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# TABLE OF CONTENTS

WEST AFRICAN JOURNAL OF MEDICINE

ORIGINAL ARTICLE

# Challenges of Case Management of COVID-19 in University of Uyo Teaching Hospital: A One-Year Experience

## *Défis de la Gestion des cas de COVID-19 à l'Hôpital Universitaire d'Uyo : Une Expérience d'un An*

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**ABSTRACT**

**BACKGROUND AND OBJECTIVES:** Coronavirus disease 2019 (COVID-19) is a global pandemic. Older people and those with poorly controlled co-morbidities have higher risk of mortality. This study was conducted to highlight the clinical features, challenges of management and outcome for the patients we have seen in our centre over the past one year.

**METHODS:** This was a retrospective cross-sectional study involving all patients admitted in the COVID-19 Isolation unit of University of Uyo Teaching Hospital (UUTH) from June, 2020–May, 2021. Clinical and laboratory information were obtained from the patient case notes. Ethical clearance for the conduct of the study was obtained from the Ethics committee, UUTH, Uyo. Data was analysed with STATA version 13.

**RESULTS:** Thirty-three (37.9%) patients were COVID-19 PCR positive. The mean ± SD age of COVID-19 PCR positive patients was 57.3 ± 13.4 years with majority (69.7%) being above 50 years. There was a male preponderance (75%). Eleven (34.4%) patients died while 21(65.6%) were discharged. The highest co-morbidity associated with COVID-19 mortality was diabetes mellitus (7 out of 11; 63.6%). There was a poor uptake of supportive investigations for the management of COVID-19 patients. A raised body temperature (P=0.0006), a low $SPO_2$ (0.00004), high respiratory rate (0.0009) on admission and shorter duration of admission (0.0002), were associated with mortality.

**CONCLUSION:** The presence of co-morbidities, fever, low $SPO_2$ and high respiratory rates on admission are associated with increased mortality from COVID-19 disease. A paucity of supportive investigations was a major challenge to COVID-19 management. We therefore recommend the strengthening of our laboratory capacity. **WAJM 2022; 39(11): 1119–1126.**

**Keywords:** COVID-19, challenges, case management, Nigeria.

**RÉSUMÉ**

**CONTEXTE ET OBJECTIFS:** La maladie de coronavirus 2019 (COVID-19) est une pandémie mondiale. Les personnes âgées et celles qui présentent des comorbidités mal contrôlées ont un risque de mortalité plus élevé. Cette étude a été menée pour mettre en évidence les caractéristiques cliniques, les défis de la gestion et le résultat des patients que nous avons vus dans notre centre au cours de la dernière année.

**MÉTHODES:** Il s'agissait d'une étude transversale rétrospective impliquant tous les patients admis dans l'unité d'isolement COVID-19 de l'University of Uyo Teaching Hospital (UUTH) de juin 2020 à mai 2021. Les informations cliniques et de laboratoire ont été obtenues à partir des notes de cas des patients. L'autorisation éthique pour la réalisation de l'étude a été obtenue auprès du comité d'éthique de l'UUTH, Uyo. Les données ont été analysées avec STATA version 13.

**RÉSULTATS:** Trente-trois (37,9%) patients étaient positifs à la PCR COVID-19. L'âge moyen ± SD des patients positifs au COVID-19 PCR était de 57,3 ± 13,4 ans, la majorité (69,7%) ayant plus de 50 ans. Il y avait une prépondérance masculine (75 %). Onze (34,4 %) patients sont décédés et 21 (65,6 %) sont sortis de l'hôpital. La comorbidité la plus importante associée à la mortalité de COVID-19 était le diabète miletus (7 sur 11 : 63 : 6 %). Les investigations de soutien pour la gestion des patients COVID-19 ont été peu utilisées. Une température corporelle élevée (P=0,0006), une faible SPO2 (0,00004), une fréquence respiratoire élevée (0,0009) à l'admission et une durée d'admission plus courte (0,0002) étaient associées à la mortalité.

**CONCLUSION:** La présence de comorbidités, de fièvre, d'une faible SPO2 et d'une fréquence respiratoire élevée à l'admission est associée à une mortalité accrue de la maladie de COVID-19. Le manque d'investigations de soutien a été un défi majeur pour la gestion de la maladie COVID-19. Nous recommandons donc le renforcement de la capacité de nos laboratoires. **WAJM 2022; 39(11): 1119–1126.**

**Mots clés:** COVID-19, défis, gestion des cas, Nigeria.

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**Abbreviations: ARDS,** Acute Respiratory Distress Syndrome; **COVID-19,** Coronavirus disease 2019; **CT,** Computed Tomography; **ECG,** Electrocardiogram; **LAMA,** Left Against Medical Advice; **PCR,** Polymerase Chain Reaction; **SARS-CoV-2,** Severe Acute Respiratory Syndrome Coronavirus 2; **$SPO_2$,** Oxygen Saturation Monitoring; **UK,** United Kingdom; **UUTH,** University of Uyo Teaching Hospital; **WHO,** World Health Organisation.

## INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a global pandemic and individuals of all ages are at risk for infection and severe disease. However, the probability of mortality is highest in people aged ≥65 years and those living in a nursing home or long-term care facility. Others at highest risk for COVID-19 are people of any age with certain underlying conditions, especially when not well-controlled, including: hypertension, cardiovascular disease, diabetes mellitus, chronic respiratory diseases, cancer, renal disease, and obesity. Health care workers are also at increased risk.[1–5]

The incubation period for COVID-19 is up to 14 days from the time of exposure, with a median of four to five days.[2,6] The spectrum of illness can range from asymptomatic infection to severe pneumonia with acute respiratory distress syndrome (ARDS) and death. Patients may also present with multi-systemic and multi organ dysfunction like renal failure, cardiac failure, thrombo-embolic phenomena and gastrointestinal disturbances. In a summary of 72,314 persons with COVID-19 in China, 81% of cases were reported to be mild, 14% were severe, and 5% were critical.[7] Among 1,482 hospitalized patients with confirmed COVID-19 in the United States, the most common presenting symptoms were cough (86%), fever or chills (85%), and shortness of breath (80%), diarrhoea (27%), and nausea (24%).[5] Other reported symptoms have included, but are not limited to, sputum production, headache, dizziness, rhinorrhea, anosmia, dysgeusia, sore throat, abdominal pain, anorexia, and vomiting.

The common laboratory findings of COVID-19 include leukopenia and lymphopenia. In addition, elevations in aminotransferase levels, C-reactive protein, D-dimer, ferritin, and lactate dehydrogenase have been observed. Other investigations like electro-cardiogram (ECG), should be performed if indicated.[8]

Radiologically, chest X-ray abnormalities vary, but typically reveal bilateral multi-focal opacities. Abnormalities seen in computed tomography (CT) of the chest also vary, but typically reveal bilateral peripheral ground glass opacities with the development of areas of consolidation later in the clinical course.[9] However, imaging could be normal in early infection and abnormal even in asymptomatic patients.

The confirmation of COVID-19 could either be by using a molecular diagnostic (reverse transcriptase polymerase chain reaction [rtPCR]) or antigen test to detect severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). These investigations should be done in all persons with a syndrome consistent with COVID-19 and in people with known high-risk exposures to SARS-CoV-2. In addition, virologic testing should also be performed in people likely to be at repeated risk of exposure, such as health care workers and first responders. Nasopharyngeal swabs are the recommended specimen for diagnostics.[10]

The case management of COVID-19 is still evolving as most of the drugs used in its treatment are still undergoing clinical trials. There are however case management protocols from World Health Organisation (WHO), which has been adopted by the Nigerian Centre of Disease Control and stepped down to various health facilities in Nigeria.[11,12]

The management of COVID-19 is usually based on the severity of the disease. COVID-19 is classified into asymptomatic, mild, moderate, severe and critical disease.[8] Due to the inadequacy of bed spaces in the public hospitals and the need for psychologic support of patients, those with asymptomatic, and mild illness are usually isolated and managed at home. These group of patients are regularly checked on via daily phone calls, temperature measurements and oxygen saturation monitoring ($SPO_2$) using pulse oximeters.[13] Hospital admission are usually indicated for those with moderate, severe or critical disease and co-morbidities. The management of severe/critical COVID- 19 is largely supportive with oxygen administration, respiratory support, fluid and electrolyte management, treatment of sepsis and nutritional support playing a major role.[11,12] Medications recommended for the treatment of severe COVID-19 include remdesivir which is given to patients with $SPO_2$ <94% in room air for a duration of five days for non-intubated patients or 10 days for intubated patients. However, WHO has a conditional recommendation against the use of Remdesvir in the treatment of COVID-19 in hospitalised patient regardless of severity of disease because there has been no evidence of improved outcomes for mortality, need for mechanical ventilation, time to clinical improvement and other important patient outcomes with its use.[14]

Hydroxychloroquine and chloroquine use were only permitted to be used as part of clinical trials. In addition, azithromycin and hydroxychloroquine combination and lopinavir/ritonavir have all been recommended for use in clinical trial situations. The use of these medications is however, hampered by potential toxicities and unfavourable pharmacodynamics.[8] These toxicities and the unclear benefits in improved outcomes has resulted in a strong recommendation against the use of hydroxychloroquine and lopinavir/ritonavir in COVID-19 patients regardless of the severity. [14]

Patients with severe COVID-19 develop a systemic inflammatory response that can lead to lung injury and multisystem organ dysfunction. The use of corticosteroids with its potent anti-inflammatory effects might prevent or mitigate these events.[15,16] A large scale multicenter, randomized, open-label trial for hospitalized patients in the United Kingdom (UK) showed that patients who were randomized to receive dexamethasone had a reduced rate of mortality compared to those who received standard of care and this effect is seen more in those who needed supplemental oxygen or mechanical ventilation.[17] The United States' National Institute of Health therefore recommends using dexamethasone (at a dose of 6 mg per day for up to 10 days) in patients with COVID-19 who are mechanically ventilated and in patients with COVID-19 who require supplemental oxygen but who are not mechanically ventilated.[8]

University of Uyo Teaching Hospital (UUTH) is one of the tertiary institutions approved by the NCDC to operate isolation centres for the management of COVID-19 patients. In view of the paucity

of data from sub-Saharan Africa on the case management of COVID-19, we decided to look at the sociodemographic features, clinical features, management and outcome for the patients we have seen in our centre over the past one year. We hope that the data generated will add to the existing information and aid in the establishment and strengthening of existing policies that will help in our emergency preparedness for the handling of the present pandemic and future public health emergencies.

