Admission pattern, Clinical outcomes and associated factors among patients admitted in medical intensive care unit at University of Gondar Comprehensive and specialized hospital, Northwest Ethiopia, 2019. A retrospective cross-sectional study.

Hailemariam Getachew Tessema

Dilla University

Girmay Fitiwi Lema (✉ tsagir.fitiwi@gmail.com)

University of Gondar College of Medicine and Health Sciences <https://orcid.org/0000-0001-6229-5121>

Nebiyu Mesfin

University of Gondar College of Medicine and Health Sciences

Demeke Yilkal Fentie

University of Gondar College of Medicine and Health Sciences

Nurhussien Rizke Arefaynie

University of Gondar College of Medicine and Health Sciences

Research article

Keywords: admission, intensive care unit, Length of stay, Mortality, Outcome

Posted Date: August 4th, 2019

DOI: <https://doi.org/10.21203/rs.2.12415/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Intensive care unit (ICU) is a multidisciplinary staffed and specially equipped area of a hospital dedicated to provide care for patient with life-threatening illness. Provision of intensive care services to critically ill patients is a global enterprise. The care is advancing but in resource-limited settings, it is lagging far behind and ICU mortality is still higher due to various reasons. **Objective:** We aimed to determine the admission patterns, clinical outcomes and associated factors among patients admitted medical intensive care unit (MICU). **Results:** A total of 738 patients were admitted to MICU during September 2015- April 2019. Two hundred thirty four patients had incomplete data on the registries and their charts could not be located. So that, 504 (68%) of all ICU admissions had complete data and were analyzed. Out of the 504 patients, 268 (53.2%) patients were females. Cardiovascular disease 182(36.1%) was the commonest categorical admission diagnosis. The overall mortality rate of the MICU was 38.7 %. In the multivariate analysis, mortality was associated with need for mechanical ventilation (AOR=5.87, 95% CI: 3.24 - 10.65) and abnormal mental status at admission (AOR = 2.8.8, 95% CI: 1.83-4.29). Patients who stayed less than four days in MICU are 5 times more likely to dies than who stayed(AOR= 5.58, 95% CI: 3.58- 8.69). Therefore, we recommend improving the acute critical care through the expansion of the care, supply emergency equipment's and medications and implementation of admission criteria protocols and other local guidelines. **Key words:** admission, intensive care unit, Length of stay, Mortality, Outcome

Background

Intensive care is a continuum of care from various source of admissions such as trauma unit, emergency department, inpatient wards, and post anesthesia care unit where patients' requiring a frequent assessment of vital signs, invasive hemodynamic monitoring, intravenous medications and fluid management, ventilatory and nutritional support to assure safe and effective outcomes(1). Access to critical care is a crucial component of healthcare systems hence critically ill patients are admitted to the intensive care units to reduce morbidity and mortality associated with acute illness, trauma or surgical procedures(2, 3)

Mortality in ICU is a global burden which results in a huge loss of productivity and financial costs. It varies across the world depend on ICU infrastructure, staff availability, and training, pattern, and cause of ICU admission. In developed contents 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% (4, 5).

In Ethiopia, the first ICU was introduced more than 30 years ago in Addis Ababa Tikur Anbessa Hospital since then the number of intensive care service is increasing in both public and private hospitals of the country(6). Even though critical care services have been undergoing significant advancements for improvements due to technological progress, new

scientific development in treatment outcome of the critically ill patients globally, the progress of critical care service provision in resource-limited settings is lagging far behind and the mortality is still higher (4, 7-9).

In Africa, the ICU mortality rate is high as it compared to the other developed continents. The mortality rate in Nigeria, Uganda, Tanzania, and Kenya were 32.9%, 40.1%, 41.1%, and 53.6% respectively (10-13). Different studies showed that the mortality rate of ICU patients in Ethiopia is relatively similar to other Africa countries. Previous studies done in Jimma, Addis Ababa, and Mekelle showed that the mortality rate was 50.4%, 32% and 27% respectively (14-16).

In developing countries, the burden of critical illness is high. Severe infections such as pneumonia, malaria are endemic, road traffic accident, obstetric complications, and surgical emergencies are common. In addition, underlying malnutrition and HIV infection will make patients to have a poor physiologic function during admission thereby worsen the outcome of critically ill patients. Moreover, the burden is certain to extend with Growing urbanization and rising epidemics, (5, 12, 17).

