed in the ICU before death or discharge(11).



Figure 1 Conceptual frame work of the study showing determinants of outcome

CHAPTER 2. OBJECTIVE OF THE STUDY

2.1 General objective

- to **assess** the magnitude of mortality and associated factors of ICU admissions in FHRH, during the period of September 2017 to August 31/2018 G.C.

2.2 Specific objectives

- to determine the mortality rate in the ICU admitted patients
- to identify the associated factors of death in the ICU

CHAPTER 3. RESEARCH DESIGN AND METHODOLOGY

3.1 Study Design: Institution based cross-sectional study was conducted to assess the mortality and associated factors of patients admitted to MICU, FHRH.

3.2 Data type and data Source: the type of data used in this research was secondary data from what is documented on each patient's chart and HMIS log books.

3.3 Study area and setting: This study was conducted in FHRH, the referral hospital found in Bahir Dar, the capital city of Amhara regional state, located about 564km from Addis Ababa, Northwest Ethiopia. There are three governmental hospitals in the town of which FHRH is the oldest and was established in 1961 G.C. Currently it is acting as a referral center for the majority of the regional hospitals delivering both for outpatient and inpatient service in departments of Internal medicine, Surgery, Gynecology & obstetrics, pediatrics, orthopedics, oncology, ophthalmology, dermatology & venerology, Ear-Nose & Throat, Radiology with its own laboratory and pharmacy. It had started to provide ICU service since 2009 G.C.

CHAPTER 4. POPULATION AND SAMPLE SIZE:

4.1 Source Population: All patients admitted to the ICU

4.2 Study population: All ICU admitted patients who fulfilled the inclusion criteria were recruited.

4.3 Eligibility criterias

4.3.1 Inclusion criterias: all patients having charts of full documentation

4.3.2 Exclusion criterias:

- patients who died with in 2 hours after ICU admission
- age <15 years

4.4 Sample size: All patients admitted to the ICU fulfilling the criterias were recruited

4.5 Study instruments & Data collection:

Checklists were prepared and the demographic and other additional data of patients starting from the time of admission to the time of final outcome were collected.

4.6 Variables

4.6.1 Dependent variable: The outcome of patients admitted to the ICU

4.6.2 Independent variables

- ❖ Age
- ❖ Sex
- ❖ The presence of underlying prior co-morbidities
- ❖ The need for vasoactive agents
- ❖ The severity of the illness during admission to the ICU
- ❖ The occurrence of AKI

4.7 Operational definitions

Mechanical ventilation: a way of delivering oxygen support via endotracheal tube for patients having respiratory failure or hypoxia

Sepsis: is life-threatening organ dysfunction caused by a dysregulated host response to infection

Septic shock: is defined as sepsis in need of vasopressors to maintain a MAP \geq 65 mm Hg

Ventilator Associated Pneumonia (VAP): inflammation of the lung parenchyma of intubated patients occurring after 48 hours of intubation.

Acute Coronary Syndrome: is applied to patients with a suspicion of myocardial ischemia

Acute Myocardial Infarction: is a sub set of ACS, but there is evidence of myocardial necrosis

Glasgow Coma Scale: is a scale composed of Eye opening, Verbal communication & motor activity to assess the patient's mental status

Acute Kidney Injury: is acute onset of renal dysfunction resulting in failure of the kidneys to excrete nitrogenous waste products

Cardioversion: application of synchronized electrical energy to the heart in patients' having arrhythmia

Defibrillation: application of asynchronized electrical energy to the heart in patients' having arrhythmia

4.8 Data analysis: The collected data was checked for completeness and entered in to EPI-Data version 3.1 Statistical software. Then it was exported and analyzed using SPSS version 23. Descriptive analysis like frequency and percentages were computed to describe study objectives. Chi square test was used to analyze the association between independent and dependent variables. Then all variables with Pearson Chi square value < 0.25 were entered into the final multivariable analysis. A p value < 0.05 were considered as cut-off point for statistical significance.

4.9 Ethical considerations

Ethical clearance was sought from the institutional review board of Bahir Dar University, College of Medicine and Health Sciences. Support letter was taken from Amhara regional Public Health Institute and FHRH Administration office. Data was collected after getting permission from ICU and Chart room co-ordinators. All the informations retrieved were kept in a way that could not interfere personal confidentiality.

