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Clinical Features and Management Outcome, and Associated Factors of Patients Admitted to Covid-19 ICU Center of Yekatit 12 Hospital Medical College 2021gc

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Abstract

Background: *The coronavirus disease 2019 (COVID-19), caused by the recent severe acute respiratory syndrome (SARS-CoV-2) novel virus, is considered one of the greatest global public health crises by the WHO. It claimed millions of lives globally, with death occurring among populations with certain contributing factors. However, evidence regarding the burden of mortality and its associated factors is scarce. Objective: Clinical Features and Management Outcome, and Associated Factors of Patients admitted to the COVID-19 ICU Center of Yekatit 12 Hospital Medical College 2022 GC from June 8, 2020, to May 30, 2021. Methods and Results: A single-centered, retrospective, study was conducted at the ICU Center of Yekatit 12 Hospital Medical College COVID-19. A simple random sampling technique was applied to select eligible patients' charts. The data were entered and analyzed using SPSS version 26. Descriptive analysis was used for statistical analysis of baseline data, and regression analysis was used to determine associations between dependent and independent variables. A p-value <0.05 was considered significant. Tables and figures were used to present the results.*

A total data of 272 patients were analyzed, with a median (interquartile range) age of 60.5 (45–70) years and more than two-thirds (183, 67.3%) being males. Most (75.7%) had a pre-existing comorbid medical condition, and a majority (71.3%) had a COVID-19 disease of critical disease severity. The most common clinical presentation was cough and shortness of breath. Overall, the ICU mortality rate was 64.3%. Multivariable analysis was done to identify determinant factors for adverse outcomes, hence mortality was strongly associated with intubation, AOR:2.716(95%-CI;1.23,5.6), Septic shock, AOR:26.03(95%CI:8.41,80.57), critical, disease, AOR:10.7(95%CI;5.59,21.14), comorbidity, AOR:3.24(95% CI=1.64,6.9), AKI, AOR:2.99(95%CI:1.3,7.95). Conclusion: This study showed most common comorbidities are hypertension, diabetes, and CKD. High mortality among ICU-admitted COVID-19 patients is strongly associated with comorbidity, intubation, critical COVID-19 disease severity, septic shock, and those patients with AKI.

Keywords: Blood Transfusion, HB, HC, HIV, Elisa Technique.

Introduction

Background

In December 2019, Wuhan, Hubei Province, China, reported a cluster of pneumonia cases of unknown cause, later identified as COVID-19. This contagious disease is caused by SARS-CoV-2. COVID-19 was declared a pandemic by the WHO on March 11, 2020 [1]. The COVID-19 pandemic has exploded since then, as of February 22, 2022, more than 426 million cases of COVID-19—caused by SARS-CoV-2 infection— have been reported globally, including more than 5.8 million deaths which brought a significant negative impact on social and economic, political, and other activities [2].

Coronaviruses belong to a large family of diverse enveloped, single-stranded positive-sense RNA viruses that are recognized to bring about respiratory, hepatic, neuronal, and gastrointestinal diseases in humans and animals. SARS-CoV, HCoVs-NL63, HCoVs-OC43, HCoVs-HKU1, HCoVs-229E, and MERS CoV, were until recently the coronaviruses that were known to affect humans. SARS-CoV and MERS-CoV infections resulted in, 10% and 40% mortality rates in humans, respectively, the highest among the coronaviruses. SARS-CoV-2, the most recently ascertained coronavirus, is the seventh of the coronavirus family known to affect Homo sapiens and currently has a mortality rate of 3.2% [3].

However, in 2002 the SARS-CoV emerged, and then in 2013 the MERS-CoV. The SARS-CoV and MERS-CoV caused severe respiratory syndrome and were highly pathogenic for humans [4]. Based on severity COVID-19 cases are classified as non-severe which are mild, severe, and critical COVID-19 [5]. At present, most studies of COVID-19 have focused on risk factor analysis and mortality prediction for mild and moderate cases, which comprise a large proportion of patients with COVID-19. However,14% to 20% of cases are severe or even critical, and the mortality rate of these patients is as high as 50% [6-8] This doesn't represent the developing country's mortality rate in ICU.

Individuals of all ages are at risk for SARS-CoV-2 infection and severe disease. However, the probability of serious COVID-19 disease is higher in people aged ≥60 years, those living in a nursing home or long-term care facility, and those with chronic medical conditions. Among these more than 1.3 million laboratory-confirmed cases that were reported in the United States between January and May 2020, 14% of patients required hospitalization, 2% were admitted to the intensive care unit, and 5% died. The percentage of patients who died was 12 times higher among those with reported medical conditions (19.5%) than among those without medical conditions (1.6%), and the percentage of those who were hospitalized was six times higher among those with reported medical conditions (45.4%) than among those without medical conditions (7.6%) [9].

The mortality rate was highest in those aged >70 years, regardless of the presence of chronic medical conditions. Among those with available data on health conditions, 32% had cardiovascular disease, 30% had diabetes, and 18% had chronic lung disease. Other conditions that may lead to a high risk for severe COVID-19 include cancer, kidney disease, obesity, sickle cell disease, and other immunocompromising conditions. Transplant recipients and pregnant people are also at a higher risk of severe COVID-19 [10].

Statement of the Problem

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus responsible for the coronavirus disease 2019 (COVID-19) previously called the '2019-novel coronaviruses. The SARS-CoV-2 is an enveloped positive-sense single-stranded RNA virus believed to have a zoonotic origin; it is 96% similar at the whole-genome level to a bat coronavirus. Despite measures to contain the virus, SARS-CoV-2 spread widely across all continents in the following months. [11-13].

The COVID-19 pandemic has significantly harmed a wide array of health services globally, particularly in low-and middle-income countries (LMICs). According to the Global Fund Survey, as many as 85%, 78%, and 73% of HIV, TB, and malaria programs, respectively, have been disrupted across 106 countries, with Latin America, the Caribbean, and high burden. African countries report the highest level of disruption in health service delivery. Prevention and treatment services for non-communicable diseases have also been disrupted [14].

Till now Coronavirus disease 2019 (COVID-19) has affected millions of people around the world since December 2019. Epidemiological studies have shown that 6 to 10% of patients develop a more severe form of COVID-19 and will require admission to the intensive care unit (ICU) due to acute hypoxemic respiratory failure. Most of these patients admitted to ICU, will finally require invasive mechanical ventilation due to diffuse lung injury and acute respiratory distress syndrome (ARDS) [15].

The African continent is known to have a distinct epidemiological response to most of the epidemics occurring worldwide. However, it needs to be confirmed if this could be due to the tropical nature of most African countries of the Sub Sahara. The burden of these virus epidemics in Africa varies from that in other climates.

Following the above analogy, the burden of COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 or novel coronavirus, in tropical Africa will be expectedly different compared to that in the Western world, made up of the "high-income countries" [16-18].

Despite this assumption, however, the COVID-19 disease has challenged and placed some burden on the African people with scarce resources, poor infrastructure, and unstable governments among other factors. The burden of COVID-19 also differs among the different African countries depending on the speed with which they tried to contain it, availability of testing materials, population density, clusters of the population at the poverty level, and health infrastructure among others. The low level of testing in some countries has made it difficult to recognize the true impact of the disease on the continent, the same is true for our country [16, 17].