## SUBJECTS, MATERIALS AND METHODS

The University of Uyo Teaching Hospital is the only tertiary health institution in Akwa Ibom state. It has a 20 bed Isolation centre in which patient with COVID-19 are managed. There is a dedicated two bed ICU with ventilator and monitors within the Isolation centre for critically ill patients. There are two fulltime infectious diseases consultants that see to the day-to-day activities of the unit, in addition to at least two medical officers/resident doctors and 16 nurses. Other allied health workers include laboratory scientists, environmental health officers, cleaners, porters, pharmacist, morticians and an ambulance driver. In addition, there were consultant pulmonologist, paediatric pulmonologist, nephrologist, anaesthesiologist and mental health specialist who were involved in the management of the patients.

This was a retrospective cross-sectional study involving all patients admitted in the Isolation unit of UUTH from July 2020 to June 2021. Information obtained from the patient case notes were entered into a proforma. The information obtained included the sociodemographic characteristics of the patient: Age, gender, occupation, level of education, occupation of spouse, socioeconomic status and history of contact with household member with COVID. Information on the symptoms at presentation, physical examination findings, laboratory investigations including confirmation test for COVID-19 and co-morbidities, if any, were also documented. In addition, the interval between admission and resolution of symptoms, type of treatment administered, total duration of admission and outcome of the illness were documented.

Ethical clearance for the conduct of the study was obtained from the Ethics committee, UUTH, Uyo. The addresses, names, hospital number and other identifiers of the patients were omitted. The patients were identified by their unique serial number that was known to the investigators and data analyst.

### Definitions

#### *Suspect Case*[12]

A suspect case is defined as any person (including severely ill patients) presenting with fever, cough or difficulty in breathing AND who within 14 days before the onset of illness had any of the following exposures:

- History of travel to any country* with confirmed and ongoing community transmission of SARS-CoV-2 OR.
- Close contact with a confirmed case of COVID-19 OR.
- Exposure to a healthcare facility where COVID-19 case(s) have been reported.

#### *Confirmed Case*[12]

A person with laboratory confirmation of SARS-CoV-2 infection with or without signs and symptoms.

Clinical syndromes associated with COVID-19 were defined adapting the WHO classification as follows: [11]

1. Asymptomatic case: infection identified during screening or contact tracing without symptoms.
2. Mild case: fever and/or fatigue and/ or upper airways symptoms without radiological/ultrasound findings (if performed).
3. Moderate case: fever and/or fatigue and/or upper airways symptoms (cough or mild respiratory distress) and/ or poor feeding and/or pneumonia identified with chest X-ray or ultrasound.
4. Severe case: Fever and cough, plus at least one of the following:
   i. Oxygen saturation on finger pulse ($SpO_2$) < 92% on room air.
   ii. Severe respiratory distress (grunting, severe chest in-drawing), cyanosis, intermittent apnea.
   iii. Fast breathing (regardless of fever and crying): respiratory rate (RR) in breaths/minute > 60 < 3 months; > 50 3–12 months; > 40 1–5 years; > 30 > 5 years)
   iv. Systemic symptoms: drowsiness, lethargy, seizures, dehydration.
5. Critical case: i. Acute respiratory distress syndrome (ARDS), ii. Sepsis-associated organ dysfunction, iii. Septic shock, iv. Coma.

### Data Analysis

Data was analysed using STATA version 13. Categorical variables were summarized as frequencies and percentages while quantitative continuous data were summarized as mean and standard deviation. Association between categorical data was assessed with chi square test at a level of significance of $p<0.05$. Multiple logistics regression was done to assess the predictors of disease severity and mortality. Results were presented as tables, charts and graphs.

## RESULTS

A total of 100 patients were admitted based on the COVID clinical case definition in the isolation ward between June 2020 and May 2021. However only 87 case notes had complete documentation and were included in the final analysis. The mean ± SD age of patients seen in the isolation ward was 54.9±15 years with majority of them (63.2%) being above 50 years. There was a female preponderance (69%). (Table 1). There was no statistically significant difference in age ($p=0.273$), gender ($p=0.533$), marital status ($p=0.833$) and occupation ($p=0.583$) between those who had PCR testing and those who did not. A total of 43 out of 87 patients (49.47%) were tested for the disease.

The mean ± SD age of those tested was 55.2±15 years, with majority (67.4%) being above 50 years. Thirty-three (76.7%) of those tested were COVID-19 PCR positive. Ten (23.3%) out of the forty- three tested were COVID-19 PCR negative. Thirty-one (72.1%) of those tested were males but there was no