4.10 Dissemination of the result: after completion the result of the research is submitted to BDU-CMHS and FHRH.

5 RESULTS

During the study period there were a total of 663 admissions of which 105 (15.8%) were documented either not clearly or incompletely and 13 admissions were below the age of 15 years. 545 admissions had full and clear documentations.

Males account for the 51.2% (279) of admissions while females account for the remaining. Young adults ranging 15- 30 years of age constituted for the majority of the admission being 32.1% followed by the age groups 31-45, 46-60 and ≥ 61 years being 26.2%, 21.1% and 20.6% respectively and the mean age was 43.82 ± 18.58 years (see Figure 2 and table 1 below). Majority of patients come from the rural area (71.7%) and the commonest source of referrals were clinics and Hospitals (70.1%) followed by health centers (15.2%). The commonest causes of admission are infectious diseases accounting 32.1% followed by cardiac disorders consisting 30.27%, of which ACS caused for the 54.5% and the other cardiac diseases caused the remaining admissions. Poisoning accounts for 10.1% of admissions (see figure 5).

33.6% of the admissions had previous comorbidities the most common being cardiac diseases (29%) followed by hypertension (21.3%) and diabetes mellitus (13.7%). Fortunately 81.4% of them were taking medication but only 79.2% of them were adherent. The study showed that about 68.6% of patients were having clear mentation (GCS= 15) while 17.6% had GCS between 10-14 and the remaining 13.8% had GCS below 10. 90 patients (16.5%) required mechanical ventilation of which only 68 patients (75.6%) were intubated. The average duration of intubation was 4.9 ± 4.68 days and the maximum duration was 23 days. From those who were intubated the mortality rate was 63.2% (figures 6 & 7).

150 patients (27.5%) were having hemodynamic instability mainly low blood pressure requiring vasoactive agents, of whom 64.6% required for more than 12 hours and 75.5% need only single agent (figure 8). Only 4 patients (0.7%) needed electrical cardioversion and it was successful in half of them. About 25.9% of patients had AKI either during the admission or develop after admission with 3.5% of them requiring dialysis. The average length of stay was 4.5 ± 3.64 days (ranging from 1 to maximum of 27 days) (table 2).

Table 1. Sociodemographic data of the study population

Sociodemographic characteristics (n=545)		Frequency	
		No.	%
Age	15-30 years	175	32.1%
	31-45 years	143	26.2%
	46-60 years	115	21.1%
	Age ≥61 years	112	20.6%
Sex	Male	279	51.2%
	Female	266	48.8%
Residency	Rural	391	71.7%
	Urban	154	28.3%
Source of Referral	Health Center	83	15.2%
	Clinics & Hospitals	382	70.1%
	None	80	14.7%
Disease classification	Circulatory	165	30.27%
	ACS	90	54.5%
	Other cardiac lesions	75	45.5%
	Respiratory	29	5.3%
	Endocrine & Metabolic diseases	34	6.2%
	Infectious diseases	175	32.1%
	Poisoning	55	10.1%
	Traumas	42	7.7%
	Neurologic disorders	45	8.2%
	Miscellaneous diseases*	42	7.7%
	Previous comorbidities	Yes	183
Type of comorbidity			
HTN		39	7.2%
DM		25	4.6%
HTN & DM		21	3.9%
HIV		24	4.4%
Smoking		3	0.6%
Psychiatry		8	1.5%
Cardiac		53	9.7%
Hematologic		10	1.8%
On treatment			
Yes		149	81.4%
Adherent for the treatment			
Yes		118	79.2%
No		31	20.8%
No	34	18.6%	

*Miscellaneous: includes post-operative patients having none of the above disease categories, obstetric complications like pre-eclampsia/eclampsia syndrome.

Table 2. Other demographic characters and outcome

Other demographic Characters and outcome	Frequency	
	No.	%
Level of mentation		
GCS =15	374	68.6%
GCS 10-14	96	17.6%
GCS ≤ 9	75	13.8%
Need of ventilator support		
Yes	90	16.5%
Intubated		
Yes	68	75.6%
Duration of intubation		
1-3 days	35	51.5%
4-8 days	25	36.8%
>8 days	8	11.8%
Outcome		
Improved	20	29.4%
Died	43	63.2%
Left against medical advice	5	7.4%
Need of vasopressor(s)		
Yes	150	27.5%
Duration of vasopressor(s)?		
<6 hours	22	15%
6-11 hours	31	20.4%
≥12 hours	97	64.6%
Number of vasopressors		
Single	113	75.5%
≥2	37	24.5%
Evidence of AKI		
Yes	141	25.9%
Improved	61	43.3%
Died	28	19.9%
No reassessment	5	3.5%
Deteriorated but no need of dialysis	36	25.5%
Dialysis required	11	7.8%
Need of Cardioversion or Defibrillation		
Yes	4	0.7%
Successful	2	50%
Not successful	2	50%
Length of ICU stay		
1-5days	408	74.9%
6-10 days	105	19.3%
>10 days	32	5.9%
Final outcome		
Improved	267	49%
Left against medical advice	61	11.2%
Death	217	39.8%