Provision of ICU care is very challenging in developing countries like Ethiopia. The scarcity of drugs and medical equipment's, lack of well-trained staffs and poor infrastructures are the main challenges to provide optimal care to critically ill patients (3, 18).

Apart from medical diagnosis of patients, most hospital in low income countries lack formal triage system and emergency department which forces critically ill patients to be seen in either in the ward or outpatient clinics on the bases of "first come first served" which will increases the burden of ICU and compromises patients outcome since triage system decrease waiting time and mortality through identification of critically ill patients with early warning score and care Delivery(1, 19). There is scarcity of information regarding critically ill patients admitted in the ICU in the study area. Therefore, the aim of the current study was to describe the admission patterns, clinical outcomes and associated factors among patients admitted in the medical intensive care unit of UOGCSH.

Methods

Study design, area and period

University of Gondar Comprehensive Specialized Hospital is a specialized teaching hospital located in Amhara National Regional state, North Gondar zone, which is about 738km away from Addis Ababa in Northwest of Ethiopia. It is one of the largest specialized hospitals providing service to about 5 million people. The critical care service of University of Gondar Comprehensive Specialized Hospital (UoGCSH) was started in 2011 as a four-bed

MICU capacity with two mechanical ventilators one defibrillator, four non-invasive hemodynamic monitoring devices, one ultrasound machine, and one ABG-analyzer machine. The MICU is an open ICU system run under the department of internal medicine. Currently, the MICU has a team composed of one specialist in pulmonary and critical care medicine (PCCM), internal medicine residents, senior anesthetists, 2 critical care and 8 clinical nurses, anesthetists, physiotherapists, and other health professionals according to the demands of the individual cases. The MICU provides critical care service not only for internal medicine cases but also surgical and obstetrics cases.

A retrospective cross sectional study was conducted based on the ICU registration notes and charts. Patients who were admitted to the MICU from September 2015 to April, 2019 and whose ICU registry notes and charts were available were included in the study. Missed Patients chart and incomplete data on the charts were the exclusion criteria (**Figure 1**).

Study variables

The dependent variable was clinical outcomes (Survivors Vs Non survivors) of patients admitted to MICU. Independent variables were: Socio-demographic variables (Age, gender, residency), Clinical diagnosis at admission, presence of comorbid illness, Source, frequency and category of admission, vital sign at admission, intervention during MICU stay, and Length of ICU stay.

Data collection procedures

Data was collected through reviewing chart and ICU registry by using pretested structured data retrieval form (checklist) which included the chart number, date of admission, age, gender, source of admission, admission diagnosis, admission category, vital sign during admission, presence of comorbidity, length of stay, intervention in ICU, and treatment outcome.

Data processing and analysis procedures

Data was entered, coded and cleaned using the Epi-data software and analyzed using SPSS version 20. Categorical variables were reported as frequencies and percentages whereas; median and interquartile range (IQR) were used for continuous variables. Descriptive statistics were carried out and the results were presented using text, tables and graph. Model fitness was checked using a Hosmer-Lemeshow goodness-of-fit test. Crude odds ratios with their 95% confidence intervals were estimated in the bivariable logistic regression analysis to assess the association between each independent variable and outcome variable. In the

bivariable logistic regression, variables with P-value < 0.2 were fitted into the multivariable logistic regression analysis. Adjusted odds ratios with their 95% confidence intervals were estimated to assess the strength of association, and variables with P-value < 0.05 were considered statistically significant factors.

Results

Demographic and Admission Characteristics of among patients admitted to MICU

A total of 738 patients were admitted from September 2015 to April 2019 .Two hundred thirty-four patients had incomplete data on the registries and their charts could not be located. So that, 504 (68%) patients were included in this study.

Patient age ranged from 15 to 98, median (IQR) was 32 (28 – 40) years. Of the total admitted patients 268 (53.2%) were female with female to male ratio of **(F: M) 1.1: 1** and most of the patients 264(52.4%) were urban residents.

From the total 504 case notes reviewed, majority 299(59.3%) patients were admitted from medical ward followed by emergency department 168 (33.3%), surgical ward 29(5.8%) and gynecology and obstetrics ward 8(1.6%) respectively **(Table 1)**.

Table 1: Socio demographic characteristics among patients admitted to MICU of UoGCSH. September 2015 to April 2019, (N=504).