Like other countries, Ethiopia faces several challenges due to the pandemic and has taken several steps to detect, manage, and control the transmission of COVID-19, especially for critical patients. More efforts are needed to increase testing capacity and bring about behavioral changes and early identification of high-risk populations to develop the severity of the illness. The country needs to put in place alternative options to mitigate interrup-

tions of essential healthcare services and scientific research of significant impact [19]. Knowledge of clinical conditions and management outcomes of critical patients is paramount important. There are few studies about the clinical patterns and outcomes of critical patients, so this study will help as additional knowledge for the topic that will help in early identification and management accordingly, also it will be a supportive study for further research in Africa and particularly in Ethiopia

Rationale of the Study

The COVID-19 pandemic brought a great impact on different aspects of living, especially, in low-income countries like Ethiopia. to challenge this threat data about clinical and socio-demographic factors that lead to being critically ill and addition to ICU is the baseline for stockholders. Despite the increasing available literature on COVID-19, very few publications have emerged from Africa inclusive of Ethiopia. Besides, curtailing the COVID-19 pandemic in middle and low-income countries requires understanding the clinical presentations, laboratory characteristics, and factors associated with poor outcomes in patients with COVID-19 requiring ICU admission.AS there is so limited data in the country this study will help as additional data and support for other literature and describe the risk factors, and management outcomes of Covid-19 ICU admitted patients.

These findings can shed light on the true burden of COVID-19 patients requiring ICU admission and inform system-strengthening efforts. The results will enable us to better understand the epidemiology of critical COVID-19 in Africa. This study will also provide useful information for effective public health measures and future pandemic preparedness in response to outbreaks. It will also support policymakers in managing the epidemic based on scientific evidence. Finally, it puts the basis for further study as baseline data since previously done research on the subject matter is scarce.

Literature Review

Empirical Review

All high-income countries together represent 86% of COVID-related death. This leaves 14% of the developing world, which comprises about 85% of the global population [20]. Ethiopia, like other countries, faced some major vulnerabilities as it was struck by COVID-19. The socio-economic impacts being felt across Ethiopia already are wide-ranging and serious, with the potential to become severe, depending on the combination of the pandemic's trajectory, the effects of countermeasures, and underlying and structural factors [21].

A systematic meta-analysis done in China from December 2019 to February 2020 included 10 studies, a total of 1995 cases. This study showed that the main clinical symptoms of COVID-19 patients were fever (88.5%), cough (68.6%), myalgia or fatigue (35.8%), expectoration (28.2%), and dyspnea (21.9%). Minor symptoms include headache or dizziness (12.1%), diarrhea (4.8%), nausea, and vomiting (3.9%). The laboratory condition showed that lymphocytopenia (64.5%), an increase of CRP (44.3%), an increase of lactic dehydrogenase (LDH) (28.3%), and leukocytopenia (29.4%) were more common. Based on sex, men accounted for 60% (95% CI [0.54,0.65]) of COVID-19 patients, which was higher than women [21].

A retrospective study in the Cleveland Clinic enterprise 10-hospital healthcare system in Northeast Ohio analysis of 495 COVID-19 patients who were admitted to the ICU from March 15 to June 1, 2020. In this particular study, the mean age was 67.3 years, 206 (41.6%) were females and 289 (58.4%) were males. Among these the majority of patients (54.9%) were Caucasian, and 192 (38.3%) were African American. In addition, 176 (33.7%) were admitted from emergency rooms, and 228 (46.1%) were transferred from medical or surgical wards to the ICU. Median BMI was 29.7 kg/m2, 177 patients (35.8%) were diabetic, and 64 (12.9%) met the criteria for severe sepsis or septic shock. The mean APS was 45.3, and the mean APACHE III score was 60.5. Among a total of 495 cases, 215 patients (43.3%) were intubated for a mean duration of 9.2 days. Mean ICU and hospital length of stay were 7.4 and 13.9 days, respectively, while mean ICU and hospital mortality rates were 18.4% and 23.8% [22, 23].

In this study, there were no cases of catheter-associated urinary tract infection, no cases of ventilator-acquired pneumonia, and one case of fungal central line-associated bloodstream infection. Among 215 patients who stayed on mechanical ventilation (43.3%) for a mean duration of 9.2 days. Of those 215 intubated patients, 24 underwent tracheostomy and were discharged on mechanical ventilation to a nursing home with ventilator capacity or a long-term acute care hospital (11.16%). Mean ICU and hospital LOS values were 7.4 and 13.9 days, respectively, and ICU and hospital mortality rates were 18.4% and 23.8% [23]. Close mortality rates were observed in Germany, Sweden, Poland, and the Netherlands [24-27].

Another systematic review and meta-analysis of a total of twenty-eight studies comprising 12,437 COVID-19 ICU admissions from seven countries in Italy who were on COVID-19 ICU and mechanical ventilation patient characteristics and outcomes showed Pooled ICU admission rate was 21% [95% CI 0.12–0.34] and 69% of cases needed IVM [95% CI 0.61–0.75]. Fever at 81%, cough at 76%, and dyspnea at 75% were the 3 most prevalent comorbidities and symptoms respectively. The reported test findings were lymphopenia at 78%, elevated alanine (ALT) and aspartate aminotransferases (AST) at 71%, and 66.3% respectively, and elevated troponin at 22%.

It was also found that the major correlates with ICU mortality were IVM [p OR 16.46, 95% CI 4.37–61.96], acute kidney injury (AKI) [p OR 12.47, 95% CI 1.52–102.7], and acute respiratory distress syndrome(ARDS)[pOR6.52,95%CI2.66–16.01) ICU and IVM mortality were 28.3% [95% CI 0.25–0.32], 43% [95% CI 0.29–0.58] and ICU, IVM duration was 7.78 [95% CI 6.99–8.63] and 10.12 [95% CI 7.08–13.16] days respectively]. The prevalence of comorbidities as well as presenting clinical features showed hypertension (HTN) at 51%, obesity (BMI>30kg/m2) at 35%, and diabetes (DM) at 30% [28].

In a multicenter, prospective cohort study conducted in 138 hospitals in France, Belgium, and Switzerland from February 25 to May 4, 2020, with 4643 patients (median [IQR] age 63 [54–71] years and SAPS II 37 [28–50]) were admitted in ICU, with day-90 post-ICU admission status available for 4244. On ICU admission, standard oxygen therapy, high-flow oxygen, and non-invasive ventilation were applied to 29%, 19%, and 6% of patients,

respectively. 2635 (63%) patients were intubated during the first 24 h whereas overall 3376 (80%) received invasive mechanical ventilation (MV) at one point during their ICU stay.

Median (IQR) positive end-expiratory and plateau pressures were 12 (10–14) cmH2O, and 24 (21–27) cmH2O, respectively. Paralyzing agents and prone position were applied to 88% and 70% of patients intubated on Day 1, respectively. Pulmonary embolism and ventilator-associated pneumonia were diagnosed in 207 (9%) and 1209 (58%) of these patients [29].

