

## Sociodemographic Characteristics and Outcomes of Critically Ill Patients in a Lubumbashi ICU, DR. Congo: A 3 Years Review

Manika Muteya M<sup>1\*</sup>, Mundongo Tshamba H<sup>2</sup>, Kabamba Nzaji M<sup>3</sup>, Kakisingi Ngama MC<sup>4</sup>, Matand Kapend S<sup>4</sup>, Kabey A Kabey AW<sup>1</sup>, Isango Idi Y<sup>5</sup>, Malonga Fanny K<sup>5</sup>, Yav Tshibind E<sup>4</sup>, Mbey Mukaz P<sup>6</sup>, Mwamba Mulumba C<sup>4</sup>, Kapend A Kalala L<sup>4</sup>, Kakoma Sakatolo ZJB<sup>2,5</sup> and Kilembe Manzanza A<sup>7</sup>

<sup>1</sup>Department of Anesthesiology and Intensive Care Medicine, Faculty of Medicine, University of Lubumbashi, DR Congo

<sup>2</sup>School of Public Health, University of Lubumbashi, DR Congo

<sup>3</sup>Department of Public Health, Faculty of Medicine, University of Kamina, DR Congo

<sup>4</sup>Department of Internal Medicine, Faculty of Medicine, University of Lubumbashi, DR Congo

<sup>5</sup>Department of Gynecology-Obstetrics, Faculty of Medicine, University of Lubumbashi, DR Congo

<sup>6</sup>Department of Surgery, Faculty of Medicine, University of Lubumbashi, DR Congo

<sup>7</sup>Department of Anesthesiology and Intensive Care Medicine, Faculty of Medicine, University of Kinshasa, DR Congo

\***Correspondent Author:** Manika Muteya Michel, Department of Anesthesiology and Intensive Care Medicine, Faculty of Medicine, University of Lubumbashi, DR Congo.

**Received:** May 19, 2018; **Published:** July 26, 2018

### Abstract

**Background:** Material and human resources, staff training and reassessment of critical care processes may be possible depending on the sociodemographic characteristics and outcomes of the critically ill patient admitted to ICU. We sought to describe the sociodemographic characteristics, diagnosis and clinical outcomes of critically ill patients admitted to Lubumbashi University Teaching Hospital (LUTH) ICU.

**Methods:** A retrospective descriptive cross-sectional study in the LUTH ICU. Data were collected from the registers and records of patients admitted between January 2013 and December 2015. We excluded patients' records which were incomplete.

**Results:** We admitted 464 patients during the study period of whom 453 have been analyzed, 277 (61.1%) were male and 176 (38.9%) female with a sex ratio M/F of 1.6/1, who's the mean age was  $44.4 \pm 19.6$  years. The most of patients were admitted from the emergency department (53.2%), followed by Internal Medicine department (21.2%). A mortality of 43.7% was recorded with an average length of stay (LOS) of 4.64 days which ranged from a few hours to 48 days. The most (69.32%) of patients had a LOS between 1 and 4 days. The causes of admission were like the primary diagnosis. Most patients were admitted for Stroke (18%), followed by uncontrolled diabetes (12.14%) and sepsis (8.83%). When admission diagnoses are gathered together, cardiovascular diseases (26, 93) are the leading cause of admission, followed by infectious diseases (22.96) and uncontrolled diabetes (12.58%).

**Conclusion:** Critically Ill patients admitted to the ICU are relatively young. They are admitted mainly from the emergency and internal medicine departments. The causes of admission are marked with cardiovascular disease mainly the stroke. Mortality was very high, this could be related to several factors. A focus on cardiovascular disease and further studies are needed.

**Keywords:** Characteristics; Critically Ill Patients, ICU; Outcomes; Lubumbashi

## Abbreviations

AKI: Acute Kidney Injury; CPR: Cardiopulmonary Resuscitation; COPD: Chronic Obstructive Bronchopneumonia; CHF: Congestive Heart Failure; DRC: Democratic Republic of the Congo; DKA: Diabetic Ketoacidosis; GO: Gynecology-Obstetrics; HIV/AIDS: Human Immunodeficiency Virus/Acquired Immuno-Deficiency; Int. Med: Internal Medicine; ICU: Intensive Care Unit; NTDs: Non-transmission diseases; OR: Operating Room

## Introduction

Critically ill patients are a group of patients with severe disease that leads to a single or multiple organ failure and often with other multiple medical problems (comorbidities) [1,2]. These are patients who may have favorable or unfavorable outcome, because they have a reduced physiological reserve [3,4]. This is a very heterogeneous population of patients ranging from newborns to elderly and people suffering from a chronic disease such as Chronic Obstructive Bronchopneumonia (COPD) or Congestive Heart Failure (CHF), patients with acute pathology such as severe infection, severe trauma or Acute Kidney Injury (AKI) [1,5].