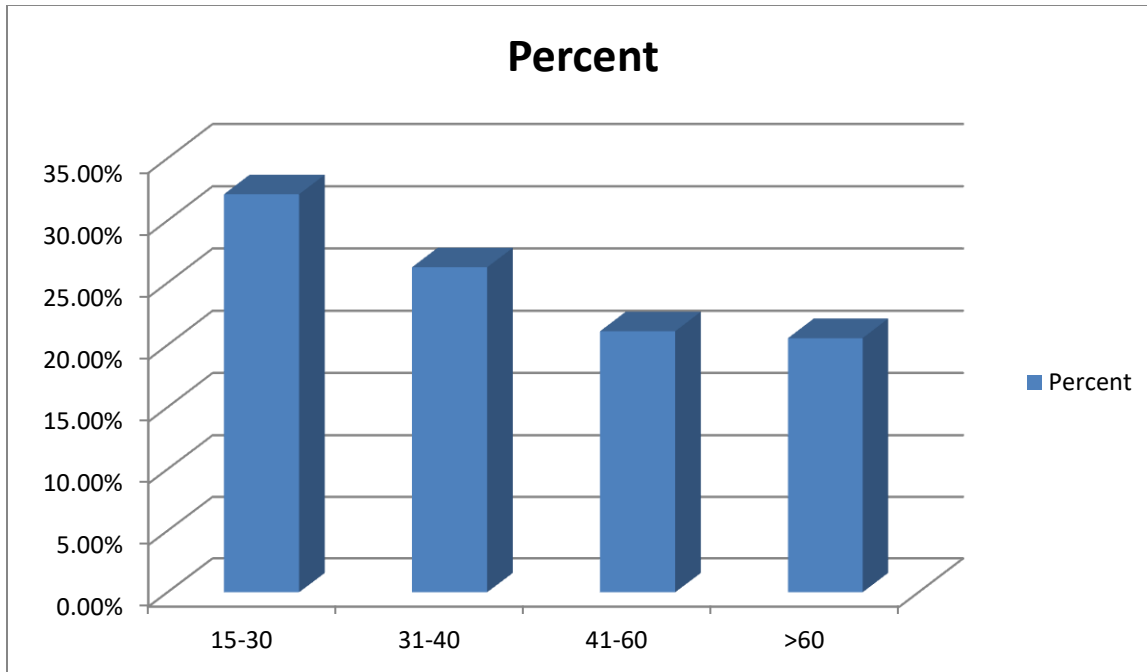


Figure 2 Percentage of the age groups

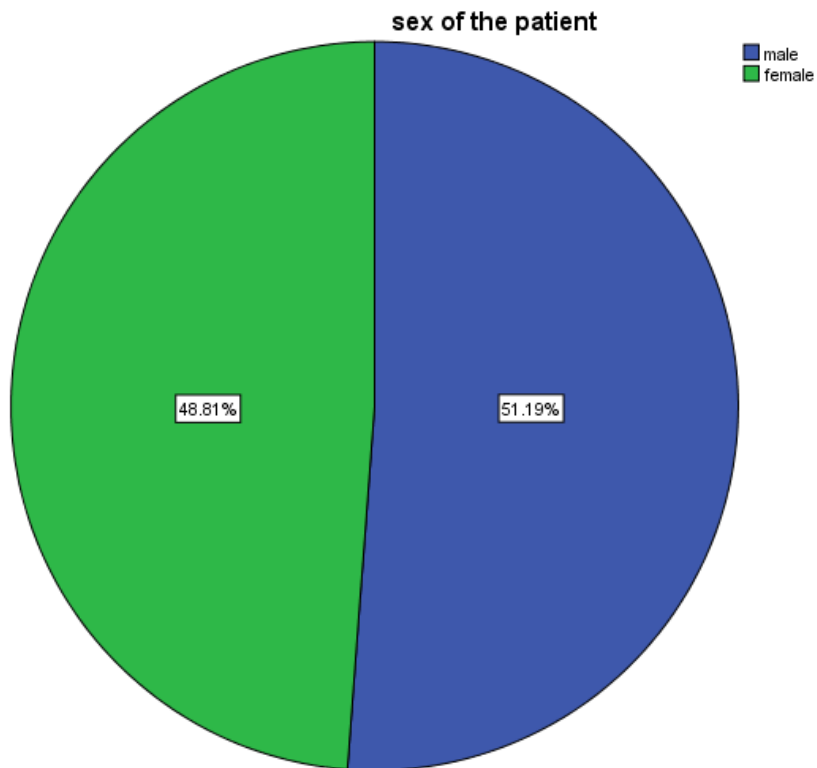


Figure 3. Sex distribution

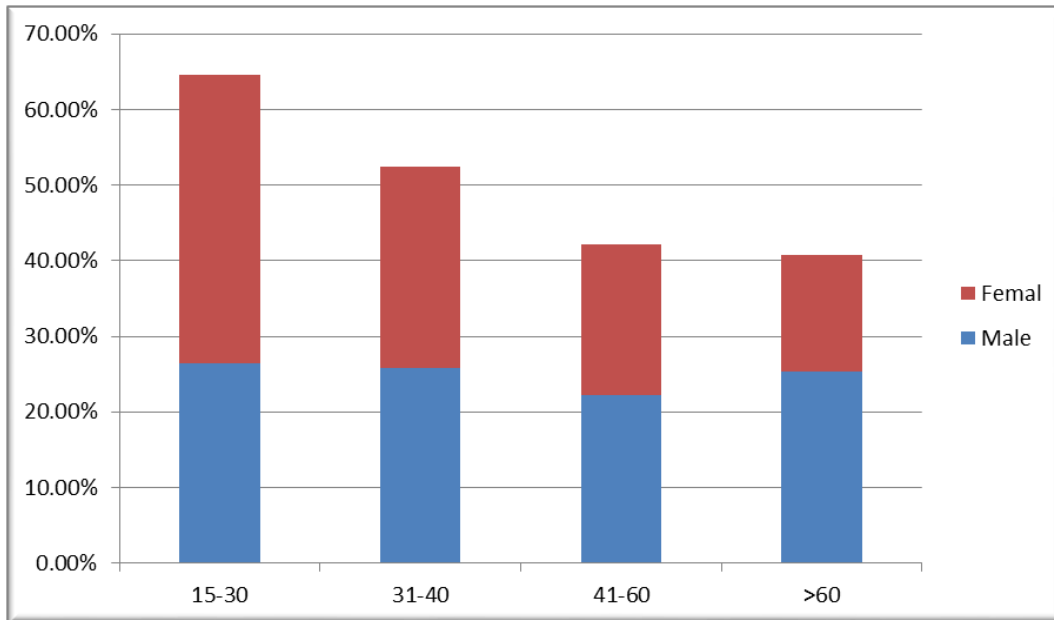


Figure 4. Sex distribution per age group

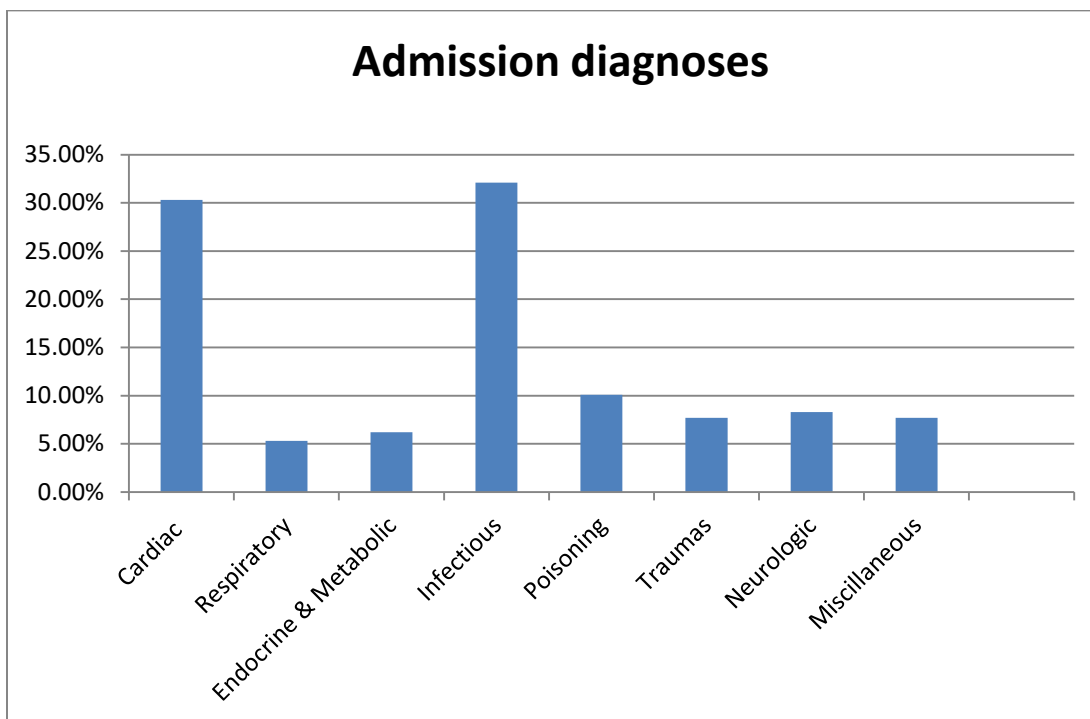