A retrospective regarding 733 critically ill adult patients with laboratory-confirmed COVID-19 from 19 hospitals in China from January 1 to February 29, 2020, was analyzed. In this study multivariate Cox regression analysis showed that older age, malignancies, high APACHE II score, high d-dimer level, low PaO2/FiO2 level, high creatinine level, high sensitivity cTnI level, and low albumin level were independent risk factors of 28-day mortality in critically ill patients with COVID-19. Older age, malignancies, high APACHE II score, high d-dimer level, high creatinine level, high sensitivity cTnI level, low P/F ratio, and low albumin level were independent risk factors of mortality in critically ill patients with COVID-19 [30].

Interestingly, a multinational, multicentre, prospective cohort study embedded in the International Severe Acute Respiratory and Emerging Infection Consortium World Health Organization COVID-19 platform reported that patients with severe COVID-19 admitted to an ICU had significantly lower 28-day fatality ratio than those cared for outside an ICU [31]. Apart from this, in United Arab Emirates (UAE), a retrospective study analyzed a total of 371 critically ill patients with COVID-19 pneumonia between March 16 and July 19, 2020. The study recorded 20.2% of both ICU and hospital mortality rates. The risk factors for in-hospital mortality were greater Acute Physiology and Chronic Health Evaluation II score on ICU admission, and diarrhea before hospital admission [32].

In Europe, there is one study that is done in a large number of hospitals. This was a multicenter, prospective cohort study conducted from February 25 to May 4, 2020, which included 4244 patients who were admitted to ICU, with day-90 post-ICU in 138 hospitals in France, Belgium, and Switzerland. There were 1085/4244 (26%) female patients. At ICU admission, their median (interquartile) age, SAPS II, and SOFA scores were 63 (54–71) years, 37 (28–50), and 5 (3–8), respectively. The rate of obese (BMI ≥ 30 kg/ m2) patients was 1607/3935 (41%). The most frequent comorbidities were hypertension 2018/4197 (48%), known diabetes 1167/4196 (28%), and immunocompromised status 314/4192 (7%). The Median (IQR) time between first symptoms and ICU admission was 9 (6–12) days. Of note, only 176/4124 (4%) patients were active smokers and only 208/4116 (5%) had concomitant bacterial pneumonia at ICU admission [29].

In another retrospective study done on 120 patients with SARS-CoV-2 pneumonia who had been admitted to Ningbo First Hospital and Jingzhou Central Hospital, 58 patients with mild to moderate disease who received the same antiviral drugs were included. In this study the mean age (SD) of patients was 47·8 years (13·8), where patients aged 40–79 years accounted for 63·8%. 30 (51·7%) patients were male.15 (25·9%) cases had underlying chronic diseases, and 9 (15·5%) had hypertension [33].

There was prospective cohort study done in France in March 2020, the result shows that factors associated with death were advanced age (OR:2.7, per 10-year increase; 95% CrI:2.1–3.4), being male (OR:1.7; 95% CrI:1.1–2.7), immunosuppression (OR:3.8; 95% CrI:1.6–7.7), diabetes (OR:1.7; 95% CrI:1.0–2.7), chronic kidney disease (OR:2.3; 95% CrI:1.3–3.9), dyspnea (OR:2.1; 95% CrI:1.2–3.4) and inflammatory parameters such as a C-reactive protein level of 100– 199 mg/L (OR:2.0; 95% CrI:1.1–3.2) and neutrophil count ≥ 8,000 per µL (OR:1.9; 95% CrI:1.0–3.0) [34].

A cross-sectional analysis was done in Argentina on 207,079 cases which shows, a mean age of 42.9±18.8 years, 50.0% were males. Frequent co-existing conditions included hypertension (19.2%), diabetes (9.7%), asthma (6.1%), and obesity (5.2%) Study done in Argentina shows risk factors for adverse outcomes included older age, male sex, coma, and seizures, and the concurrent presence of several morbidities [35]. A multicenter, prospective, observational cohort study was carried out among adults with suspected or confirmed COVID-19 infection who were referred to intensive care or high-care units in 64 hospitals in ten African countries including Ethiopia.

Mortality in critically ill patients with COVID-19 was observed to be higher in African countries than reported in studies done elsewhere. Increased mortality was associated with insufficient critical care resources, as well as the comorbidities of HIV/AIDS, diabetes, chronic liver disease, kidney disease, and severity of organ dysfunction at admission [31]. Another multicenter prospective observational study was conducted in Libya from May 29th to December 30th, 2020, COVID-19 critical care patients in 11 ICUs.

In this study, a total of 465 consecutive COVID-19 critically ill patients were included. The majority (67.1%) of the patients were older than 60 years, with a median (IQR) age of 69 (56.5–75); 240 (51.6%) were male, 184 (39.6%) were discharged alive, while 281 (60.4%) died in the intensive care unit. The median (IQR) ICU length of stay was 7 days (4–10) and non-survivors had significantly shorter stay, 6 (3–10) days. The body mass index was 27.9 (24.1–31.6) kg/m2. At admission to the intensive care unit, the quick SOFA median (IQR) score was 1 (1–2), whereas the total SOFA score was 6 [4-7]. In uni-variate analysis, the following parameters were significantly associated with increased/decreased hazard of mortality: increased age, BMI, white cell count, neutrophils, procalcitonin, cardiac troponin, C-reactive protein, ferritin, fibrinogen, prothrombin, and d-dimer levels were associated with a higher risk of mortality. Decreased lymphocytes and platelet count were associated with a higher risk of mortality. Quick SOFA and total SOFA scores increase, emergency intubation, inotrope use, stress cardiomyopathy, acute kidney injury, arrhythmia, and seizure were associated with higher mortality [36].

In South Africa Fifty-eight studies (44,305 patients) were included in the review, showing increasing age (SMD 0.65, 95%CI 0.53–0.77); smoking (OR 1.40, 95%CI 1.03–1.90); hypertension (OR 1.54, 95%CI 1.29–1.85); diabetes (OR 1.41,

95%CI 1.22–1.63); cardiovascular disease (OR 1.91, 95%CI 1.52– 2.38); respiratory disease (OR 1.75, 95%CI 1.33–2.31); renal disease (OR 2.39, 95%CI 1.68–3.40); and malignancy (OR 1.81, 95%CI 1.30–2.52) were associated with mortality. A higher sequential organ failure assessment score (SMD 0.86, 95%CI 0.63–1.10) and acute physiology and chronic health evaluation-2 score (SMD 0.89, 95%CI 0.65–1.13); a lower PaO2:FIO2 (SMD 0.44, 95%CI 0.62 to 0.26) and the need for mechanical ventilation at admission (OR 2.53, 95%CI 1.90–3.37) were associated with mortality.

Higher white cell counts (SMD0.37,95%CI0.22–0.51); neutrophils (SMD0.42,95%CI0.19–0.64); D-dimers (SMD0.56,95%-CI 0.43–0.69); ferritin (SMD 0.32, 95%CI 0.19–0.45); lower platelet (SMD 0.22, 95%CI 0.35 to 0.10); and lymphocyte counts (SMD 0.37, 95%CI 0.54 to 0.19) were all associated with mortality [37].