**Table 1: Sociodemographic Characteristics of the suspected COVID-19 cases and access to PCR Testing**

| Variables | PCR n (%) | | Total (n=87) | Statistical Indices |
|---|---|---|---|---|
| | Tested (n=43) | Not tested (n=44) | | |
| **Age (years)** | | | | |
| 20 – 40 | 8 (18.6) | 6 (13.6) | 14 (16.1) | Df=3 |
| 1 – 50 | 6 (14.0) | 12 (27.3) | 18 (20.7) | $\chi^2$=3.8938 |
| 51 – 60 | 17 (39.5) | 11 (25.0) | 28 (32.2) | P value=0.273 |
| Above 60 | 12 (27.9) | 15 (34.1) | 27 (31.0) | |
| | | | | Df=85 |
| Mean (SD) | 55.2 (15.3) | 54.5 (14.9) | 54.9 (15.0) | Tt=0.2050 |
| | | | | P value=0.838 |
| **Marital Status** | | | | |
| Single | 6 (14.0) | 5 (11.4) | 11 (12.6) | Df=2 |
| Married | 31 (72.1) | 31 (70.5) | 62 (71.3) | $\chi^2$=3.8938 |
| Widowed | 6 (14.0) | 8 (18.2) | 14 (16.1) | P value=0.833 |
| **Gender** | | | | |
| Male | 12 (27.9) | 15 (34.1) | 27 (31.0) | Df=1 |
| Female | 31 (72.1) | 29 (65.9) | 60 (69.0) | $\chi^2$=3.8938 |
| | | | | P value=0.533 |
| **Occupation** | | | | |
| Civil Servant | 9 (21.4) | 5 (11.4) | 14 (16.1) | Df=4 |
| Trading | 11 (26.2) | 10 (22.7) | 21 (24.1) | P value=0.583 |
| Retiree | 7 (16.7) | 7 (15.9) | 14 (16.1) | |
| Others | 14 (33.3) | 19 (42.1) | 33 (37.9) | |
| *Not indicated | 1 (2.4) | 4 (6.8) | 5 (5.8) | |

**Lawyer, doctors, police, teachers.*

**Table 2: Socio demographic Characteristics of suspected COVID -19 Patients who had PCR Testing in UUTH Isolation Center**

| Variables | Sex n(%) | | Total (%) (n=43) | Statistical Indices |
|---|---|---|---|---|
| | Male (n=31) | Female (n=12) | | |
| **Age (years)** | | | | |
| 20 – 40 | 6 (19.4) | 2 (16.7) | 8 (18.6) | Df=3 |
| 41 – 50 | 5 (16.1) | 1 (8.3) | 6 (14.0) | P value= 0.128 |
| 51 – 60 | 9 (29.0) | 8 (66.7) | 17 (39.5) | |
| Above 60 | 11 (35.5) | 1 (8.3) | 12 (27.9) | |
| Mean (SD) | 56.7 (16.7) | 51.3 (10.7) | 55.2 (15.3) | |
| **Marital Status** | | | | |
| Single | 5 (16.1) | 1 (8.3) | 6 (14.0) | Df=2 |
| Married | 24 (77.4) | 7 (22.6) | 31 (72.1) | 0.093 |
| Widowed | 2 (6.5) | 4 (33.3) | 6 (14.0) | |
| **PCR Testing** | | | | |
| Negative | 6 (19.3) | 4 (33.3) | 10 (23.3) | Df=1 |
| Positive | 25 (80.7) | 8 (66.7) | 33 (76.7) | P value=0.427 |
| **Occupation** | | | | |
| Civil Servant | 4 (12.5) | 5 (41.7) | 9 (20.5) | Df=4 |
| Retiree | 5 (15.6) | 2 (16.7) | 7 (15.9) | P value=0.055 |
| Trading | 7 (21.9) | 4 (33.3) | 11 (25.0) | |
| Others | 15 (46.9) | 1 (8.3) | 16 (36.4) | |
| Not indicated | 1 (3.1) | 0 (0.0) | 1 (2.3) | |

statistically significant difference in the PCR result (p=0.427) between the males and females. (Table 2).

Forty-one (47.1%) patients admitted in the UUTH COVID-19 isolation center died, while 31 (35.6%) were discharged. Eleven (12.6%) suspected cases were either transferred to other wards or left against medical advice (LAMA). Figure 1. Of the 33 patients that were COVID-19 PCR positive, 11 (33.3%) died while 21(66.7%) were discharged.

The mean ± SD age of COVID-19 PCR positive patients was 57.3 ± 13.4 years with majority of them (69.7%) being above 50 years. There was a male preponderance (75%). There was no statistically significant age (p=0.644) and gender difference (p=0.209) between the PCR positive COVID-19 patients who died and those who were discharged.

Nine (27.27%) COVID-19 positive patients had no co-morbidity. Of the 11 COVID-19 positive patients who died, three (27.3) had no co-morbidity. The highest co-morbidity associated with COVID-19 mortality was diabetes milletus (7 out of 11; 63.6%), followed by hypertension (27.3%: 3 out of 11). All the HIV patients with COVID-19 positive PCR died (2 out of 11; 18.2%) (Table 3).

The number of supportive investigations done for patients who were COVID-19 PCR positive was generally low (Table 4).

The peak incidence of admission in our centre was in February 2021. (Figure 2).

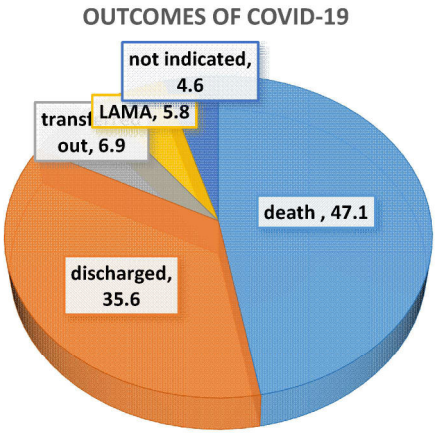


**Fig. 1: Outcome of all suspected COVID-19 Patients in UUTH Isolation Centre.**

**Table 3: Comorbidities and Death among 33 Patients with PCR Positive COVID-19 in UUTH, Uyo**

| *Comorbidities | Frequency (%) n=33 | No. of Death (%) n=11 |
|---|---|---|
| Hypertension | 13 (39.4) | 3 (27.3) |
| Diabetes | 15 (45.5) | 7 (63.6) |
| HIV | 2 (6.1) | 2 (18.2) |
| **Others | 8 (24.2) | 4 (36.4) |
| No co-morbidity | 9 (27.3) | 3 (27.3) |