These patients are admitted to a specialized area of a hospital that provides comprehensive and continuous care for people who are critically ill and who can benefit from treatment to reduce morbidity and mortality associated to acute illness, trauma or surgical procedures [6]. Generally, if they are likely to benefit from the levels of provided care. This is an Intensive Care Unit (ICU).

The modern ICU began in 1953 with the anesthesiologist Dr. Bjørn Aage Ibsen, following the respiratory failure of polio patients during the epidemic of 1952 in Copenhagen, Denmark [7,8]. The development of mechanical ventilation, tracheostomy and cardiopulmonary resuscitation (CPR) made the intensive care medicine as a specialty in its own, independent, necessary in a hospital [7]. Since then, the care in the ICU has remarkably reduce mortality in this category of patients [9]. Because, intensive care has been shown to be beneficial for critically ill patients and medically unstable, they have a potentially life-threatening disease or disorder [6].

There are several reasons which can lead to the admission to ICU, patients who are admitted in are with severe conditions during the evolution of their diseases and at the same time they are undergoing complex interventions, that's why they are extremely vulnerable to experiencing a fatal outcome and therefore the high level of intensive cares are needed [10-13].

Generally, in low-income countries such as the Democratic Republic of the Congo (DRC), resources are very limited, while the burden of critical illness is high and likely to increase with increasing of urbanization and emerging epidemics [14,15]. Indeed, the prevalence of diseases such as HIV/AIDS, malaria, tuberculosis and trauma is high in these countries where intensive care medicine is not much developed, with Sub-Saharan Africa accounting for 25% of this burden [14-18]. In addition to this already high burden, there is an increase in acute and chronic non-communicable diseases (NCDs) in Africa such as cardiovascular diseases (CVDs), diabetes and tumoral diseases. All these diseases are, by their prevalence, subsequent morbidity and mortality, a real public health concern [19-21]. Patients suffering from those diseases are admitted in the form as emergencies and advanced state of severity that requires hospitalization in ICU.

The sociodemographic characteristics and outcomes of critically ill patients are one of the determinants of the short-term prognosis in ICU. These vary considerably from the ICU to another in the same hospital, from a hospital to another, from one country to another and from one population to another [22]. In a Burkina Faso study, admission diagnoses were divided into 43.2% of injuries, 35.8% of surgical suites and 21.0% of medical conditions. The mean of length of stay (LOS) of  $4.69 \pm 0.42$  days and the occupancy rate of 25% beds with the overall mortality rate of 63.6% were observed [23]. In Uganda Kwizera, *et al.* reported in their study that the mean age of patients admitted to ICU was 35, 5 years. Male patients accounted for 56.5% of the study population and 92.8% of patients were indigenous, 42.9% came from upcountry units. Mortality was 40.1%, which varied between 33% and 44% during the study period. Sepsis, acute respiratory distress syndrome, brain trauma and conditions related to HIV / AIDS were the most common admission diagnoses [14]. In DRC, in an

inventory study of ICU activities at the Kinshasa University Teaching Hospital, Mejeni., *et al.* have reported a mean age of  $46 \pm 22$  years, the admissions diseases were related to medical pathologies in 60%, and traumatic pathologies in 35%. Most patients were admitted for severe sepsis. The mortality rate in this study was 86% with a mean of LOS of  $8.2 \pm 4.2$  days. One concern about the human and material resources has been highlighted [24].

In Lubumbashi, some health facilities have a place where the management of critically ill patient can be possible. So Basic intensive care services such as intravenous access and fluid resuscitation, basic antibiotic support, oxygen with non-invasive ventilator (continuous positive airway pressure) and invasive support, these try to save the lives of many patients every year to decrease mortality.

A review highlights the paucity of Knowledge regarding intensive care medicine in Lubumbashi and the entire DRC. In the ICU, knowledge about sociodemographic characteristics and outcome of critically ill patients plays a role in defining qualitative and quantitative strategies to improve patient care. Information on these sociodemographic characteristics also helps to identify priorities and the resources required for improvement of the care of this type of patients and plays an important role in the planning of health policies which could mitigate factors associated to the evolution of diseases prevalent in ICUS in Lubumbashi. In addition, the acquisition of material and human resources, staff training and re-evaluation of ICU care processes can be possible that depending on the sociodemographic characteristics, outcomes and morbidity of the critically ill patients admitted to ICU or the whole population. With these considerations above, we sought to describe the sociodemographic characteristics, admission diagnosis and clinical outcome of critically ill patients admitted to the Lubumbashi University Teaching Hospital ICU in DRC.