A study was done in Ethiopia on confirmed cases in 8955, between 13 March and 13 September 2020. Overall, 4346 (48.5%) have recovered from the virus; and a total of 52 deaths were reported with a case fatality rate of 1.2%. In the reported case fatality rate, 44 (84.6%) of those reported as COVID-19 death, the virus was detected in dead bodies. Only 64 (0.7%) of the cases had symptoms at diagnosis. Cough was the most common among symptomatic cases reported in 48 (75.0%), while fever was the least [38].

An institution-based retrospective cross-sectional study was carried out using medical records of COVID-19 patients who were admitted to Boru Meda Hospital with positive reverse transcription (RT)-PCR results from May 9, 2020, to September 20, 2020. A total of 279 COVID-19 patients were included in the final analysis. The median age of patients was 28 years (interquartile range23–40). The majority (69.5%) were male. Around a quarter (n= 73; 26.2%) of the patients were symptomatic of which cough (n = 49; 67.1%) and fever (n = 32; 43.8%) were common symptoms. Among symptomatic patients, 48 (65.8%) were mild, four (5.5%) moderate, 12 (16.4%) severe, and nine (12.3%) were critical. The case fatality rate was 2.1%. Hypertension, age older than 25 years, and HIV/AIDS were significantly associated with symptomatic infection [39].

Another institution-based retrospective cohort study was done in western Ethiopia including 318 patients. The study revealed that most (81.45%) of the patients recovered from COVID-19 while 267 (84%) of patients were censored at the end of follow-up.The incidence rate of mortality was 14.1 per/1000 persons on the days of observation. Age ≥59 years, low oxygen saturation, and delayed presentation were independent predictors of mortality among COVID-19 patients [40].

Conceptual Framework

This is the conceptual framework developed specifically for this study by the principal investigator after reviewing related studies such as in which this study is intended to revolve [37,41,42]. The framework tries to depict factors that can potentially contribute to mortality among patients admitted to the intensive care unit, and it is believed to support the present study entitled 'Clinical Features and Management Outcome, and Associated factors of patients admitted to COVID-19 ICU Center of Yekatit 12 Hospital Medical College'.

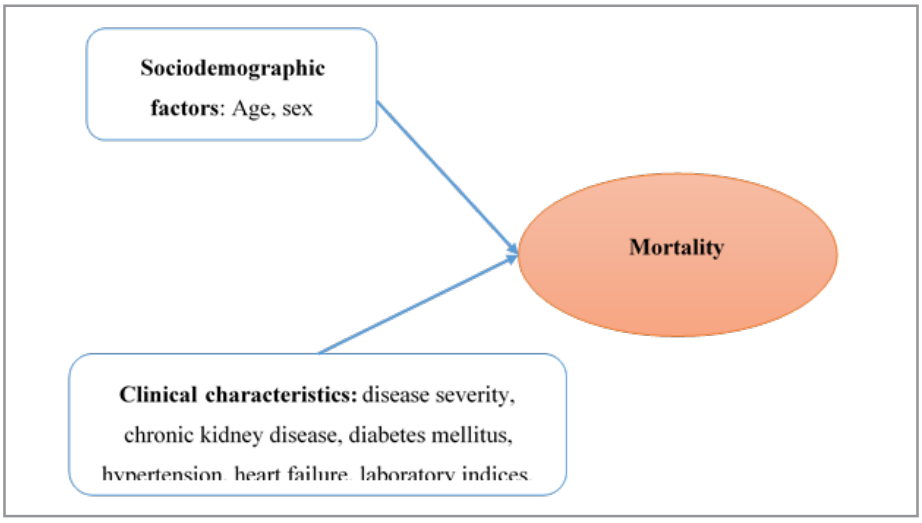

Figure 1: A conceptual framework for factors that could affect mortality among ICU-admitted COVID-19 patients

Objectives

General Objective

- To assess the Clinical profile, Management outcome, and associated factors of COVID-19-infected patients who were admitted to the COVID-19 ICU Center Yekatit 12 Hospital Medical College' from June 8, 2020, to May 30, 2021

Specific Objectives

- To describe the clinical characteristics of patients with COVID-19 admitted to the COVID-19 ICU Center of Yekatit 12 Hospital Medical College during the study period
- To assess the management outcome of patients with COVID-19 admitted to the COVID-19 ICU Center of Yekatit 12 Hospital Medical College during the study period

- To identify risk factors in patients with COVID-19 admitted to the COVID-19 ICU Center of Yekatit 12 Hospital Medical College during the study period

Methods and Materials

Study Setting and Study Period

The study was conducted at Yekatit 12 Hospital and Medical College Internal Medicine Department. Yekatit 12 Hospital was established in 1923G.C. Until the Ethiopian revolution of the 1970s, it was known as Haile Selassie I Hospital, named after Emperor Haile Selassie I. In addition, Yekatit 12 Hospital Medical College maintains electronic medical record systems, which streamline the process of collecting data for this study. These records contain detailed information on patient demographics, medical history, patient investigation results, diagnosis, and disease progress over time.

The hospital services over 5 million people in its five significant departments in the catchment area. The college has more than 1800 clinical, academic administrative, and supporting staff that provide medical specialty services to patients who are referred from all over the country. The inpatient capacity is more than 700 beds, and an average of 1000 emergency and outpatient clients are seen daily in the hospital before the pandemic.

The hospital was designated officially starting on June 8, 2020, G.C. as the national center for the management of COVID-19-infected patients in Ethiopia mainly serving the city and surrounding areas populations. It was repurposed to have different compartments on an already existing building, including an intensive care unit (ICU), Semi-ICU, HDU, and also male and female wards for treatment of patients at a different level of illnesses which are assigned according to WHO criteria. The adult ICU has 13 beds with MV and dialysis machines. RT-PCR SARS-CoV-2–positive cases were admitted to the hospital.

The initial decision to admit all patients to the treatment center was because of the inconvenience of home isolation and management in many Ethiopian settings. Severe and critical cases were admitted to the ICU and semi-ICU, whereas the others remained in the general ward and HDU. The care of COVID-19 patients is given by a multidisciplinary team composed of nurses, residents, laboratory technologists, pharmacists, internists, anesthesiologists, pulmonologists, emergency, and critical care specialists, and other supporting staff. The management of COVID-19 in the center is in line with the national and SPHMMC's treatment guidelines.

The study will be conducted among the patients who were consecutively admitted with RT-PCR-confirmed COVID-19 and admitted to ICU from June 8, 2020, to May 30, 2021G.C.

Study Design

An institutional-based cross-sectional study was conducted among patients with RT-PCR-confirmed COVID-19 and admitted to ICU from June 8, 2020, to May 30, 2021G.C.

Source Population

All adult patients with laboratory-confirmed COVID-19 infection by real-time reverse transcriptase PCR assay of naso/oropharyngeal swab specimens and admitted to ICU during the study period

Study Population

All sampled adult patients who were admitted consecutively to the ICU with laboratory-confirmed COVID-19 infection by real-time reverse transcriptase PCR assay of naso/oropharyngeal swab specimens during the study period that fulfills eligibility criteria.