**Some patients had more than one co-morbidity.*
*** Others include, COPD, Asthma, tuberculosis, Peptic Ulcer disease, Chronic Liver disease, Chronic kidney disease and hypertensive heart disease.*

**Table 4: Supportive Investigations done among Patients with PCR Positive COVID-19 in UUTH, Uyo**

| Investigations | Done (%) | Not Done(%) | Investigation Done Mean(SD) |
|---|---|---|---|
| Urinalysis | 4(12.1) | 29 (87.9) | |
| Blood culture | 0 (0.0) | 33 (100) | |
| Liver function test | 2(6.1) | 31 (93.9) | |
| Electrolyte and urea | 12 (36.4) | 21 (63.6) | Na 134.5 (5.1)<br>Cl 99.7 (5.5)<br>K 3.8 (0.5)<br>HCO3 21.1 (3.3)<br>Urea 28.4 |
| TWBC | 10 (30.30) | 23 (69.90) | 6.82 (1.8) |
| Neutrophil | 10 (30.30) | 23 (69.90) | 65.80 (14.8) |
| Lymphocyte | 10 (30.30) | 23 (69.90) | 26.90 (14.2) |
| Monocyte | 10 (30.30) | 23 (69.90) | 5.69 (1.2) |
| Eosinophil | 10 (30.30) | 23 (69.90) | |
| Pack cell Volume (%) | 14 (42.42) | 19 (57.58) | 37.60 (5.6) |

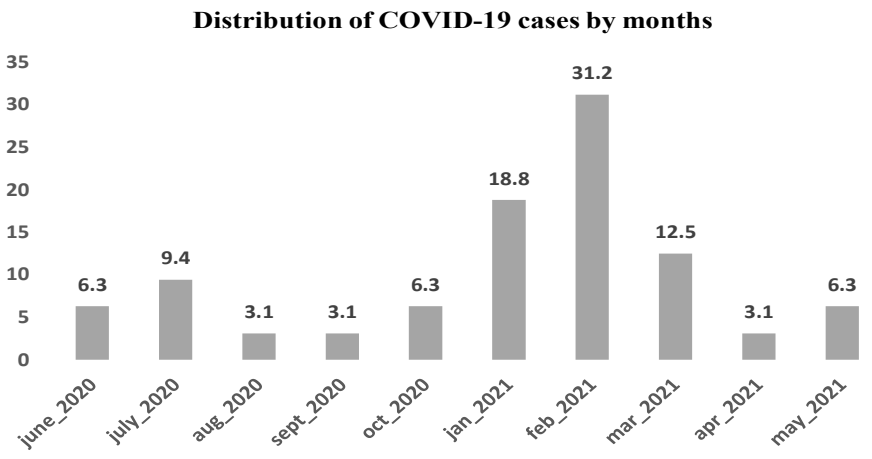


**Fig. 2: Monthly Distribution of Cases Admitted into the Isolation Ward.**

A raised body temperature on admission (P=0.0006), shorter duration of admission (0.0002), a low SPO2 (0.00004) and a high respiratory rate on admission (0.0009) were associated with mortality among patients who were COVID-19 positive. In addition, the use of lopinavir/ritonavir (p=0.008) was also associated with reduced mortality in COVID-19 positive patients (Table 5).

A higher number of COVID-19 positive patients who were treated with azithromycin and ivermectin were discharged compared to those who were not treated with these medications but it was not statistically significant. (Table 6).

## DISCUSSION

Our study has shown that majority of patients admitted in our isolation unit were 50 years and above. This is not surprising as various studies have shown that older people are at higher risk of COVID-19 disease.[1–5,18] The mean age of COVID-19 PCR positive patients in our facility was 57 years old. This is slightly higher than the 52 years seen in an American study[19] and lower than the 73 years seen among UK patients.[18] These age differences may not be unconnected to the differences in life expectancy seen in the different countries, Nigeria has a lower life expectancy and tends to have a younger population, while the UK with an average life expectancy of 81 years has a lot of older population.[20]

There was a male preponderance (75%) among the COVID-19 PCR positive patients. Our results is in keeping with several other studies that have observed a male preponderance among hospitalised COVID-19 patients.[18–19,21] The likely reason for the male preponderance is largely unknown, but likely multifactoral. Some of the reasons adduced include gender differences in the immune system, genetic polymorphism, personal hygiene habits, lifestyle factors including smoking, pre-existing co-morbidities and expression of the angiotensin-converting enzyme 2 (ACE2). [22]

Our results showed that only two hospitalised COVID-19 patients were health workers. This finding is different from other studies that reported a preponderance of COVID-19 among health care workers.[23,24] A likely reason for this is the possibility that most health workers in our facility had mild disease and so were not hospitalised. In addition, the increased awareness of the transmission and preventive process with the attendant use of personal protective equipment and the maintenance of good hand hygiene would have resulted in reduced infections among health workers.[25]