## Methods

### Type of study

This is a cross-sectional descriptive and retrospective study. The data were collected from the medical records and files of all patients admitted to the ICU during from 1 January 2013 to 30 December 2015.

### Setting of study

This study was carried out in the polyvalent ICU of the Lubumbashi University Teaching Hospital in the DRC. This is an ICU with mixed patient populations both medical and surgical for all age. This hospital is a tertiary level structure in the country's health system. There are 211 functional beds while the total facility capacity is of 230 beds. The ICU is part of the Anesthesia-Intensive Care Medicine Department and consists of 7 beds, which represent 3.3% of the capacity of the hospital. The ICU nursing staff consists of 6 registered nurses, head nurse and 4 practical nurses, 4 physicians among one anesthesiology-intensive care medicine specialist, and two janitors. The weekly work load is 30 hours. The nurse shifts are divided into 8 to 12 hours shifts both daytime and nighttime. The medical shifts are 8 during the day and 12 hours at night.

### Data collection and analysis

Critically ill patients admitted to ICU were characterized by the following parameters: age, gender, source of admission (coming place before admission to the ICU), mode of admission, diagnosis, outcome (death and Survival) and length of stay (LOS). Patient records whose parameters were deemed incomplete for this study were excluded. The study was approved by hospital administration. Presentation of results is anonymous, and data was kept confidential.

The Data were encoded and analyzed using Epi Info® 7 and Excel 2007 software. We used the distribution of absolute and frequencies relatives based on the simple tabulation of variables, then as table and figure for simple statistical analysis.

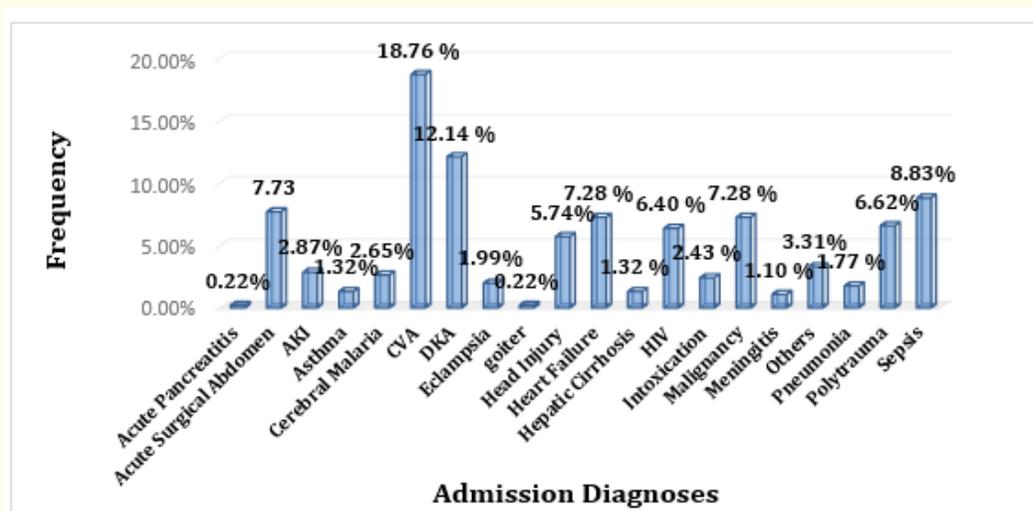
## Results

During the 3-years-study period, total of 464 records analyzed, 277 (61.1%) patients were males and 176 (38.9%) females, with a sex ratio M/F of 1.6/1. The mean age was  $44.4 \pm 19.6$  years. Most patients were transferred from the emergency department (53.2%), followed by internal medicine (21.2%). The mortality rate was 43.7% observed with a mean of LOS of 4.64% days (Table 1).

Variables	Effective
Number of Patients	453 (100%)
Age	44.4 ± 19.9 years
<b>Gender</b>	
M	277 (61.1%)
F	176 (38.9%)
Duration of stay	4.64 ± 6.3days
<b>Origin</b>	
Surgery	87 (19.2%)
GO	28 (6.2%)
Int. Med	96 (21.2%)
OR	1 (0.2%)
Emergency	247 (53.2%)
<b>Outcomes</b>	
Death	198 (43.7%)
Survival	255 (56.3%)

**Table 1:** General characteristics of patients admitted to the ICU.

In our study the reasons for admission was likened to the primary diagnosis. Most patients were admitted to a Stroke (18.76%), followed by diabetic ketoacidosis (12.14%) and sepsis (8.83%) (Figure 1).