Sample Size

Taking the population proportion of patients who were admitted to COVID-19 ICU, reported an overall mortality rate to be 23% taken from the previous study done in Africa, Ghana (18).

$$n = \frac{z^2 p(1-p)}{e^2}$$

n = the required sample size
p = proportion of patients admitted to COVID-19 ICU reported having a mortality of – 23%
Zα\2 = the critical value at 95% confidence level = 1.96
e = precision (margin of error) = 5%
Accordingly,

$$n = \frac{(1.96)^2 * 0.23(1-0.23)}{0.05^2}$$

$$n = \frac{(1.96)^2 * 0.23(0.1771)}{0.05^2}$$

$$n = 272$$

Therefore, the minimum calculated sample size, by adding 10% of the calculated sample size for a contingency that might happen due to lost charts or incomplete reports, the final sample size became 286.

Eligibility Criteria

Inclusion Criteria

Patients aged ≥18 years old were admitted to the ICU with SARS-Cov-2 infection as confirmed by real-time reverse transcriptase PCR assay of naso/oropharyngeal swab specimens during the study period.

Exclusion Criteria

- If the primary outcome is not reported
- All patients under 18 years old
- Lost patients card
- Transferred cases to other facilities

Variables

Dependent Variables

Outcome (Death and Alive/Discharged/improved)

Independent Variables

- Age
- Sex
- Clinical presentation (signs and symptoms)
- Chronic kidney disease
- Diabetes mellitus
- Hypertension
- Obesity
- Heart failure

- Laboratory values upon admission to ICU
- Vital signs at initial presentation of patients
- ICU length of stay
- Need of MV
- Respiratory support

Operational Definition

A) Respiratory support

Patients receiving mechanical ventilation through NIV or IMV

2) Noninvasive ventilation

The delivery of positive pressure ventilation through a noninvasive interface (e.g., nasal mask, or face mask)

3) Invasive ventilation

Positive pressure is delivered to the patient's lungs via an endotracheal tube or a tracheostomy tube.

B) Outcome: represents the end clinical status of patients who were admitted to COVID-19 ICU as documented in patients' cards (improved, death).

C) COVID-19–related complications:

Infectious: co-infection at presentation, reactivation like TB, Nosocomial, opportunistic fungal infection

Noninfectious: DVT, PTE

D) Severity of COVID-19 infection

Mild COVID-19, as no pneumonia or mild pneumonia

Severe COVID-19: defined as dyspnea, respiratory frequency ≥30 breaths/min, oxygen saturation [SpO2] ≤93%, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen [PaO2/FiO2] <300 mm Hg, and/or lung infiltrates >50% within 24 to 48 hours.

Critical COVID-19: defined as respiratory failure, septic shock, and/or multiorgan dysfunction or failure

Data Collection Tools and Procedures

Data were collected from patients' medical records using structured checklists in the English language. The questionnaire was prepared by reviewing different literature and undertaking modifications for the population studied. It was modified further after a pre-test and before the data collection, then followed and reviewed during data collection. It was collected by trained Emergency Medicine and Critical Care Residents in SPHMMC working at the COVID treatment center and completeness was checked by Principal Investigator.

The information of all patients, including demographics, clinical presentation, laboratory parameters, and patient outcomes was extracted from medical records. Laboratory parameters were divided into three categories: hematologic and radiologic.

Data Quality Control

An English version and a pretested checklist were used to collect data. Brief training for the data collectors about the process of data collection was given before the process of data collection. Close supervision was maintained during data collection and filled checklists were double-checked daily for consistency and completeness by data collectors and the principal investigator before analysis.

Data Processing and Analysis

Data entering, coding, and cleaning were performed using Epi-info version 7.0, and statistical analysis was done using SPSS (Statistical Package for Social Science) version 26. Frequency and cross-tabulation were used to check for missed values and variables. The demographic and clinical characteristics of patients were computed by using descriptive statistics such as mean, percentage, frequencies, and standard deviation. Multivariate logistic regression was used to determine associations between independent and dependent variables. Those variables with a p-value of ≤0.2 in binary logistic regression were taken to multiple logistic regressions. Finally, the study findings were presented using diagrams, tables, and figures.

Ethical Consideration

This study will require secondary data from patient charts. The data from the case records were handled with strong confidentiality. The research proposal was approved by the ethical board of St. Paul's Hospital Millennium Medical College. The study was started after obtaining ethical clearance from the board and after permission from the hospital management to review records. Owing to the retrospective design, the requirement for informed consent was waived.

Dissemination of Results

The result of this study will be presented for partial fulfilment of the residency program. The manuscript will also be sent to journals for possible publication and presentations (conferences, workshops).

Results

Sociodemographic Profile of Study Participants

A total of two hundred seventy-two patients' medical records were reviewed in this study. The patient median age at diagnosis was 60.5 years, with an interquartile range of 45–70 years. More than half (142, 52.2%) are aged 60 years or more. Males accounted for more than two-thirds (183, 67.3%) of the total study population (Figures 2 and 3).

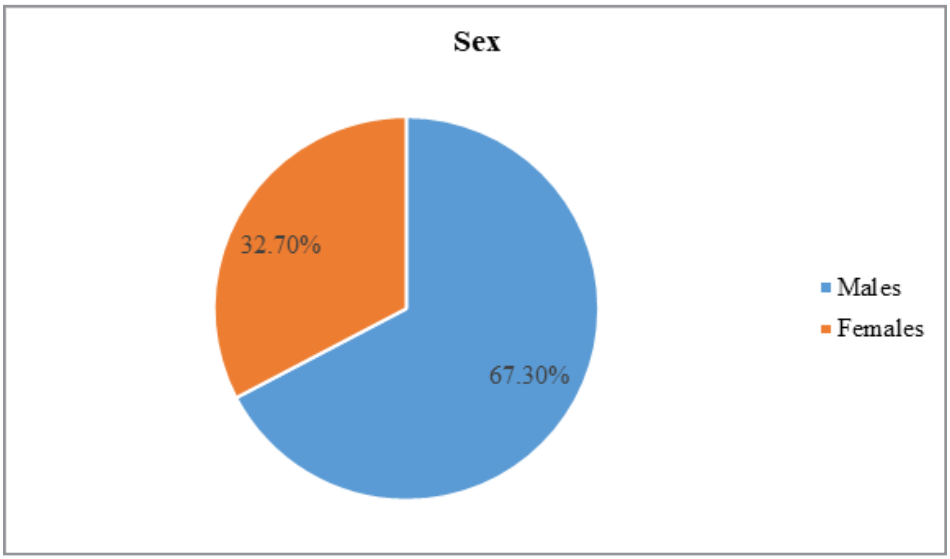

Figure 2: Sex distribution of COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College, Addis Ababa, Ethiopia from June 8, 2020, to May 30, 2021

Clinical profile of Study Participants

Regarding the clinical profile of the studied patients, most (n=206, 75.7%) had some form of chronic comorbidity. More particularly, hypertension (n=109, 40.1%), diabetes mellitus (n=90, 33.1%) and chronic kidney disease (n=40, 14.7%) were the most commonly documented comorbid conditions. The majority (n=194, 71.3%) of the patients were diagnosed to have critical COVID-19 disease based on WHO classification while a little more than a quarter (n=75, 27.6%) had a severe form of the disease (Table 1).