**Table 5: Symptoms and other Clinical Parameters associated with Outcome among PCR Positive COVID-19 Patient seen in UUTH, Uyo**

| Variables | Death (n=11) | Discharged (n=21) | Statistical indices |
|---|---|---|---|
| **Fever** | | | |
| No | 3 (25.0) | 9 (75.0) | Df=1 |
| Yes | 8 (40.0) | 12 (60.0) | $\chi^2$=2.3293 |
| | | | P value=0.387 |
| **Cough** | | | |
| No | 2 (33.3) | 4 (66.7) | Df=1 |
| Yes | 9 (34.6) | 17 (65.4) | P value=1.000 |
| **Difficulty in Breathing** | | | |
| No | 3 (25.0) | 9 (75.0) | Df=1 |
| Yes | 8 (40.0) | 12 (60.0) | P value=0.319 |
| **Sore Throat** | | | |
| No | 11 (37.9) | 18 (62.1) | Df=1 |
| Yes | 0 (0.0) | 3 (100.0) | P value=0.268 |
| **Anosmia** | | | |
| No | 10 (35.7) | 18 (64.3) | Df=1 |
| Yes | 1 (25.0) | 3 (75.0) | P value= 1.000 |
| **Aguesia** | | | |
| No | 10 (38.5) | 16 (61.5) | Df=1 |
| Yes | 1 (16.7) | 5 (83.3) | P value=0.637 |
| **Chest Pain** | | | |
| No | 9 (32.1) | 19 (67.9) | Df=1 |
| Yes | 2 (50.0) | 2 (50.0) | P value=0.593 |
| **General Body Weakness** | | | |
| No | 8 (40.0) | 12 (60.0) | Df=1 |
| Yes | 3 (25.0) | 9 (75.0) | P value=0.465 |
| **Diarrhea** | | | |
| No | 11 (35.5) | 20 (64.5) | Df=1 |
| Yes | 0 (0.0) | 1 (100.0) | P value=1.000 |
| **Vomiting** | | | |
| No | 11 (35.5) | 20 (64.5) | Df=1 |
| Yes | 0 (0.0) | 1 (1.000) | P value= 1.000 |
| **Comorbidity** | | | |
| None | 3 (33.3) | 6 (66.7) | Df=1 |
| Yes | 8 (34.8) | 15 (65.2) | P value=1.000 |
| **Oxygen Therapy** | | | |
| No | 0 (0.0) | 7 (100.0) | Df=1 |
| Yes | 11 (44.0) | 14 (56.0) | P value=0.066 |
| **Body Temperature on Admission** | | | |
| Mean (SD) | 37.4 (1.0) | 36.5 (0.5) | Df=31 |
| | | | tt=3.8359 |
| | | | P value= 0.006+ |
| **Diastolic Blood Pressure (mmHg)** | | | |
| Mean (SD) | 80 (10.3) | 87.5 (25.7) | Df=28 |
| | | | T-test = –0.4353 |
| | | | P value=0.6647 |
| **Systolic blood pressure (mmHg)** | | | |
| Mean (SD) | 127.6 (17.1) | 146.0 (48.8) | Df=28 |
| | | | Ttest = –1.0809 |
| | | | P value= 0.2812 |
| **Days Spent on Admission (Days)** | | | |
| Median (IQR) | 2 (4–1) | 13.5 (17.5–5) | Z = –3.759 |
| | | | P value<0.0002+ |

There was a poor uptake of supportive investigations needed for the management of COVID-19 patients. Some of the reasons that may have accounted for this were poverty – as all investigations are done as out of pocket expenses. In addition, the absence of biosafety cabinets in our laboratory to process hazardous and highly infectious samples led to a reluctance among our laboratory staff to perform these investigations.

Of the 33 patients that were COVID-19 PCR positive, 11 (33.3%) died while 21(66.7%) were discharged. Our finding is similar to that in US where 69.5% of patients were discharged and higher than the 41% of UK patients. The differences in our results are likely due to differences in patient characteristic, sample size, severity of illness and study protocol.

Nine (27.3%) of our patients who were COVID-19 PCR positive had no co-morbidities. The commonest co-morbidities among our patients were Diabetes mellitus (45.5%%) and Hypertension (39.4%). However, Diabetes mellitus (63.6%), Hypertension (27.3%) and HIV-infection (18.2%), were the co-morbidities with the highest association with mortality. A UK study reported that 23% of their patients had no major co-morbidities and the commonest co-morbidities were chronic cardiac disease (31%), uncomplicated diabetes (21%), and non-asthmatic chronic pulmonary disease (18%).[18] In our study, increasing age was not a significant factor in outcome. This is in contrast to a US study that observed that increasing age in addition to co-morbidities was risk factor for mortality.[19] The differences observed in these studies is probably related to the differences in sample sizes, disease patterns, access to care and treatment options.

The peak incidence of COVID-19 admissions in our facility was in February 2021 which coincided with the second wave of the infection in Nigeria.

