**Clinical profile and predictors of outcomes of hospitalized patients with laboratory-confirmed severe acute respiratory syndrome coronavirus 2 in Nigeria: A retrospective analysis of the 13 high burden states**

**Background**

Globally, the current COVID 19 pandemics has resulted in a high number of deaths and associated disruption of both public health and socioeconomic activities of countries and populations. As at 9th of April 2021, Nigeria had recorded 163,581 confirmed cases, with 150,005 cases discharged, 7,518 cases on admission and 2,058 deaths with a significant increase in the number of confirmed cases and concurrent deaths since the beginning of the second wave of infections. Most of these deaths have been in-hospital. Little is known about the deaths in the community due largely to poor community records of deaths and other vital statistics. The weak Nigerian health system is thought to have led to a considerably high in-hospital mortality especially in settings where critical care services and resources are scarce. Underlying morbidities such as malnutrition, anemia, HIV/AIDs, and chronic respiratory conditions, diabetes and heart failure have been shown to be important contributors to high global mortality in the current COVID 19 pandemic.

Even though several global reports have been written about the impact of the COVID 19 pandemic on clinical outcomes especially the attendant morbidity and mortality, little is known about the situation in Nigeria. Understanding the relative contributions and probable mechanism through which sociodemographic, clinical and laboratory factors relate to the high in-hospital mortality in Nigeria could help us identify weak points within the health system that can be improved upon for current and future responses. In addition, such review will also help us plan and prioritize health infrastructure and resource allocation for better health outcomes in our public health system.

We therefore set out to describe clinical characteristics and factors associated with the outcomes for patients hospitalized with laboratory-confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection early in Nigeria. In addition, we evaluated the demographic, clinical and laboratory predictors of mortality in those patients hospitalized with laboratory-confirmed severe acute respiratory syndrome coronavirus 2 (SRAS-COV-2) infection in Nigeria.

**Methods**

***Study design***

This was a retrospective descriptive analysis on … patients with laboratory-confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection seen and managed in the COVID 19 treatment centers across the 13 high burden states in Nigeria.

**Study Setting**

We conducted a retrospective analysis of archived data on patients with laboratory-confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection treated in COVID 19 treatment centers across the 13 high burden states in Nigeria including the federal capital territory (FCT). Patients admitted from February 2020 up until July 20th 2021 were all included in the cohort. All patients who had negative RT-PCR even if their symptoms suggested SARS-COV-2 infection as well as those who did not require admission were excluded from this analysis.

**Study population**

We conducted a retrospective descriptive study of all patients admitted with real time polymerase chain reaction (RT-PCR)–positive SARS-CoV-2 across the treatment centers in Nigeria between 1st April 2020 and 1st August 2021. The …Those patients who were not admitted as well as those who had a negative test result even though treated for COVID-19 based on symptom scores were excluded from the review. Where a patient had 2 or more RT-PCR positive results, we will include the first episode that required hospitalization.

**Sample size determination**

**Ethical Considerations**

We secured ethical approval from the National Health Research Ethics Committee (NHREC) and WHO AFRO ethics committee prior to commencement of the mortality review to allow for publishing of the key findings from the mortality review. In addition, we also obtained permission from the various treatment centers ethical review board for use of their patient data. Only variables needed for the review were abstracted and used. Patient identification and other identifiers linked to the patient were coded and anonymized in order to maintain patient confidentiality.

**Data Collection**

We collected individual patient information from the treatment center electronic medical records. We retrieved demographic (patients’ sex, age, ethnicity, place of residence-urban or rural, educational level, and occupation), clinical (preexisting health condition, SPO2, symptoms, time to admission from onset of symptoms, and duration on admission) laboratory (leucocyte count, packed cell volume, platelet count, eGFR), radiological (COVID specific changes) and other relevant information from the electronic records of each participating treatment center. We also collected health system associated information such as availability of an ICU, number of ICU beds, availability of COVID dedicated triage room or area and the availability of an infection prevention and control committee.

**Outcomes of Interest**

The primary outcome was mortality. This was defined as death while on admission for a PCR confirmed infection with SARS-COV-2 virus. This was coded as 0 if the patient survives, or 1 if the patient dies.

The secondary outcome of interest was severity of the disease. This is a composite consisting of any or all of:

1. need for admission in the ICU
2. use of invasive ventilation
3. requiring a ≥60% fraction of inspired oxygen (FiO2) to maintain SaO2 >94%
4. any use of ventilator to maintain work of breathing

**Statistical Analysis**

We performed descriptive statistics using Chi square (χ2), Student t test, or Wilcoxon rank-sum tests as appropriate to describe the prevalence of covariates at admission among patients who had completed outcome. Univariate statistics, including means, standard deviations, frequencies, and proportions were computed on all non-missing cases. We further performed adjusted and unadjusted logistic regression to assess predictors of COVID-19 hospital mortality and differences in mortality by region of residence in Nigeria. We treated numeric variables with a normal distribution plot as continuous variables. Variables with a *P* value below .20 in unadjusted regression were selected for adjusted regression. In the adjusted regression model, all variables with a *P* value <.05 were considered statistically significant and thus included in the final prediction model. Variables with >20% missing values were excluded from regression analysis. In addition, Kaplan -Meir statistics was done to assess the relationship between time from hospital admission to development of primary outcome of interest. We also examined the effect of selected covariates on the hazard of death using Cox proportional hazard model. All statistical analysis was conducted using STATA 14 software or R studio as the case may be. Statistical test of significance was set at an alpha=0.05.

**Results**

*Descriptive statistics*

*Predictors of Mortality*

*Outcomes by Region/State*

**Discussions**