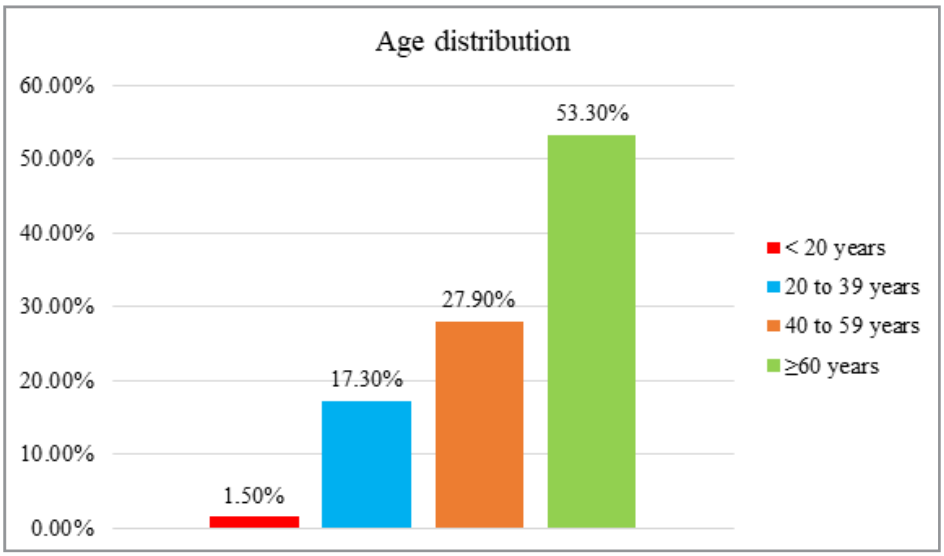

Figure 3: Age distribution of COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College, Addis Ababa, Ethiopia from June 8, 2020, to May 30, 2021.

The median (interquartile range) time duration from onset of symptom(s) to hospital admission for the ICU-admitted patients was 5 (4–7) days while the corresponding time duration from onset of symptom(s) to ICU admission was 6 (4–8) days. Similarly, the median (IQR) duration from the onset of initial symptom(s) to intubation was 8 (6–10) days. Most (n=246, 90.8%) of the patients had a systolic blood pressure measuring ≥90 mm of Hg at the initial presentation to the ICU (Table 1).

Regarding the vital signs recorded at arrival to the ICU, two hundred forty-six (90.8%) patients had a baseline systolic blood pressure measuring 90 mm of Hg or more while 153 one hundred fifty-three (56.3%) were tachycardic, having a pulse rate exceeding 100 beats per minute. Again, most (243, 89.3%) of the patients were tachypneic, with more than 20 breaths per minute while about two-thirds (171, 62.9%) were hypothermic as they had an axillary temperature of less than 36.5 C. Finally, hypoxemia (peripheral oxygen saturation <90%) was (Table 1).

Table 1: Clinical data of COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College , Addis Ababa, Ethiopia from June 8, 2020, to May 30, 2021

Variable	Frequency	Percent (%)
Comorbidity		
No	66	24.3
Yes	206	75.7
Type of comorbidity		
Hypertension	109	40.1
Diabetes mellitus	90	33.1
Chronic kidney disease	40	14.7
Bronchial asthma	21	7.7
Malignancy	13	4.8
Retroviral infection	13	4.8
Stroke	10	3.7
Chronic obstructive lung disease	9	3.3
Tuberculosis	8	2.9
Other	18	6.6
Disease severity		
Mild	3	1.1
Severe	75	27.6
Critical	194	71.3
Chief complaints		
Cough	118	43.4
Shortness of breath	112	41.2
Myalgia	20	7.4
Fever	17	6.3
Diarrhoea	3	1.1
Anosmia	2	0.7
Duration of symptoms in days (median + IQR)	5	4–7
Duration from the onset of symptoms to ICU admission(median + IQR)	6	4–8
Time interval before intubation in days (median + IQR)	8	6–10
Systolic blood pressure (mmHg)		
<90	25	9.2
≥90	246	90.8
Pulse rate		
<60 beats per minute	4	1.5
60-100 beats per minute	115	42.3
>100 beats per minute	153	56.3
Respiratory rate		
<12 breaths per minute	1	0.4
12-20 breaths per minute	28	10.3
>20 breaths per minute	243	89.3
Axillary temperature (C)		
<36.5	171	62.9
36.5–37.5	69	25.4
>37.5	32	11.8
Oxygen saturation (%)		
<90	161	59.2
90–95	92	33.8
>95	19	7.0

IQR: Interquartile range

Laboratory, complication, and management-related data

About the laboratory data of the studied patients, the majority (201, 73.9%) of the patients had hyperleukocytosis, evidenced by a baseline white blood cell count of 11,000 cells/L. Of all, one hundred and five (38.6%) had a haemoglobin level less than 12 g/dL at initial presentation to the ICU whereas 162 (39.7%) of the patients had thrombocytopenia (platelet count <150,000) (Table 2).

On the other hand, all of the patients needed ventilator support, with 108 (39.7%) and 164 (60.3%) of the patients receiving non-invasive and invasive mechanical ventilator support, respectively. The median (IQR) days on mechanical ventilation for the intubated patients was 14 (6–20) days. Further, hospital-acquired pneumonia, septic shock, and acute kidney injury were the leading intra-facility complications, affecting 138 (50.7%), 117 (43%), and 110 (40.4%) of the patients, respectively. Moreover, neuromuscular blocking agents were administered to 28 (10.3%) of the patients, while renal replacement therapy and vasopressors were given to 58 (21.3%) and 111 (40.8%) of the patients. Finally, the overall median length of hospital stay was 17 days, with an interquartile range of 9–23.75 (Table 2).

Table 2: Laboratory, complication, and management-related data of COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College , Addis Ababa, Ethiopia from June 8, 2020, to May 30, 2021

Variable	Frequency	Per cent (%)
Leukocyte count (*109/L)		
<11	71	26.1
≥11	201	73.9
Hemoglobin (g/dL)		
<12	105	38.6
≥12	167	61.4
Platelet (*103)		
<150	162	39.7
≥150	210	60.3
Respiratory support		
Noninvasive ventilation	108	39.7
Invasive mechanical ventilation	164	60.3
Duration in mechanical ventilation in days (median + IQR) (n=164)	14	6–20
No	108	39.7
Yes	164	60.3
Type of in-ICU complication		
Hospital-acquired pneumonia	138	50.7
Septic shock	117	43.0
Acute kidney injury	110	40.4
Acute respiratory distress syndrome	63	23.2
Deep venous thrombosis	24	8.8
Pulmonary embolism	23	8.5
Ventilator-associated pneumonia	21	7.7
Disseminated intravascular coagulopathy	4	1.5
Adjuvant therapy given		
Neuromuscular blocking agent	28	10.3
Renal replacement therapy	58	21.3
Vasopressor	111	40.8
Length of hospital stay in days (median + IQR)	17	9–23.75
ICU: Intensive care unit; IQR: Interquartile range		

Management Outcome of Patients with COVID-19

In the present study, about two-thirds (n=175) of all patients died, making a mortality rate of 64.3% (95CI: 58.6–70.1%). Among those who left the ICU alive, fifty (18.4%) were discharged successfully and forty-seven were transferred to other units (Figure 3).