Characteristics		Frequency (N)	Percentage (%)
Sex	Male	236	46.8
	Female	268	53.2
Age (years)	< 20	58	11.5
	20-40	198	39.3
	41-60	132	26.2
	>60	116	23
Residency	Urban	264	52.4
	Rural	240	47.6
Source of admission	Medical ward	299	59.3
	Emergency department	168	33.3
	Surgical ward	29	5.8
	Gynecology and obstetrics ward	8	1.6
Category of admission	Emergency medical patients	482	96
	Emergency surgical patients	18	3.6
	Elective surgical patients	2	0.4
Frequency of admission	First admission	446	88.5
	Readmission (2 times and above)	58	11.5

The commonest categorical diagnosis at admission was all type Cardiovascular, respiratory and infectious diseases with 36.1%, 17.9% and 13.11% of occurrence, respectively (**Table 2**). Similarly, these disorders are the commonest categorical admission diagnosis in the specific year of the past five years (**Figure 2**).

Table 2: Distribution of categorical admission diagnosis among patients admitted to MICU of UoGCSH. Gondar. September 2015 to April 2019, (N=504).

Disease category	Frequency (N)	Percent (%)
Cardiovascular disease	182	36.1
Respiratory disease	90	17.9
Infectious disease	66	13.1
Neurologic disease	44	8.7
Endocrine disease	36	7.1
Renal disease	18	3.6
Hematologic disease	22	4.4
Poisoning	14	2.8
Miscellaneous conditions	32	6.3
Total	504	100

Key: Miscellaneous conditions; GI disorder, Rheumatologic, Malignancies, Electrolyte disorder.

- All respiratory infections were under respiratory disease.
- Infective heart disease and rheumatic heart disease were under cardiovascular disease
- Guillen Barrie Syndrome was under the category of Infectious disease

The most common specific diagnosis at ICU admission was all types of myocardial infarction 96 (19 %) followed by Heart failure 56 (11.1%), ARDS 46(8.9%), septic shock 37 (7.3%) and HIV infection 25 (5%) of the all admissions (Table 3).

Table 3: Distribution of common specific admission diagnosis among patients admitted to MICU of UoGCSH. September 2015 to April 2019, (n=376).

Specific diagnosis	Frequency (n)	Percent (%)
Myocardial infarction(MI)	96	19
Congestive Heart failure (CHF)	56	11.1
Acute respiratory disease syndrome (ARDS)	45	8.9
Septic shock	37	7.3
Diabetic keto Acidosis(DKA)	28	5.6
Stroke	25	5
Human immuno deficiency virus (HIV) infection	25	5
Pneumonia	25	5
Cardiogenic shock	20	4
Pulmonary thrombo embolism (PTE)	19	3.7
Total	376	74.6

All type of myocardial infarction was the commonest disease subcategory from the cardiovascular disorder which accounted 53% of admission. ARDS of different cause took 50% of all respiratory disease admissions. Thirty-seven patients were presented with a septic shock which put sepsis first in the list from infectious disease admission with the proportion of 56%. Organophosphate poisoning resulted in 86% of all type of poisoning admission. All form of stroke constituted 25(57%) of neurologic disease while DKA 28(78%), acute kidney injury (AKI) 15(83%) and thromboembolism 19(86%) were the commonest disease diagnosis from endocrine, renal, and hematologic disorder respectively.

About 256(50.8%) patients were admitted with comorbid illness from which 84(16.7%) patients had more than one systemic illness. Respiratory disease 47(27.2%) were the commonest co-morbid condition in the patient admitted to ICU followed by cardiovascular 44(26.3%) and infectious disease 22(13.2%) **(Figure 3)**.

Admission vital sign of patients admitted in MICU: In this study, the majority of patients had unstable vital sign during admission, 331(65.7%) patients had high pulse rate.39.1%of patients had deranged blood pressure (either elevated or decreased MAP). Majority of patients were had high temperature and pulse rate. In addition, 45% of patients had saturation below 90%. Regarding the consciousness level of patients at arrival to the intensive care unit, 299 (59.3%) patient were conscious, the rest were presented with disturbed mental status. **(Table 4)**.

Table 4: Distribution of admission vital signs among patients admitted toMICU of UoGCSH. September 2015 to April 2019, (N=504).