The clinical features significantly associated with COVID-19 mortality among our patients were fever, low SPO2 and high respiratory rate on admission. In a US study, admission oxygen saturation <88% with high values of some acute phase reactants were the strongest

**Table 5 (contd.): Symptoms and other Clinical Parameters associated with Outcome among PCR Positive COVID-19 Patient seen in UUTH, Uyo**

| Variables | Death (n=11) | Discharged (n=21) | Statistical indices |
|---|---|---|---|
| **SPO2** | | | |
| Median (IQR) | 73 (87–58) | 92 (96–83) | Z = –3.324<br>P value=0.0004+ |
| **Respiratory Rate on Admission** | | | |
| Median (IQR) | 40 (46–34) | 30 (36–28) | Z = 3.325<br>P value=0.0009+ |

**Table 6: Types of Medications and Outcome of Illness among COVID-19 Patients with PCR Positive Result**

| Medications | Death (n=11) | Discharge (n=21) | Total (n=32) | Statistical Indices |
|---|---|---|---|---|
| **Azithromycin** | | | | |
| Yes | 6 (28.6) | 15 (71.4) | 2111 | Df=1 |
| No | 5 (45.5) | 6 (54.6) | | $\chi^2$=0.9121<br>P value=0.340 |
| **Ceftriazone** | | | | |
| Yes | 5 (71.4) | 19 (76.0) | 248 | Df=1 |
| No | 6 (24.0) | 2 (28.6) | | P value=0.032 |
| **Amoxicillin/Clavulanate** | | | | |
| Yes | 8 (40.0) | 12 (60.0) | 2012 | Df=1 |
| No | 3 (25.0) | 9 (75.0) | | P value=0.465 |
| **Metronidazole** | | | | |
| Yes | 6 (66.7) | 3 (33.3) | 923 | Df=1 |
| No | 5 (21.7) | 18 (78.3) | | P value=0.016 |
| **Quinolone** | | | | |
| Yes | 3 (75.0) | 1 (25.0) | 428 | Df=1 |
| No | 8 (28.6) | 20 (71.4) | | P value= 0.106 |
| **Ivermectin** | | | | |
| Yes | 4 (36.4) | 14 (63.6) | 1814 | Df=1 |
| No | 7 (33.3) | 7 (66.7) | | P value=1.000 |
| **Dexamethasone** | | | | |
| Yes | 6 (42.2) | 8 (57.1) | 1418 | Df=1 |
| No | 5 (27.8) | 13 (72.2) | | P value =0.373 |
| **Enoxaparin** | | | | |
| Yes | 1 (25.0) | 3 (75.0) | 428 | Df=1 |
| No | 10 (35.7) | 18 (64.3) | | P value=1.000 |

risk for critical illness and mortality.[19] In addition, a short duration of admission and not taking of lopinavir/ritonavir was also associated with mortality. Our observations were in contrast with the RECOVERY study that showed that lopinavir-ritonavir was not associated with reduction in 28day mortality, duration of hospital stay or risk of progressing to invasive mechanical ventilation or death. There is need for larger randomized studies in the African population to corroborate this finding.[26] Our observation of a shorter duration of hospital stay for patients who died could be explained by late presentation in hospital and very severe illness coupled with limited capacity for mechanical ventilation.

Our study observed that more patients who were treated with Ivermectin were discharged compared to those who were not, though the association was not significant. This result corroborates a randomised control trial done in Lagos that showed the efficacy of Ivermectin in reducing the days to COVID negativity, increasing $SPO_2$ and increasing platelet count in hospitalised patients with mild or moderate COVID-19 disease.[27] Some of the mechanisms through which ivermectin inhibits SARS COV-2 in COVID-19 patients include inhibition of RNA dependent RNA polymerase required for viral replication and inhibition of viral mRNA and viral protein translation.[28]

## CONCLUSION

In conclusion, our study provides support for the observations that, older age greater than 50 years, male gender and the co-morbidities – diabetes mellitus and hypertension are risk factors for COVID-19 PCR positivity in southern Nigeria. In addition, the presence of co-morbidities, fever, low $SPO_2$ and high respiratory rates on admission are associated with increased mortality from COVID-19 disease. Furthermore, one major challenge faced in managing our patients was the low up-take of supportive investigations for the management of COVID-19 PCR positive patients. We therefore recommend the strengthening of our laboratory capacity and the provision of biosafety cabinets for the processing of highly infectious samples not only for COVID-19 but also for other emerging and re-emerging infections.

## REFERENCES

1. Wu C, Chen X, Cai Y, Xia J, Zhiu X, Xu S, *et al*. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med.* 2020; **180:** 934–943. Doi: 10.1001/jamainternmed. 2020.0994.
2. Guan WJ, Ni ZY, Hu Y,Liang WH, *et al.* Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med.* 2020; **382:** 1708–1720.
3. Cai Q, Chen F, Wang T, Luo F, Liu X, Wu Q *et al*. Obesity and COVID-19 severity in a designated hospital in Shenzhen, China. Diabetes care. 2020; **43:** 1392–1398. Doi 10.2337/dc20-0576.
4. Centers for Disease Control and Prevention. Coronavirus disease 2019 (COVID-19): People who are at higher