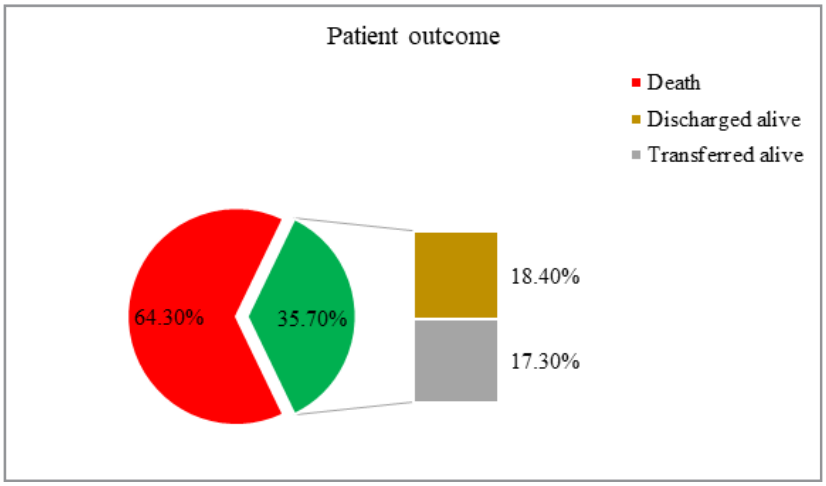

Figure 4: The outcome of COVID-19-infected patients admitted to the COVID-19 ICU Center of Yekatite 12 Hospital Medical College, Addis Ababa, Ethiopia from June 8, 2020, to May 30, 2021.

Factors Associated with Mortality

In this study, twenty-two variables, namely sex, age category, presence of comorbidity, history of hypertension, diabetes mellitus, chronic kidney disease, heart failure, bronchial asthma, malignancy, retroviral infection, stroke, chronic obstructive lung disease, tuberculosis, disease severity, systolic blood pressure, pulse rate, respiratory rate, axillary temperature, peripheral oxygen saturation, baseline leukocyte count, baseline platelet count, and baseline hemoglobin count were included in the regression model. To determine the factors associated with mortality while controlling possible confounders, independent variables that yielded a p-value of ≤0.25 in binary logistic regression were exported to a multiple regression model to compute an adjusted odds ratio to quantify the strength of association with the dependent variable.

Hence, variables, like age category, presence of comorbidity, history of hypertension, diabetes mellitus, chronic kidney disease, tuberculosis, disease severity, systolic blood pressure, pulse rate, respiratory rate, axillary temperature, peripheral oxygen saturation, baseline leukocyte count, baseline platelet count and baseline hemoglobin count, septic shock, intubation, AKI, and disease severity a were observed in the bivariate regression analysis to be associated with death.

After running a multivariable logistic analysis, the only variables that showed statistically significant association with mortality were the presence of a comorbidity, disease severity, intubation, AKI, and septic shock were strongly associated with adverse outcomes (Table 3). In particular, this study showed that when compared to those who had a disease classification of non-critical, COVID-19 patients with critical ones were more likely to die [AOR(95%CI) = 10.87(5.59,21.14)].

Similarly, about those with no documented comorbidity, patients who were diagnosed to have a certain comorbid medical condition had higher odds of death [AOR (95%CI) = 3.24(1.64, 6.39)]. Furthermore, the odds of mortality were 26 times as much among patients with septic shock during their hospital stay at as compared to those who didn't develop septic shock. Finally, patients who were intubated had the odds of 2.71 times to die as compared to non-intubated patients, on other hand those patients with AKI had 2.99 times risk of mortality (Table 3).

Table 3: Factors associated with mortality among COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College, Addis Ababa, Ethiopia

Variable	Death		COR(95%CI)	AOR(95%CI)
	Yes (%)	No (%)		
Severity				
Noncritical	24(30.8)	54(69.2)	1	1
Critical	151(77.8)	43(22.2)	7.90(4.39,14.23)	10.87(5.59,21.14)
Comorbidity				
No	33(50.0)	33(50.0)	1	1
Yes	142(69.9)	64(30.1)	2.22(1.26,3.91)	3.24(1.64,6.39)
Septic shock	113(96,9%)	4(3.4)	OR 4.50(3.15,34.2)	AOR:26.03(95%CI;8.41, 80.57)
Intubated patients	136(84)	26(14)	(OR.3.15:95%CI: 1.148-4.671	AOR:2.716(95%CI;1.23, 5.69)
AKI	141(69.5)	62(30.5)	3.34(1.34,4.09)	AKI(OR: (2.99:95%CI,1.31-7.95)

Only variables with p-value <0.05 in bivariable logistic regression are shown here

*P value < 0.05; **P value < 0.01; *** P value < 0.001

Furthermore, a disproportionately higher mortality rate was observed among patients who developed medical complications such as acute respiratory distress syndrome, septic shock, and hospital-acquired pneumonia during their stay in the ICU and among those who needed in-ICU intubation, as evidenced by chi-square analysis (Table 4).

Table 4: Complications associated with mortality among COVID-19 infected patients admitted to COVID-19 ICU Center of Yekatite 12 Hospital Medical College, Addis Ababa, Ethiopia

	Death		X2(p-value)
	Yes(%)	No(%)	
Acute respiratory distress syndrome			24.4(<0.001)
No	118(59.3)	91(40.7)	
Yes	57(90.5)	6(9.5)	
Septic shock			93.0(<0.001)
No	62(40.0)	93(60.0)	
Yes	113(96.6)	4(3.4)	
Hospital-acquired pneumonia			5.4(0.02)
No	77(57.5)	57(32.5)	
Yes	98(71.0)	40(29.0)	
Pulmonary embolism			10.74 (0.01)
No	153(61.4)	96(38.6)	
Yes	22(95.6)	1(4.4)	
Respiratory support			62.2(<0.001)
Invasive mechanical ventilation	136(84.0)	26(16.0)	
Noninvasive ventilation	39(39.8)	69(60.2)	

Only complications with p-value <0.05 are displayed here

Discussion

The COVID-19 pandemic continues as a significant global health threat, with a disproportionately high case-to-fatality ratio in settings with poor healthcare and limited resources[12-16] Identifying the factors for these poor short-term outcomes among hospitalized patients would help in guiding evidence-based interventions and mitigate the problem. Thus, this study was conducted to explore the mortality rate of COVID-19 disease and associated factors by analyzing patients admitted to the intensive care unit of St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

As a consequence, the study showed a high mortality rate, with patients having a critical based on disease severity at presentation, comorbidity (diabetic mellitus, hypertension), septic shock, and intubated patients having an increased risk for death. Similar to the pattern observed in the previous Ethiopian study [43], cough (43.4%), shortness of breath (41.2%), myalgia (7.4%), and fever (6.3%) were the leading presenting symptoms in the present study.