**Figure 1:** Admission Diagnoses in ICU.

When grouped admission diagnoses, cardiovascular diseases (26, 93) are the leading cause of admission, followed by infectious diseases (22.96) and uncontrolled diabetes (12.58%) (Figure 2).

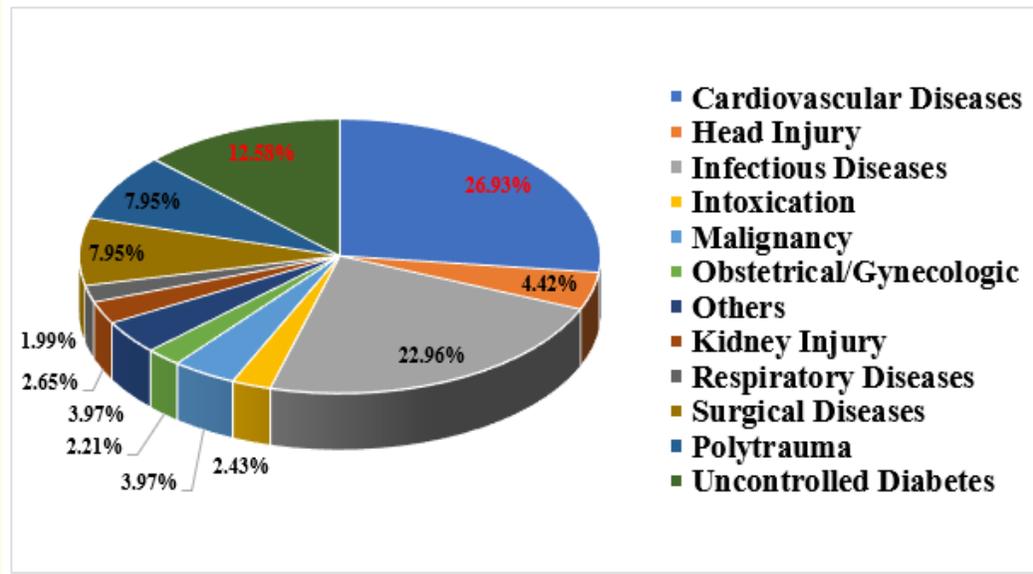


Figure 2: Grouped diagnoses of admission.

The length of stay of our patients varies between less than 24 and 48 days. In this study 69.32% of patients had a dwell time between 1 and 4 days (Figure 3).

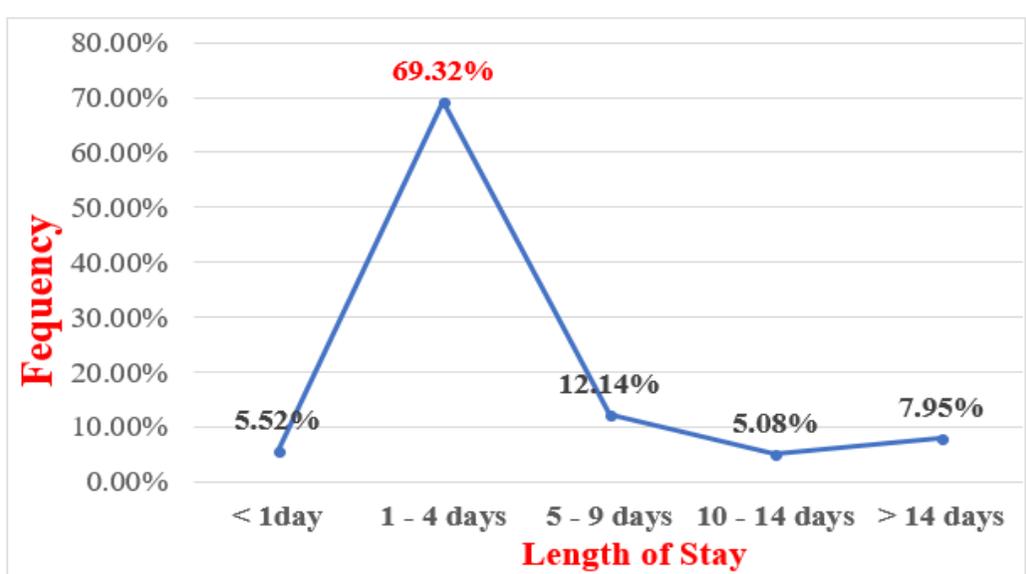


Figure 3: Distribution of patients with respect to the length of stay.