risk for severe illness. 2020. Available at: https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html. Accessed April 8, 2020.
5. Garg S, Kim L, Whitaker M, O'Hallaran A, Cummings C, Holstein R, *et al*. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019 - COVID-NET, 14 states, March 1-30, 2020. MMWR Morb Mortal Wkly Rep. 2020; **69:** 458–464. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32298251.
6. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, *et al*. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med. 2020;382(13):1199-1207
7. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72,314 cases From the Chinese Center for Disease Control and Prevention. *JAMA*. 2020. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32091533.
8. COVID-19 Treatment Guidelines Panel. Coronavirus Disease 2019 (COVID-19) Treatment Guidelines. National Institutes of Health. Available at https://www.covid19treatmentguidelines.nih.gov/. Accessed [14/7/2020].
9. Shi H, Han X, Jiang N, Cao Y, Alwalid O, Gu J, *et al*. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. *Lancet Infect Dis.* 2020; **20:** 425–434.
10. Centers for Disease Control and Prevention. Interim guidelines for collecting, handling, and testing clinical specimens from persons for coronavirus disease 2019 (COVID-19). 2020. Available at: https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html.
11. World Health Organization. Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected: Interim Guidance 13 March 2020. https://www.who.int/publications-detail/clinicalmanagement-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected. Accessed 26 Jun 2020.
12. Nigeria Centre for Disease Control. National Interim Guidelines for Clinical Management of COVID-19. version 3, June 2020.
13. World Health Organization, 'Interim Guidance: Home care for Patients with COVID-19 Presenting with Mild Symptoms and Management of their Contacts. WHO reference number: WHO/nCov/IPC/HomeCare/2020.3,' WHO, 2020.
14. Rochwerg B, Agarwal A, Siemienuik RAC, Agoritsas T, Lamongtagne F, Askie L, *et al.* Rapid recommendations. A living WHO guideline on drugs for COVID-19. (Update 4) BMJ 2020; 370: m3379. http://dx.doi.org/10.1136/bmj.m3379. (Accessed 15/8/2021)
15. Yang Z, Liu J, Zhou Y, Zhao X, Zhao Q, Liu J. The effect of corticosteroid treatment on patients with coronavirus infection: a systematic review and meta-analysis. *J Infect.* 2020; **81:** e13–e20. Available at https://www.ncbi.nlm.nih.gov/pubmed/32283144.
16. Horby P, Shen Lim W, Emberson J, *et al*. Effect of dexamethasone in hospitalized patients with COVID-19: preliminary report. medRxiv. 2020; [Preprint]. Available at: https://www.medrxiv.org/content/10.1101/2020.06.22.20137273v1.
17. Randomised Evaluation of COVID-19 Therapy (RECOVERY). Low-cost dexamethasone reduces death by up to one third in hospitalised patients with severe respiratory complications of COVID-19. 2020. Available at: https://www.recoverytrial.net/news/low-cost-dexamethasone-reduces-death-by-up-to-one-third-inhospitalised- patients-with-severe-respiratory-complications-of-covid-19. Accessed June 23, 2020.
18. Docherty AB, Harrison EM, Green CA, Hardwick H, Pius R, Norman L, *et al.* Features of 20133 hospitalised patients with COVID19 using the ISARIC WHO clinical characterisation protocol: prospective observational cohort study. BMJ 2020; 369: m1985. Doi:10.1136/bmj.m1985. (accessed 9th December 2021).
19. Petrilli CM, Jone SA, Yang J, Rajagopalan H, O'Donnell L, Chernyak Y, *et al*. Factors associated with hospital admission and critical illness among 5279 people with coronavirus disease 2019 in New York City: prospective cohort study. *BMJ.* 2020; **369:** m1966. Doi: 10.1136/bmj.m1966 (accessed 9th December 2021).
20. World health statistics 2019. Monitoring health for the SDGs Sustinable Development goals. Geneva. World Health Organization. 2019.
21. Vahey GM, McDonald E, Marshall K, Martin SW, Chun H, Herlihy R, *et al*. Risk factors for hospitalization among persons with COVID-19 – Colorado. PLoS ONE 2021; **16:** 9: e0256917. https://doi.org/10.1371/journal.pone.0256917.
22. Jutzelar CR, Bourguignon L, Weis CV, Tong B, Wong C, Rieck B, *et al*. Comorbidities, clinical signs and symptoms, laboratory findings, imaging features, treatment strategies and outcomes in adult and paediatric patients with COVID-19. A systematic review and meta-analysis. *Travel Med Infect Dis.* 2020; **37:** 101825. https://doi.org/10.1016/j.tmaid.2020.101825.
23. Nguyen LH, Drew DA, Graham MS, Joshi Ad, Guo C-G, Ma W, *et al.* Risk of COVID-19 among frontline healthcare workers and the general community: a prospective cohort study. *Lancet Public Health.* 2020. https://doi.org/10.1016/S2468-2667 (20) 30164-X.
24. Black JRM, Bailey C, Przewrocka J, Dijkstra KK. COVID-19: The case for healthworker screening to prevent hospital transmission. *Lancet.* 2020; **395:** 1418.
25. Oloyede IP, Ekanem AM, David U, Bassey B. Knowledge, awareness and perception of health care workers towards COVID-19 in Southern Nigeria. *Ibom Med J.* 2021; **14:** 479–488.
26. Horby W, Mafham M, Bell JL, Linfell L, Staplin N, Emberson JR *et al*. Lopinavir-ritonavir in patients admitted to hospital with COVID-19 (RECOVERY): a randomised controlled open-label platform trial. *Lancet.* 2020; **396:** 1345–1352.
27. Babalola OE, Bode CO, Ajayi AA, Alakaloko FM, Akase IE, Otrofanowei E, *et al*. Ivermectin shows clinical benefits in mild to moderate COVID 19; A randomised control double blind dose response study in Lagos. *QJM.* 2021; **18:** hcab035. Doi:10.1093/gjmed/hcab035.
28. Parvez MSA, Karim MA. Hasan MN, Jaman J, Karim Z, Tahsin T, *et al*. prediction of potential inhibitors for RNA polymerase of SARS-CoV-2 using comprehensive drug repurposing and molecular docking approach. *IntJ Biol Macromol.* 2020; **163:** 1787–1797. Doi: 10.1016/j.ijbiomac.2020.09.098.