Figure 5. Percentage of each admission diagnosis

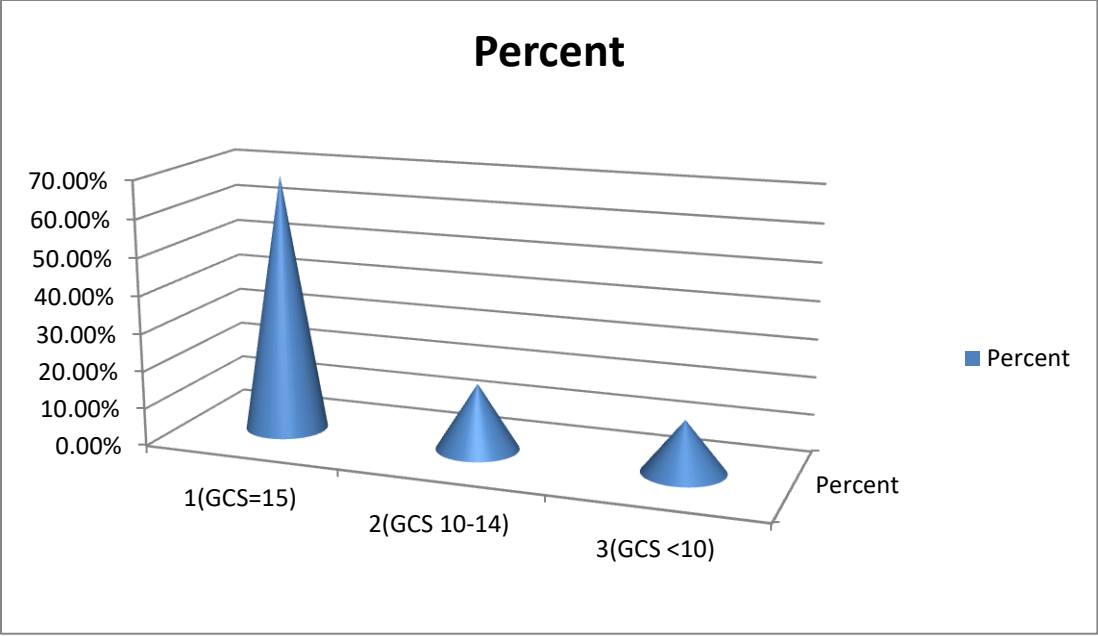


Figure 6. Percentage of level of mentation in each group

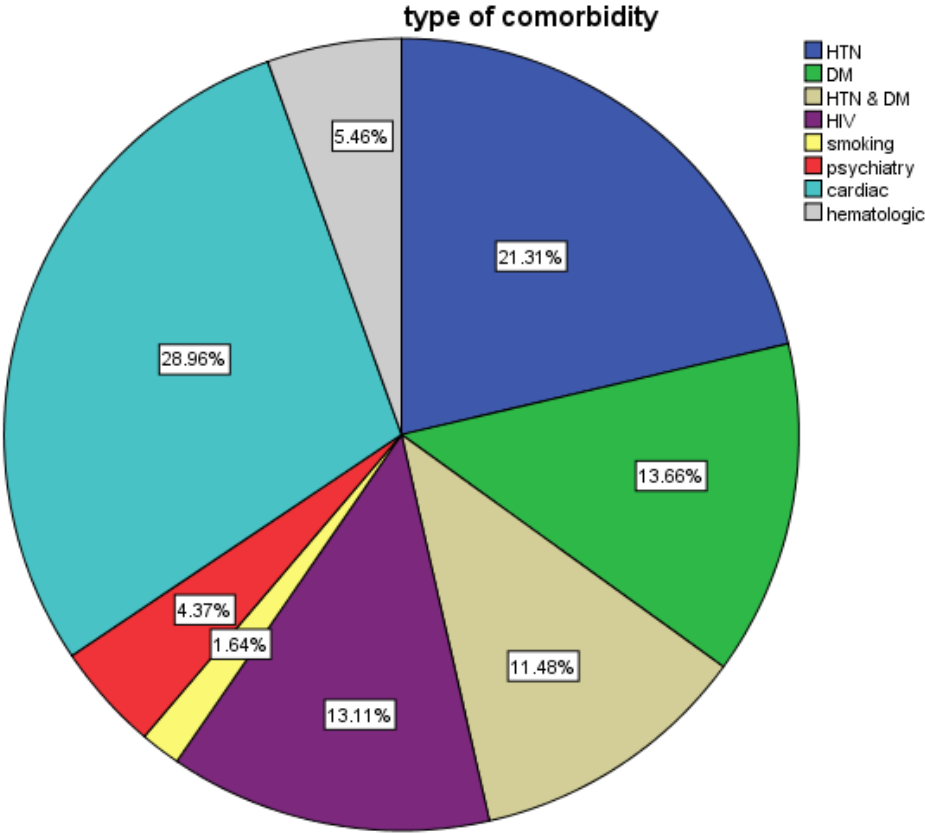


Figure 7. Distribution of the comorbidities

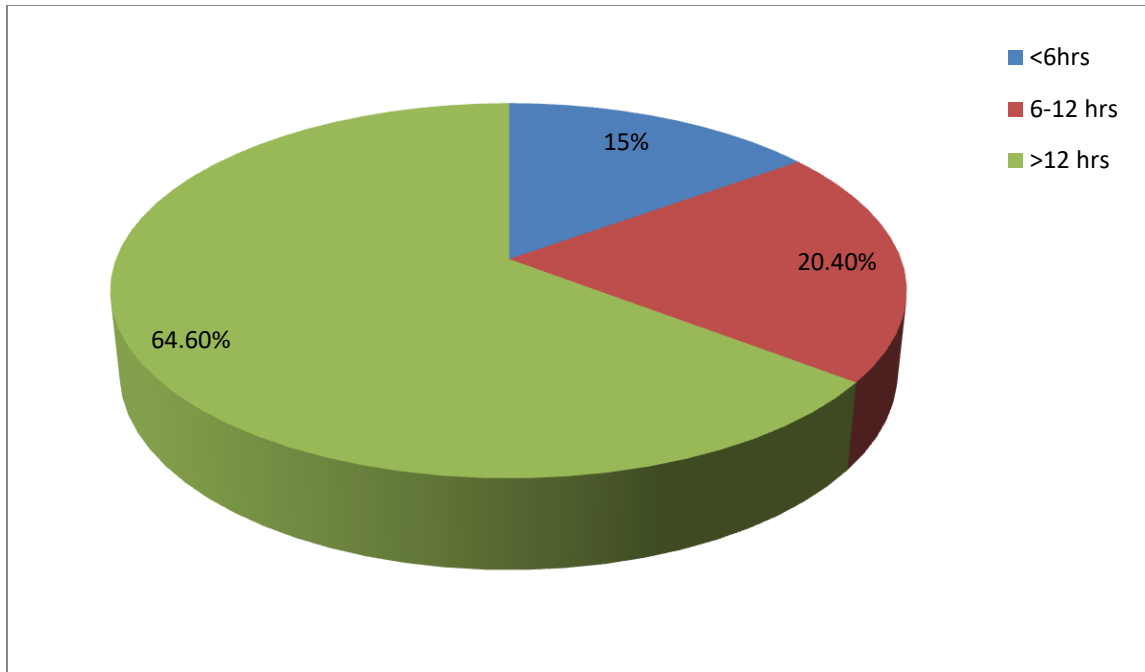


Figure 8. Pie chart showing the ratio of duration of vasopressor use

The research showed that the over all mortality rate was 39.8% and 11.2% left the hospital against medical advice. The most common admission diagnoses for those who died were infectious diseases (41.9%) followed by cardiac diseases (20.3%), majorly caused by those diseases other than ACS (63.55%). From those who died 51.6% were males, 34.6% were young, in the age group 15-30 years of age and 86.6% were those who were referred from hospitals and clinics.