Variables		Frequency (n)	Percent (%)
Pulse rate (bpm)	<60	4	0.8
	60-100	166	32.9
	>100	331	65.7
	No pulse	3	0.6
Respiratory rate (bpm)	<12	7	1.4
	12-20	72	14.3
	>20	423	83.9
	Apnea	2	0.4
Mean arterial pressure (mmHg)	65-106	302	59.9
	<65	122	24.2
	>106	65	12.9
	Unrecordable	15	3
Peripheral oxygen saturation(SPO2)	<90%	227	45.0
	90%-100%	277	55.0
Temperature (o ^c)	< 36.5	120	23.8
	36.5 - 37.5	151	30.0
	>37.5	233	46.2
Mental status	Concious	299	59.3
	Confused	53	10.5
	Lethargic	43	8.5
	Unconcious	109	21.7
Total		504	

Intervention done in MICU: Three hundred and eighty-two (75.8%) patients were in mechanical ventilation with facilitation of tracheal intubation, 323(64.1%) were in antibiotics, 311(61.6%) were received anticoagulants, 162(32.1%) patients received inotrope support respectively.

Clinical Outcome of patients admitted to MICU: The overall mortality rate of the MICU was 38.87%. Three hundred and nine (61.3%) patients were survivors, among them 238(77%) of patients were improved and transferred to the wards. 30(9.7%) were cured and got discharged to home, 36(11.6%) were left against medical advice, and 5(1.6%) patients were referred to another setting for further treatment.

The highest mortality rate (46.6%) was observed in 2009; the lowest mortality rate (29.1%) was observed in 2008 (**Figure 4**). The proportion of death among females (40.6%) was higher than males (36.5%) however, there was no significant sex difference in patients clinical outcome($X^2=1$, $P=0.33$). The proportion of mortality was increased as the age increases. Among the non survivors, 43.9% of patients were beyond 60 years old and 32.7% patients were under 20 years old.

In ICU mortality was not significant among source of admission as the proportion of mortality from emergency department, medical ward, surgical ward and gynecology/obstetrics was found to be 40%, 38%, 34%, and 40% respectively with (P=0.91) Among the commonest specific admission diagnosis, cardiogenic shock (57.1%) had the highest case fatality ratio followed by ARDS (54.4%) and ischemic heart disease (53.5%) (Table 5).

Table 5: Case fatality ratio, among patients admitted to MICU of UoGCSH. September 2015 to April 2019, (n=376).

Specific disease	Number of patients admitted	Case fatality ration
Cardiogenic shock	14	57.1
Acute Respiratory Distress Syndrome(ARDS)	22	54.4
Ischemic heart disease	71	53.5
Congestive heart failure	29	44.8
Severe pneumonia	15	40
Septic shock	32	37.5
Pulmonary Thrombo embolism (PTE)	14	34.5
Stroke	11	19.7
Human Immunodeficiency Virus (HIV) infection	17	19.7
Diabetic Keto Acidosis (DKA)	16	29.4

The median length of ICU stay (IQR) was 4.0 (2.0–5.0) days. The most frequent stay (19.8%) was 1 day. The minimum stay in ICU was 30 minutes secondary to poisoning while the maximum stay was 24 days with the diagnosis of myocardial infarction. About 81.7% of patients died or discharged with in the first one week of stay. The median duration of mechanical ventilation was 4.5(1-6) (interquartilerange) days. Patients with Myocardia infarction, Gullies Barrie Syndrome, and ARDS had longer duration of mechanical ventilation.

Patients who stayed in MICU for less than 4 days were 5 times more likely to die than who stayed four and above days. As illustrated in the following figure most of the patients died in the first 24 hours of admission (figure 5).

Bivariate logistic analysis shown that gender, diagnosis at admission, need for mechanical ventilation, duration of mechanical ventilation, length of ICU stay, mean arterial pressure at admission, and mental status at admission were significantly associated with the clinical out of MICU patients. However, in a multivariate analysis, the associated risk factors of death were the need for mechanical ventilation, abnormal mental status at admission and length of ICU stay (**Table 6**).

Table 6: Multivariable logistic regression showing the factors associated with mortality among patients admitted to MICU of UoGCSH. September 2015 to April 2019, (N=504).