## Discussion

The sociodemographic characteristics of critically ill patients admitted in ICU and mortality rate are diversified from an ICU, an environment and a population to another [8, 22, 25]. In this study, 453 critically ill patients admitted in the LUTH ICU were analyzed among which the most of patients (61.1%) were male than female (38.9%), with a sex ratio M/F of 1.6/1. This result appears to be similar those of Sawe *et al*, in Tanzania who reported a sex ratio M/F of 1.4/1 [22], Baloji *et al*, in Nigeria, found 62.7% of males against 37.3% [26], Omar *et al*, also found 61.3% [27]. The same was found in an epidemiological study in Manitoba in Canada in which the authors found that across the region most critically ill patients admitted to the ICU were males who ranged between 58.5% and 60.8% [28]. Du *et al* [29], in China reported 63.3% and in Brazil, El-Fakhouri *et al* [30] found 57.91%. In contrast, some authors found the opposite. This is the case of Ilori *et al* [31] and Mato *et al* [32], who reported 55% and 54.5% of female patients admitted to ICU. To explain this predominance of male in the admission to ICU, some authors believe that there is a high rate of critically ill patients in male than in female, and there is a low willingness of female patients to accept admission to the hospital and therefore to the ICU [27]. There are authors who think that men often consult health facilities only when the disease reaches a stage of high severity of illness that requires aggressive care [28]. The male predominance in this study can also be explained by the fact that most critically ill patients are who experience road traffic accident or gun trauma, which make that these admissions to be significantly constituted by men, because it seems that men are more active and violent than women in our society. Some authors think also that women have a lower incidence for some critical illnesses [33].

The current study showed that the emergency department was the main source of admission of patients in ICU (53.20%), followed by the internal medicine department (21.19%) and the surgical department (19.19%). The results of this study are similar to those of other authors. This is the case of the study of Wunch., *et al*, who reported a rate of 58% in the United States and 33.4% in the United Kingdom of admissions were from emergency department compared to other hospital department [34]. Ahsan and Khalidis in Sanadaj Tohid [35], also found 73% of patients admitted in ICU from the emergency department followed by the operating room with 10.4% [35]. In contrast, Ho., *et al* [36], in Australia found in their study that 61.9% of patients were admitted from the operating room and Mato., *et al* [32], in Nigeria found that most (48.7%) admissions were from the Gyneco-obstetrics department. This is evident to the extent that the emergency department is the action first line of intervention in any hospital's care system and internal medicine department is the one that supports many patients with multiple comorbidities which take place during their stay in the hospital, and then they are transferred to the ICU when they become unstable. Sometimes the purpose of the admission to the ICU is to isolate patients from their relatives in the last moment of life and then without any medical reason which reaches the criteria of admission to the ICU.

The mean age of patients in this study was  $44.4 \pm 19.9$  years, ranging between 2 and 92 years. 79.91% of patients were part of the age group between 18 and 69 years. In Kinshasa, in 2015 Mejeni., *et al*. [24], cited above found a mean age of critically ill patients admitted to the ICU of  $46 \pm 22$  years. The mean age of patients in this study is higher than that was found in most of those published in the Sub-Saharan countries. Kwizera., *et al*. [14], found a mean age of 35.5 years in Uganda, Sawe., *et al*. [22] in Tanzania had found 34 years, Gundo., *et al*. [37], in Malawi, noted a mean age of  $29 \pm 1.6$  years, Mato., *et al*. [32] and Abubakar [38], in Nigeria had found respectively  $31.7 \pm 5.6$  and  $32 \pm 18.32$  years. The mean age in this study is lower than what found in the studies conducted outside of Africa. In Yemen, Omar., *et al*. [27], found a mean age of 60.35 years, Zand and Rafi'ei [39] in Iran found  $55.64 \pm 0.73$  years, El-Fakhouri., *et al*. [30], in Brazil found  $56.64 \pm 19.18$  years, Du., *et al*. [21], in China found  $58.5 \pm 19.2$  years, Garland., *et al*. [28], in Manitoba, Canada found  $64.5 \pm 16.4$  years and in the United States of America Wunch., *et al*. [40], noted a mean age of  $60.4 \pm 18.6$  against  $57.4 \pm 18.8$  years with United Kingdom. In our ICU we admit critically ill patients of any age. Most of our patients are young if compared to those of industrialized countries. It is believed that this is related to low levels of life and low life expectancy [14].