Age above 40 years ($p < 0.05$; adjusted OR=1.68; 95% CI, 1.5-1.9), admission with trauma ($P < 0.05$; adjusted OR=1.2; 95% CI, 1.16-1.76) and requirement for vasopressor ($p < 0.05$; adjusted OR=1.7; 95% CI, 1.6-1.95) were significantly associated with mortality.

Subgroup analysis was done and showed that among deaths due to infectious diseases the most common causes were sepsis, 47% (20.7% of total deaths) followed by severe community acquired pneumonia, 38.46% (16% of the total deaths). Interestingly 70.9% of those admitted with poisoning were females (70.9%) and the commonest age group for both sexes was 15-30 years.

The case fatality rate was higher for trauma and poisoning being 50% and 38% respectively.

6. Discussion

Similar result was found in a study conducted in 84 countries worldwide involving 730 ICU centers and recruiting a total of 10,069 patients showing the most common cause of admission or develop later, to be infection (sepsis) 29.5% in our case 32.1%. But the overall mortality rate was 16.2% (95% CI 15.5–16.9) which is much lower than what was found in this research(8).

When compared with the results of a study done in USA representing 991,571 patients admitted in 160 adult ICUs during 2009 to 2013, there are great difference interms of the average age at admission= 62.8 years in this research=43.82 years and males account 53.7%, in this research comparably 51.2%. The rate of use of vasoactive agent was 19.12% (single=11.69%, double= 4.87% triple= 1.94%, more than 3= 0.69%) in our case 27.5%(single=20.4%, multiple=7.1%) which is almost comparable. The rate of RRT was 2.55% in our case 3.5% and the rate of intubation was 26.93% for average of 3.82 days, in this research it is found to be 16.5% for an average of 4.9 days(16).

In contrast to another study done in USA to see the 28 day mortality rate of ICU admitted patients older than 65 years which showed that this age group represent 45.7 % of the total ICU admissions and as the mortality rate was high (20.4% for 65–74, 28% for 75–84 and 34.6% for ≥85 years of age), this research showed that the most common age group of ICU admission was 15-30 years of age (32.1%)(17).

The result of this study is comparable to a retrospective study conducted in Uganda to assess the demographic data, admission diagnosis, and ICU length of stay incorporating 1,774 patients in the period January 2003 to December 2009. The mean age was 35.5 years; males accounted for 56.5%. The average mortality rate was 40.1%. Sepsis, ARDS, traumatic brain injuries and HIV related conditions were the most frequent admission diagnoses(21).

A retrospective study done in Lagos University Teaching Hospital, Nigeria, between 2010 & 2015 showed 54.4% to be males and middle aged group (20-59 years) accounted for 66.9% of all the ICU admissions. Unlike our research the study showed that neurosurgical cases accounted for 32.0% (severe traumatic brain injury accounted for 77.3%). Unlike ours the most common medical indication for admission was Neurological cases 53.8% followed by cardiac illnesses 14.9% and infectious diseases accounting 10% (8.2%, 30.27% and 32.1% respectively). The mortality rate was significantly higher (61.4%) than that found in this research(22).

A case-series study of all admissions in MICU between 1985-2000 was carried out in Addis Ababa University Teaching Hospital to analyze patterns of medical admissions and evaluate for any changes in that pattern over a study period. A total of 3548 patients (males account 59%, mean age 37.10 ± 17.29 years, in our case 51.2% and 43.82 ± 18.58 years respectively) were admitted during this time. Acute infectious and cardiovascular diseases accounted for half of the entire critical care admissions with infectious diseases accounting for 30%, in this research 32.1%. Among specific diagnoses, DKA was the leading cause of admission followed by acute AMI and severe and complicated malaria, each accounting for 10.7, 9.8 and 9.3% of all admissions respectively. Unlike to the result of this research, it showed the overall mortality to be 32%, with proportionally more female deaths. Severe and complicated malaria was the

leading cause of death (10.3%) followed by tetanus (6.4%) and acute myocardial infarction (6.3%)(12).