Variables		Crude odds ratio	Adjusted odds ratio	95% Confidence Interval	P-value
Mechanical ventilator	Yes	4.312		(3.244, 10.65)	0.001*
	No	1.00	1.00		
Mental status at admission	Conscious	1.00	1.00		0.001*
	Abnormal mental status	0.237	2.808	(1.843, 4.279)	
Length of ICU stay	< 4 days	4.37	5.58	(3.58, 8.69)	0.001*
	≥ 4 days	1.00	1.00		

Key: *Significantly associated at $P < 0.05$, 1.00: reference

Discussion

The outcomes of patients admitted to intensive care unit depends on the clinical condition of patients arrival, level of training and experience of staffs, resource, infrastructure and capacity of the unit (18, 20, 21).

In this study, the overall in ICU mortality found to be 38.7 % (95% CI: 34.5, 43.1). This finding is comparable with the previous studies done in Addis Ababa (39%) and Jimma (37.7%) (14, 15). It also similar to the studies conducted in sub-Saharan African countries of Nigeria, Uganda and Tanzania was 34.6% 40.1%, 41.1% respectively (18, 21, 22). However, the overall ICU mortality of the current study was higher than studies done in Mekelle, Ethiopia (27%) and Scandinavian countries (9.1%).(16, 23). This

discrepancy might be due to lack of necessary medical equipments (ABG-analyzer machine, portable dialysis machine and portable x-ray service), infrastructure, and training. In addition, the lack of high dependency unit in the study area might be one of the contributing factors for the higher rate of ICU mortality (18, 22).

In our study, the mortality rate was lower than the previous studies done in other parts of Ethiopia Hosanna (46%), Jimma (50.4%), and Kenya (53.6%). This could be due to the difference in diagnosis of admission. Poly trauma and traumatic brain injury were the main diagnosis of admission in the previous studies.

In the current study, the median length of ICU stay found to be 4 days which resembles to the other African countries (13, 22). In our study, Out of 504 patients, 118(23%) were stayed in ICU 24 hours or less. Out of whom 89 (75%) of patients died in the mentioned period of time which accounted for 45% of overall ICU mortality. In addition, patients who stayed in ICU for less than four days were 5 times more likely to die than patients who stayed four or more days with (AOR=5.58, $p<0.001$) which is comparable with the study done in Uganda (17). However, our result was different from the study conducted in Hosanna, the length of ICU stay was more than 14 days, which was strongly associated with ICU mortality (OR=4.113, $P < 0.039$) (24). The discrepancy on the median length of ICU stay might be explained due to late arrival to ICU and delay in intervention, shortage of crucial emergency drugs including inotropes, anti-arrhythmic drugs, and antibiotics, absence of airway management and cardiopulmonary resuscitation equipment's in the medical emergency ward. Furthermore, vital signs and overall clinical conditions of the patients on admission to the MICU was found to very be poor, which may shown a gap in the continuity of care from emergency medicine department, medical and surgical wards to MICU. Early death might also be explained by a limited number of ICU bed since the World Federation of Societies of Intensive and Critical Care Medicine recommends the ICU need to have at least 5% of total hospital beds. Furthermore, shortage of functional mechanical ventilator which delays and denied admission of critically ill patients to MICU (18, 25).

This study revealed that need for mechanical ventilation is independent risk factor of ICU mortality with (AOR: 5.578, $P<0.001$) which was similar with the studies done in Kenya and Brazil where mechanical ventilator was independent risk factors for death (AOR= 10.7, $p<0.001$) and (AOR: 6.37, $p<0.001$) respectively (26, 27). The possible explanation for this association could be related that mechanical ventilator is initiated for the patients with respiratory failure, unable to protect the airway and hemodynamic instability. Furthermore, patients who need intubation and mechanical ventilator more vulnerable for ventilator associated pneumonia and other nosocomial infection which further compromises the clinical outcome of critically ill patients (28, 29). In addition, these patients who were on mechanical ventilator were presented with unstable vital sign and comorbid conditions which might be increased the odds of in ICU mortality.

Our study revealed that patients who presented with abnormal mental status were more likely to die in MICU than conscious patients (AOR: 2.741, $P<0.001$). This result may linked with the severity of disease condition during admission. Disturbance level of consciousness is related with severe

decompensated disease, cerebral hypo-perfusion due to sepsis, blood loss, poisoning, and neurological disorder. Beside to this patients with abnormal mental status might not protect their airways with further increases the probability of respiratory and infectious disease(30).