There are a variety of clinical indications for admission to intensive care unit. Age, variety of interventions and complexity of the pathological processes can influence the admission to the ICU. In this study stroke were the main leading cause of admission with 18.76%

followed by trauma (Head Injury and Polytrauma) with 12.36% and then comes the Diabetic Ketoacidosis (DKA) with 12.14% and Sepsis with 8.83%. Omar, *et al.* [27] in their study, found also that the stroke was at the main leading cause of admission to the ICU followed by Acute Kidney Injury (AKI). In most studies in Sub-Saharan Africa it is rather the trauma associated with head injury which is the main leading cause of admission to the ICU followed by Sepsis [22,35,41]. By grouping pathologies at the basis of ICU admission we found that non-transmission diseases (NTDs) with cardiovascular diseases accounted for 26.93%, followed by uncontrolled diabetes (12.58%), trauma (head injury and polytrauma), tumor diseases (3.97%), and Kidney Injury (1.99%) predominate. The result of this study is similar to those published in some studies such as those of Omar, *et al.* in Yemen who found that 37.05% of cardiovascular disease as the top of the cause of ICU admissions [27], 30% by Agalu, *et al.* in Ethiopia [42], as Zand and Rafi'ei in Turkey, El-Fkhoury in Marilia, Brazil and Landy in Iraq who reported high incidence of cardiovascular diseases [30,39,43]. A study in Kinshasa noted that cardiovascular diseases accounted for 32.52% of ICU admissions in Internal Medicine Department of the Kinshasa University Teaching Hospital in D.R. Congo where they constitute a predictive factor of mortality [44]. However, others have found that these are infectious diseases with in mind the sepsis, HIV/AIDS and surgical diseases that are major causes of ICU admission [14,34,41]. This prevalence of cardiovascular disease is a warning sign that marks an epidemiological transition from infectious diseases to acute and chronic NCDs requiring special attention despite economic and material resources almost nonexistent. This is related to the westernization of lifestyle, stress the result of the concerns of everyday life (unemployment, low socioeconomic status, etc.) and the increase in road traffic and non-compliance with traffic rules which is the basis of many accidents in road traffic which leads in turn to growth trend of demand of admission to ICU. These socioeconomic factors, cultural factors and religious beliefs also contribute to the current trend of NCDs which are intensifying the health sector that is already poor. For example, obesity is culturally adopted and considered a sign of wealth in most of our communities [45]. A growing burden of NCDs in Africa shows a health iceberg increasingly hidden in outbreaks of infectious diseases. Non-communicable diseases with an increasing burden of disease in Sub-Saharan Africa are mental and behavioral conditions, and musculoskeletal diseases [46,47].

We have identified some limitations of this study. This study was retrospective, and some data was missing, which sometimes made confusion in the diagnosis retained. In our ICU, physiological parameters to assess the severity of the clinical situation was lacking and the specific quality of care is provided.

## Conclusion

Our study is the first in Lubumbashi and the second in the Democratic Republic of the Congo, which analyzes the sociodemographic characteristics and outcomes of critically ill patients admitted to ICU. In this study most critically, ill patients admitted to ICU were males with the mean of age of  $44.4 \pm 19.6$ . This is the emergency department followed by that of internal medicine which provided the bulk of critically ill patients admitted in the ICU during the study period. The most common admission diagnoses during this period were represented by cardiovascular diseases, with stroke as the main cause of admission to ICU in this group, infectious diseases with essentially sepsis and uncontrolled diabetes. The average length of stay of patients was  $4.64 \pm 6.3$  days and most patients in this study stayed in ICU between 1 and 4 days. In this study the mortality rate was high compared to some studies in Sub-Saharan Africa. To serve our population and improve outcomes of critically ill patients we need technological conditions and human resources, the involvement of academic, political and administrative authorities, social insurance coverage to compensate for the challenge of poverty and to up emergency beds and availability of consumables. To complete this study, a deep analysis of outcomes usually studied including mortality and LOS are required.

## Ethical Aspects

The study was approved by the head of administration of the University Teaching Hospital of Lubumbashi. Presentation of results is anonymous, and data was kept confidential.

### Funding

There is no funding for this study.

### Availability of Data and Materials

Data and materials of this study are only available at University Teaching Hospital of Lubumbashi.

### Acknowledgment

We sincerely thank Mr. Constatin Okoko who helped us in the encoding of data and nurses of the intensive care units who prepared and availability to us of and patient records.

### Consent for Publication

Not applicable.

### Conflict of Interest

There is not any conflict of interest in conducting this study.

### Authors' Contributions

This work was carried out in collaboration between all authors Manika M M, Mundongo T H, Kabamba N M, Kakisingi conceived and designed the study. NMC, Matand K S, Kabey KAW, Idi IY, Malonga FK, Yav Tshibind, Mwamba M C, Kapend K L, Kakoma S ZJB, Kilembe MA contributed to data analysis, interpretation and manuscript review. Manika M M, Mundongo wrote the manuscript. All authors read and approved the final manuscript.