A longitudinal study conducted in Jimma University Specialized Hospital in 2011 to assess the reasons and outcomes of ICU admissions over a period of 9 weeks the analysed a total of 69 admissions and showed that females account for 55.1% and the mean age was 32.87 ± 17.03 years unlike to this research's result 48.8% and 43.82 ± 18.58 years respectively. The major reasons of admission were cardiovascular origin (30.4%), surgical interventions (18.8%) and respiratory infections (11.6%). Infectious diseases were the commonest (51.7%) co-morbid conditions in patients admitted to the ICU followed by cardiovascular disorders (21.7%). The mortality rate was found to be 37.7%, comparable to ours study but the major contribution comes from diseases of the cardiovascular origin(11).

7. Limitations of the study

The study did not assess separately those patients who were transferred from the general medical and surgical wards who had usually complicated illnesses which may affect the outcome. It also did not consider the the time which patients spent at the emergency rooms before transfer to the ICU. The duration of study was also short.

8. Conclusions

In conclusion the most common age group and diagnoses at admission were 15-30 years (32.1%, with an average age 43.82 ± 18.58 years) and infectious diseases (32.1%) followed by cardiac disorders (30.27%). The overall mortality rate was 39.8% and no association with sex. There was strong association between age above 40 years ($p < 0.05$; OR=1.68; 95%CI, 1.5-1.9), admission with trauma ($p < 0.05$; AOR=1.2; 95%CI, 1.16-1.78) and vasopressor requirement ($P < 0.05$; OR=1.7; 95%CI, 1.6-1.95) with mortality.

9. Recommendation

- Nurses & physicians should
 - have clear and complete documentation
 - investigate patients properly for follow up and use of standard scoring systems of patient prognostication
- Felege Hiwot Referral Hospital should
 - evaluate HMIS log book for completeness
 - address why infectious causes are major cause of admission
 - address why all patients in need of MV were not intubated
 - answer why significant number of patients went against
- The regional health Bureau should
 - address why poisoning is this much common (10.1%), females account for 70.7%, unlike other country studies and even other studies of Ethiopia
 - Provide education about infection prevention
- And finally I recommend this topic to be done for prolonged period of time.

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11. ANNEXES

Annex 1. Check lists for patients admitted in the ICU

1. Age a. 15-30 years b. 31-45 years c. 46-60 years d. Age \geq 61 years
2. Sex a. Male b. Female
3. Residency a. Rural b. Urban
4. Source of Referral a. Health Center b. Clinics & Hospitals c. None
5. Disease classification
 - a. Circulatory
 - b. Respiratory
 - c. Endocrine & Metabolic diseases
 - d. Infectious diseases
 - e. Poisoning
 - f. Traumas
 - g. Neurologic disorders
 - h. Miscellaneous disorders
6. Previous comorbidities a. Yes b. No
 - 6.1 if yes type of comorbidity
 1. HTN
 2. DM
 3. HTN & DM
 4. HIV
 5. Smoking
 6. psychiatry
 7. Cardiac
 8. Hematologic
 - 6.1 If yes, was he/ she on treatment a. Yes b. No
 - 6.2 If yes, was he/ she adherent for the treatment a. Yes b. No

7. Level of mentation a. GCS =15 b. GCS 10-14 c. GCS<10
8. Was there a need of ventilator support? a. Yes b. No
 - 8.1 If yes, was he/ she intubated? a. Yes b. No
 - 8.2 If yes, for how long was he/ she intubated?
 - a. 1-3 days b. 4-8 days c. >8 days
 - 8.3 If yes, (for Q. 8.1), what was the outcome? a. Improved b. died
9. Was there a need of vasopressor(s)? a. Yes b. No
 - 9.1 If yes, for how long was he/ she on vasopressor(s)?
 - a. <6 hours b. 6-11 hours c. \geq 12 hours
 - 9.2 If he/ she was on vasopressor, number of vasopressors?
 - a. Single b. \geq 2
10. Was there evidence of Acute Kidney Injury (AKI) requiring dialysis?
 - a. Yes b. No
 - 10.1 If yes, what was the outcome?
 - a. Improved b. Died c. Left against medical advice
11. Was there a need of Cardioversion or Defibrillation?
 - a. Yes b. No
 - 11.1 If yes, what was the outcome?
 - a. Successful b. Not successful
12. Length of ICU stay a. 1-5 days b. 5-10 days c. >10 days
13. Final outcome
 - a. Improved b. Referred to higher institution c. Left against medical advice d. Death

Declaration form

I, the under signed, declared that this is my original work, has never been presented in this University, and that all the resources and materials used for the research, have been fully acknowledged.

Principal investigator

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Signature-----date-----/-----/-----

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