In the current study, majority of patients were adult with an average age group of 20-40 years and median age of 32 years. Since, most of young the patients were diagnosed with infectious disease and respiratory disorder which might increase the probability of MICU admission. Our result is in accordance with the studies done in other sub-Saharan counties as the median age of patients in Kenya (29 years) and Tanzania (34 years), years of age respectively(13, 22). Contrarily, the patient's population in this study was younger than the developed nation as the mean age of ICU admission in Scandinavian countries 59.3 years, and Korea 64.7 years. The difference could be in the above-mentioned studies most of patients were admitted secondary to age-related degenerative and comorbid disease (3, 20, 31).

Despite the fact that the young patients took the majority proportion of admission the number of deaths increased with increasing age similar to the Addis Ababa and Mekelle(15, 16). This might be the old patients were presented with Less organ physiologic preserve, unstable vital sign and more comorbid score.

In the present study, females were more likely to admit and die in MICU than males. Which was in contrast to the other African countries where males predominate the admission and mortality proportion of the ICU of Kenya, Uganda, Tanzania, and Nigeria(3, 18, 21, 27). The gender difference could be explained by the majority of females in the current study were admitted with comorbid illness and are aged with 26% of them were above the age of 60 years.

A disease of cardiovascular system accounted for 36% of all ICU admission followed by respiratory (17.9%). This is similar to the previous study done in Jimma and Mekelle(16, 31). However, it is different from a study conducted in Uganda where infectious illness predominant (18) and in Nigeria where post-operative care were the main reason for admission(3).

Among patients of all age group myocardial infarction (56%), ARDS (27%), CHF (24%), and cardiogenic shock constituted more 60 % of in ICU mortality. This could be due to the lack of laboratory workup for cardiac enzymes like troponin and creatinine kinase, cardiac monitoring such as central Venous pressure monitoring, intra-arterial line and vaso-active medications such as phenylephrine and Ephedrine.

In the current study, there was higher case fatality ratio of cardiogenic shock (57.1%), ARDS (54.4%) and ischemic heart disease (53.5%) which is different from Mekelle septic shock (58%) and Addis Ababa severe pneumonia (56.4%)(15, 16). This discrepancy might be due to lack service for cardiac criticals such as cardiac catheterization laboratory and isolated cardiac intensive care unit for percutaneous intervention and pacing.

Limitation of the study

Although this study has provided information regarding the pattern of admission, clinical outcomes and associated factors among critically ill patients admitted to the MICU, there were some limitations that could be addressed in another study. Due to the nature of study design, retrospective study based on the ICU registries and charts, only limited data were retrieved. So that necessary variables, which helps to identify independent risk factors of clinical outcomes of patients admitted to the ICU were not collected. In addition, data related to Physiologic and laboratory variables necessary to calculate severity and prognostic score such as sequential organ failure assessment (SOFA), Simplified Acute Physiology Score (SAPS) and Acute Physiology and Chronic Health Disease Classification System (APACHE) to predict ICU mortality were not collected due to inability to locate in the available written chart and ICU registry books.

Conclusion

The overall mortality rate in the medical intensive care unit is high. Cardiovascular disorder were the most common cause of admission and death. Need for mechanical ventilator, abnormal mental status on admission and short ICU stay were significantly associated with the clinical outcome of MICU patients. This study also demonstrated that the majority of critically ill patients died within the first 24 hours of admission. Therefore, we recommend to we recommend improving the acute critical care through the expansion of the care, supply emergency equipment's and medications and implementation of admission criteria protocols and other local guidelines.

Abbreviations

ARDS	Acute Respiratory Distress Syndrome
CHF	Congested Heart Failure
DKA	Diabetic Ketoacidosis
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
LOS	Length of Stay
MICU	Medical Intensive Care Unit
TBI	Traumatic Brain Injury

Declarations

- **Ethics approval and consent to participate:** This study was approved by the ethical review board of School of Medicine, College of Medicine and Health Sciences with reference number of (**SOM /140/02/2019**). Permission also received from medical director of the hospital before the commencement of the study. Data was collected from chart and log book clinical
- **Consent for publication:** Not applicable
- **Availability of data and material:** The datasets used/or analyzed during the current study is available from the corresponding author on reasonable request.
- **Competing interests:** the authors declared that they have no competing interest.
- **Funding:** Not applicable
- **Authors' contributions** This work was carried out in collaboration among all authors. HG contributed to the conception and design of the study, acquired, analyzed and interpreted the data drafted and revised the manuscript. GF, NM, DY and NR participate in reviewing the design and methods of data collection, interpretation and preparation of the manuscript. All authors participate in preparation and critical review of the manuscripts. In addition, all authors read and approved the manuscript.
- **Acknowledgments:** The authors would like acknowledge the Internal Medicine department, school of medicine, college of Medicine and Health Science for supporting to conduct this research and also our appreciation goes to the data collectors, colleagues and staffs working in the chart and information center of UOGCSH.