### Bibliography

1. Apostopoulou E., *et al.* "Risk factors for ICU mortality in critically ill patients". *ICUS and Nursing Web Journal* (2002): 1-7.
2. Aygencel G., *et al.* "Characteristics, Outcomes and Costs of Prolonged Stay ICU Patients". *Turkish Journal of Medical Sciences Intensive Care* 2 (2011): 53-58.
3. Giraud T Dhinaut JF., *et al.* "Iatrogenic complications in adult intensive care units: a prospective two center study". *Critical Care Medicine* 21 (1993): 40-51.
4. Pronovost P., *et al.* "Building safety into ICU care". *Journal of Critical Care* 17.2 (2002): 78-85.
5. Dünser M., *et al.* "Differences in critical care practice entre year Industrialized and a Developing Country". *Wiener klinische Wochenschrift* 120 (2008): 600-607.
6. Ghoneim AHA., *et al.* "Patterns of admitted cases to Respiratory Intensive Care Unit at Zagazig University Hospitals, Egypt". *Egyptian Journal of Chest Diseases and Tuberculosis* 62.4 (2013): 661-668.
7. Berthelsen PG., *et al.* "Bjørn Aage Ibsen (1915-2007): in Memoriam". *Acta Anaesthesiologica Scandinavica* 51 (2007): 1292-1293.
8. Okafor UV. "Challenges in critical care services in Sub-Saharan Africa: perspectives from Nigeria". *Indian Journal of Critical Care Medicine* 13.1 (2009): 25-27.

9. El-Fakhouri S., *et al.* "Epidemiological profile of ICU patients at Faculdade de Medicina de Marília". 62 (2016): 455-459.
10. Cook D and Rocker G. "Dying with dignity in the intensive care unit". *New England Journal of Medicine* 370 (2014): 2506-2514.
11. Cullen DJ., *et al.* "Preventable adverse drug events in hospitalized patients: a comparative study of intensive care and general care units". *Critical Care Medicine* 25.8 (1997): 1289-1297.
12. Andrews LB., *et al.* "An alternative strategy for studying adverse events in medical care". *Lancet* 349.9048 (1997): 309-313.
13. Ferguson ND., *et al.* "Integrating mortality and morbidity outcomes using quality-adjusted life years in critical care trials". *American Journal of Respiratory and Critical Care Medicine* 187.3 (2013): 256-261.
14. Kwizera A., *et al.* "National intensive care unit bed capacity and ICU patient characteristics in a low income country". *BMC Res Notes* 5 (2012): 475.
15. Murthy S., *et al.* "Intensive care unit capacity in low-income countries: A systematic review". *PLoS One* 10 (2015): 1-12.
16. Dünser MW., *et al.* "A review and analysis of intensive care medicine in the least developed countries\*". *Critical Care Medicine* 34.4 (2006): 1234-1242.
17. Dünser MW. "Intensive care medicine in resource-limited settings: a general overview". *Update in Anaesthesia* 28 (2012): 7-10.
18. Gundo R., *et al.* "An Audit of Admissions to Intensive Care Unit at Kamuzu Central Hospital in Malawi". *Open Journal of Nursing* 4 (2014): 583-589.
19. Mboliasa I., *et al.* "Profil épidémiologique et clinique des urgences cardiovasculaires admises aux soins intensifs de médecine interne des Cliniques Universitaires de Kinshasa". *Annals of African Medicine* 8 (2015): 1933-1938.
20. Mayige M., *et al.* "Non communicable diseases in Tanzania: a call for urgent action". *Tanzania Journal of Health Research* 13.5 (2011): 378-386.
21. Naghavi M and Forouzanfar MH. "Burden of non-communicable diseases in sub-Saharan Africa in 1990 and 2010: Global Burden of Diseases, Injuries, and Risk Factors Study 2010". *Lancet* 381.2 (2013): S95.
22. Sawe HR., *et al.* "Disease patterns and clinical outcomes of patients in intensive care units admis of tertiary referral Hospitals of Tanzania". *BMC International Health and Human Rights* 14 (2014): 26.
23. Ouédraogo N., *et al.* "Intensive care in Africa: experience the first two years of activity in the ICU of the National Hospital of Ouagadougou (Burkina Faso)". *Santé* 12.4 (2002): 375-382.
24. Mejeni N and DK Tondungu NJ. "Intesive Care Unit at University Hospital of Kinshasa in 2015: inventory in 2015". *Annals of African Medicine* 8 (2015): 6-7.
25. Merah NA., *et al.* "An audit of surgical admissions to the intensive care unit of the Lagos University Teaching Hospital (1997-2002)". *Nigerian Postgraduate Medical Journal* 13.2 (2006): 153-156.
26. Bolaji BO and IK Kolawole. "The Intensive Care Unit of the University Teaching Hospital, Ilorin, Nigeria: A Ten-Year Review (1991-2001)". *Southern African Journal of Anaesthesia and Analgesia* 11.4 (2005): 146-150.