It was also slightly different from the pattern obtained in Argentina (35), where the most common initial symptoms were fever (58.5%), cough (58.0%), headache (45.4%), and sore throat (42.1%) and Abu Dhabi, where the most frequently reported symptoms were cough (79.8%), fever (77.6%), and dyspnea (77.4%) [32]. The discrepancy can be partly attributed to the clinico-demographic differences of the studied population. For instance, the mean age in the Argentine study was 42.9 years while in the current study, the median age was 60.5 years in this study. Hence, among others, elderly patients have a suppressed ability to mount fever, in contrast to younger ones.

Moreover, the most common comorbid conditions in this study were hypertension, diabetes mellitus and chronic kidney disease. This is close to the retrospective review of Ismail et al. [32] and Mezgebu et al., who independently cited diabetes mellitus and systemic hypertension as the commonest comorbidities among critically ill COVID-19 patients [44]. The median time duration from onset of symptoms prior to hospital admission was 5 days, which was close to the Chinese report, where the duration from onset of symptoms to diagnosis of COVID-19 was 4 days [45].

In agreement with Mezgebu et al. report [44], most of the patients belong to the critical disease severity on their initial presentation, and this is due to the fact that this study focused on patients admitted to intensive care unit. This study demonstrated a high mortality rate among ICU-admitted COVID-19 patients, with a figure standing at 64.3%. This is comparable to the earlier Ethiopian study conducted in north-central Ethiopia, where the overall prevalence of mortality of 67.4% among adult patients admitted to the ICU during the COVID-19 pandemic [42]. Similarly, it was very close to the findings of Elhadi and other authors who found an ICU mortality of 60.4% among critically ill COVID-19 patients in Libya [36]. The above findings were slightly higher than the in-hospital mortality (48.2%) observed in a multicentre, prospective, cohort study conducted over multiple African nations [46].

In contrast, it was much higher than the ICU and hospital mortality rates (20.2%) obtained in a tertiary care centre in the United Arab Emirates (32). The present mortality rate was also much higher than the mortality rate documented among COVID-19 patients in Western Ethiopia, in which the mortality rate and incidence rate of mortality were 16.04% and 14.1 per/1000, respectively[40]. The in-hospital mortality reported in our cohort was higher than the one observed in Latin America (24.1%) [31].

Furthermore, it was also different from the reports of Dongelmans and others who documented crude hospital mortality 29.9% and 32.0% during Wave 1 and Wave 2 among patients in the Netherlands set, respectively [24]. The overall hospital mortality noted in this study was more than thrice as much as that of the USA, Poland, Germany, and Sweden being 19.8% (15), 18.4% (25), 17% (27), and 30.3% (26). It was quite different from the Americans that recorded mean ICU and hospital mortality rates of 18.4% and 23.8%, respectively [23].

In short, the disparities across the different regions can be justified by differences in patient characteristics and socioeconomic status, ICU admission thresholds, health care systems, and availability of variable numbers of ICU beds [42]. Multiple possible explanations can be enumerated for the high mortality noted in this study. In part, the high critical care mortality might be due to the scarcity of critical care resources including steroid therapy in African countries such as Ethiopia [46]. Most of the studied patients were critically ill at admission to higher care, with various comorbidities. Again, this high mortality might be due to medical complications such as acute respiratory distress syndrome, septic shock, hospital-acquired pneumonia, ventilation acquired pneumonia, and high intubation rate which were shown to be strongly associated with mortality.

Furthermore, this study was conducted during the period when COVID-19 cases were intense in Ethiopia when many patients could not be admitted properly and promptly to the ICU due to a shortage of resources and a lack of ICU beds on the background of a high patient flow, which could lead to delay in patient care and subsequent poor outcome. An additional likely explanation is the scarcity of healthcare supplies and the lack of adequate training of healthcare practitioners as noted in other similar settings (36). In this regard, better preparedness and state-level control of the surge in COVID-19 infections were quoted to be the possible reasons for better outcomes in affluent countries [23].

In this particular study, presence of a comorbid medical condition, intubation, higher length stays, and patients who develop ARDS were an independently associated with risk of death from COVID-19 disease. These finding were supported by several studies, including the works of Jasparda et al. [47], Mezgebu et al. [44], and Kaso et al. that showed an independent association between the presence of comorbidity and poor short-term outcome among patients with COVID-19 [41].

Again, this study showed that patients with critical disease at admission were more likely to die in comparison to patients who were not critical at admition to hospital, and this is supported by the study done by Elhadi et al. and Oliveira et al.which showed an independent association of disease severity and death [15, 36]. Additionally, a systematic review by Taylor et al. supports this finding [37, 47].

Strength and Limitations

Strengths

- A very high chart retrieval rate was entertained, with a chart retrieval rate of 100%.
- The study tried to touch a timely clinical area, where there is a scarcity of data on African patients with COVID-19 that describes outcomes along with contributing factors during the period of the COVID-19 crisis.

Limitations

- Some important variables that can potentially risk affecting mortality were not consistently available for all patients, and hence, they were not included in the final model. This included neuromuscular blocker effects, use of systemic corticosteroids, and prone positioning. And coagulation profiles.
- Finally, the study was conducted at a single centre, and thus, the findings may not be generalizable
- The study was also conducted on a relatively limited number of sample size.

Conclusion and Recommendation

Conclusion

This study showed a high mortality rate in the study setting, claiming the lives of two-thirds of the ICU-admitted patients. Patients with critical disease severity, certain comorbidity, hypotension and hypothermia or hyperthermia at admission were at increased risk for death.

Recommendation

According to the results of this study, the following recommendations can be forwarded.

For Healthcare Professionals

Critical care and aggressive management of patients, particularly for those with critical disease severity, underlying chronic illnesses and deranged vital signs such as lower systolic blood pressure during admission, is required.

For Local Health Policymakers

Local policymakers and other concerned stakeholders should devise mechanisms such as delivering capacity-building training and providing healthcare equipment along with customizing the existing guidelines to enhance the quality of care and reduce in-ICU morbidity and mortality, particularly during similar viral pandemics.

For Researchers

Stronger and multicenter studies should be considered to validate and generalize the current findings, they should include variables such as Acute Physiology Score, Acute Physiology, Chronic Health Evaluation III score, use of systemic corticosteroids and prone positioning.

Acronyms and Abbreviations

ARDS- acute respiratory distress syndrome
CI- Confidence Interval
COVID-19- Corona Virus 2019

EMCCR _ Emergency Medicine and Critical Care Resident
G.C-Gregorian Calendar
HDU- High Dependence Unit
ICU – Intensive Care Unit
MERS- Middle East Respiratory Syndrome
MV-Mechanical Ventilation
OD –Odd Ratio
RT-PCR- Real-Time Reverse Transcriptase Polymerase Chain Reaction
SARS- severe acute respiratory syndrome
SPHMMC – Saint Paul's Hospital Millennium Medical College
SPSS- Statistical Package for Social Scienc
WHO-World Health Organizatio

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