References

1. Nates JL, Nunnally M, Kleinpell R, Blosser S, Goldner J, Birriel B, et al. ICU admission, discharge, and triage guidelines: a framework to enhance clinical operations, development of institutional policies, and further research. *Critical care medicine*. 2016;44(8):1553-602.
2. Park J, Jeon K, Chung CR, Yang JH, Cho YH, Cho J, et al. A nationwide analysis of intensive care unit admissions, 2009-2014 - The Korean ICU National Data (KIND) study. *J Crit Care*. 2018;44:24-30.
3. Onyekwulu F, Anya S. Pattern of admission and outcome of patients admitted into the Intensive Care Unit of University of Nigeria Teaching Hospital Enugu: A 5-year review. *Nigerian journal of clinical practice*. 2015;18(6):775-9.
4. Vincent J-L, Marshall JC, Namendys-Silva SA, François B, Martin-Loeches I, Lipman J, et al. Assessment of the worldwide burden of critical illness: the intensive care over nations (ICON) audit. *The lancet Respiratory medicine*. 2014;2(5):380-6.
5. Rhodes A, Moreno RP. Intensive care provision: a global problem. *Revista Brasileira de terapia intensiva*. 2012;24(4):322-5.
6. Melaku Z, Alemayehu M, Oli K, Tizazu G. Pattern of admissions to the medical intensive care unit of Addis Ababa University Teaching Hospital. *Ethiopian medical journal*. 2006;44(1):33-42.
7. Dünser MW, Baelani I, Ganbold L. A review and analysis of intensive care medicine in the least developed countries. *Critical care medicine*. 2006;34(4):1234-42.
8. Garland A, Olafson K, Ramsey CD, Yogendran M, Fransoo R. Epidemiology of critically ill patients in intensive care units: a population-based observational study. *Critical Care*. 2013;17(5):R212.
9. Gomersall CD. Critical care in the developing world-a challenge for us all. *Critical Care*. 2010;14(2):131.
10. Ilori IU, Kalu QN. Intensive care admissions and outcome at the University of Calabar Teaching Hospital, Nigeria. *Journal of critical care*. 2012;27(1):105. e1-. e4.
11. Kwizera A, Dünser M, Nakibuuka J. National intensive care unit bed capacity and ICU patient characteristics in a low income country. *BMC research notes*. 2012;5(1):475.
12. Sawe HR, Mfinanga JA, Lidenge SJ, Mpondo BC, Msangi S, Lugazia E, et al. Disease patterns and clinical outcomes of patients admitted in intensive care units of tertiary referral hospitals of Tanzania. *BMC International Health and Human Rights*. 2014;14(1):26.