27. Omar MAK and Aram FO SNB. "Causes of Mortality Among Critically Ill Patients in Intensive Care Unit admis". *Bahrain Medical Bulletin* 37 (2015): 1-5.
28. Garland A., *et al.* "Critically ill Epidemiology of patients in intensive care units: a population-based observational study". *Critical Care* 17 (2013): R212.
29. Du., *et al.* "Critically ill Characteristics of patients in ICUs in mainland China". *Critical Care Medicine* 41 (2013): 84-92.
30. El-Fakhouri S Carrasco HVCG and Araùjo GC MHIF. "Epidemiological profile of ICU patients at Faculdade de Medicina de Marilia". *Revista Da Associacao Medica Brasileira* 62.3 (2016): 455-459.
31. Ilori IU and Kalu QN. "Intensive care and outcome admissions at the University of Calabar Teaching Hospital, Nigeria". *Journal of Critical Care* 27.1 (2012): 105.e1-105.
32. Mato CN Onwuchokwa AC AAT. "Pattern of admissions to the University of Port Harcourt Teaching Hospital intensive care unit - a 10-year analysis U". *Southern African Journal of Critical Care* 25 (2009): 3-7.
33. Fowler RA., *et al.* "Sex- and age-based differences in the delivery and outcomes of critical care". *Canadian Medical Association Journal* 177.12 (2007): 1513-1519.
34. Wunsch H., *et al.* "Comparison of medical admissions to intensive care units in the United States and United Kingdom". *American Journal of Respiratory and Critical Care Medicine* 183.12 (2011): 1666-1673.
35. Ahsan B and Khaledi S. "Patients Prognosis and Mortality in Intensive Care Unite of Sanandaj Tohid Hospital in 2000". *Science Journal of University of Kurdistan Medical Science* 9 (2005): 20-25.
36. Ho K M., *et al.* "The outcome of critically ill Indigenous patients". *Medical Journal of Australia* 184.10 (2006): 5-8.
37. Gundo R Lengu E and Badjuwa A. "An audit of admissions to Intensive Care Unit at Kamuzu Central Hospital in Malawi". *Open Journal of Nursing* 4.8 (2014): 583-589.
38. Abubakar EO., *et al.* "An audit of one-year intensive care practice in a Developing Country". *The Internet Journal of Anesthesiology* 18 (2008): 2.
39. Zand S and Radi'ei. "Causes And Duration Of Hospitalization And Mortality Rate In Intensive Care Units In Markazi Province". *Iran Journal Critical Care Nursing* 3.1 (2010): 63-67.
40. Wunsch H., *et al.* "Comparison of medical admissions to intensive care units in the United States and United Kingdom". *American Journal of Respiratory and Critical Care Medicine* 183.12 (2011): 1666-1673.
41. RJ Kruisselbrink., *et al.* "Mortality Rate and Associated Factors Among Intensive Care Unit Patients At Mulago Hospital, Uganda: A Prospective Cohort Study". *American Journal of Respiratory and Critical Care Medicine* 189 (2014): A4521.
42. Agalu A Woldie M., *et al.* "Reasons for admission and mortalities Following admission in the intensive care unit of a specialized hospital, in Ethiopia". *International Journal of Medical Sciences* 6.9 (2014): 195-200.
43. Lundy JB., *et al.* "A descriptive analysis of patients admis to the intensive care unit of the 10<sup>th</sup> Combat Support Hospital Deployed in Ibn Sina, Baghdad, Iraq, from October 19, 2005 to October 19, 2006". *Journal of Intensive Care Medicine* 25.3 (2010): 156-162.

44. Mboliasa I Lepira B., *et al.* "Epidemiological and clinical profile of cardiovascular emergencies admitted to intensive care Internal Medicine University Clinics of Kinshasa". *Annals of African Medicine* 8 (2015): 1933-1938.
45. Mayige million Kagaruki G and K Ramaiya, Swai A. "Non communicable diseases in Tanzania: a call for emergency action". *Tanzania Journal of Health Research* 13.5 (2011): 378-386.
46. Dalal S., *et al.* "Non-communicable diseases in Sub-Saharan Africa: what we know now". *International Journal of Epidemiology* 40.4 (2011): 885-901.
47. Naghavi M and Forouzanfar MH. "Burden of non-communicable diseases in sub-Saharan Africa in 1990 and 2010: Global Burden of Diseases, Injuries, and Risk Factors Study 2010". *Lancet* 381 (2013): S95.

**Volume 4 Issue 8 August 2018**

**©All rights reserved by Manika Muteya Michel., *et al.***