13. Lalani HS, Waweru-Siika W, Mwogi T, Kituyi P, Egger JR, Park LP, et al. Intensive care outcomes and mortality prediction at a national referral hospital in western Kenya. *Annals of the American Thoracic Society*. 2018;15(11):1336-43.
14. Smith ZA, Ayele Y, McDonald P. Outcomes in critical care delivery at Jimma University Specialised Hospital, Ethiopia. *Anaesthesia and intensive care*. 2013;41(3):363-8.
15. Kedir S, Berhane A, Bayisa T, Wuletaw T. Admission patterns and outcomes in the medical intensive care unit of st. Paul's hospital millennium medical college, Addis Ababa, Ethiopia. *Ethiop Med J*. 2017;55(1):19-26.
16. Gidey K, Hailu A, Bayray A. PATTERN AND OUTCOME OF MEDICAL INTENSIVE CARE UNIT ADMISSIONS TO AYDER COMPREHENSIVE SPECIALIZED HOSPITAL IN TIGRAY, ETHIOPIA. *Ethiopian Medical Journal*. 2017;56(1).
17. Murthy S, Leligdowicz A, Adhikari NK. Intensive care unit capacity in low-income countries: a systematic review. *PloS one*. 2015;10(1):e0116949.
18. Kwizera A, Dunser M, Nakibuuka J. National intensive care unit bed capacity and ICU patient characteristics in a low income country. *BMC research notes*. 2012;5:475.
19. Wangara AA, Hunold KM, Leeper S, Ndiawo F, Mweu J, Harty S, et al. Implementation and performance of the South African Triage Scale at Kenyatta National Hospital in Nairobi, Kenya. *International Journal of Emergency Medicine*. 2019;12(1):5.
20. Vincent JL, Marshall JC, Namendys-Silva SA, Francois B, Martin-Loeches I, Lipman J, et al. Assessment of the worldwide burden of critical illness: the intensive care over nations (ICON) audit. *The Lancet Respiratory medicine*. 2014;2(5):380-6.
21. Ilori IU, Kalu QN. Intensive care admissions and outcome at the University of Calabar Teaching Hospital, Nigeria. *Journal of critical care*. 2012;27(1):105.e1-4.
22. Sawe HR, Mfinanga JA, Lidenge SJ, Mpondo BC, Msangi S, Lugazia E, et al. Disease patterns and clinical outcomes of patients admitted in intensive care units of tertiary referral hospitals of Tanzania. *BMC international health and human rights*. 2014;14:26.
23. Strand K, Walther SM, Reinikainen M, Ala-Kokko T, Nolin T, Martner J, et al. Variations in the length of stay of intensive care unit nonsurvivors in three Scandinavian countries. *Critical care*. 2010;14(5):R175.
24. Suleiman M, Adem Abdi O, Gete Getish B. Clinical outcomes of patients admitted in intensive care units of Nigist Eleni Mohammed Memorial Hospital of Hosanna, Southern Ethiopia 2017. 79-85 p.
25. Marshall JC, Bosco L, Adhikari NK, Connolly B, Diaz JV, Dorman T, et al. What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *Journal of critical care*. 2017;37:270-6.
26. Toufen C, Jr., Franca SA, Okamoto VN, Salge JM, Carvalho CRR. Infection as an independent risk factor for mortality in the surgical intensive care unit. *Clinics (Sao Paulo)*. 2013;68(8):1103-8.

27. Lalani HS, Waweru-Siika W, Mwogi T, Kituyi P, Egger JR, Park LP, et al. Intensive Care Outcomes and Mortality Prediction at a National Referral Hospital in Western Kenya. *Annals of the American Thoracic Society*. 2018;15(11):1336-43.
28. Fialkow L, Farenzena M, Wawrzeniak IC, Brauner JS, Vieira SRR, Vigo A, et al. Mechanical ventilation in patients in the intensive care unit of a general university hospital in southern Brazil: an epidemiological study. *Clinics*. 2016;71(3):144-51.
29. Bouadma L, Sonnevile R, Garrouste-Orgeas M, Darmon M, Souweine B, Voiriot G, et al. Ventilator-Associated Events: Prevalence, Outcome, and Relationship With Ventilator-Associated Pneumonia*. *Crit Care Med*. 2015;43(9):1798-806.
30. Barfod C, Lauritzen MMP, Danker JK, Sölétormos G, Forberg JL, Berlac PA, et al. Abnormal vital signs are strong predictors for intensive care unit admission and in-hospital mortality in adults triaged in the emergency department - a prospective cohort study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. 2012;20(1):28.
31. Agalu A, Woldie M, Ayele Y, Bedada W. Reasons for admission and mortalities following admissions in the intensive care unit of a specialized hospital, in Ethiopia. *International Journal of Medicine and Medical Sciences*. 2014;6(9):195-200.

Figures

Figure 1

Diagram illustrating data collection procedure among patients admitted to MICU of UoGCSH September 2015 to April 2019, (N=504).

Figure 2

Trends of common Categorical Admission Diagnosis among patients admitted to MICU of UoGCSH September 2015 to April 2019, (n=340).

Figure 3

Frequency of common comorbid illness among patients admitted to MICU of UoGCSH. September 2015 to April 2019, (n=256). Key: Miscellaneous Conditions: Gastro intestinal disorders, Post-operative conditions, Trauma, Malignancy, Tetanus, Myasthenia Gravis.

Figure 4

Trend of in ICU mortality among patients admitted to MICU of UoGCSH from 2014-2019 (n=195).

Figure 5

Length of ICU stay between survivor and non-survivor among patients admitted to MICU of UoGCSH September 2015 to April 2019, (N=504).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [STROBESStatementICU.docx](#)