


COVID-19 and Comorbidities: Experience of the Epidemic Treatment Center of the Abass Ndao Hospital Center

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Abstract

Introduction: Coronavirus disease 2019 (COVID-19) is an infectious disease caused by SARS-CoV-2. It has rapidly spread worldwide, causing a pandemic since March 11, 2020. Elderly patients or those with underlying chronic illnesses are more likely to develop severe forms of COVID-19. This motivated us to conduct this study. **Materials and Methods:** This was a retrospective, descriptive, and analytical study conducted at the CTE of the Abass Ndao Hospital Center in Dakar. We used an existing database populated with patient records and consultation logs. Data analysis was performed using SPSS (Statistical Package for Social Sciences) version 18 software. **Results:** A total of 340 patients hospitalized for COVID-19 included 234, or 68.8%, with comorbidities. The sex ratio was 0.7 and the mean age was 60.6 years. The most frequent comorbidities were endocrine (82.5%), cardiovascular (46.2%), and renal (12%). The main clinical signs were asthenia (90.2%), dyspnea (77.4%), cough (65.4%), body aches (53%), fever (47%), headache (37.2%), anorexia (35%), myalgia (29.5%), and chest pain (27.8%). The RT-PCR test was positive in 86.3% of cases. The D-dimer level was ≥ 1000 ng/ml (54.3%), while the C-reactive protein level ≥ 100 mg/l (32.5%). Chest CT scans (96.05%) revealed severe (8.1%) and critical (15.4%) lung lesions. Pulmonary embolism was found in 4 patients. Anti-COVID-19 treatment was dominated by antibiotics (99.6%), corticosteroid therapy (91.5%), anticoagulants (98.7%), and hydroxychloroquine (21.29%). The presence of comorbidities and age > 60 years were linked to disease severity. Mortality of 14.1% was associated with the presence of comor-

bidities ($p = 0.024$). **Conclusion:** Our results show a high frequency of comorbidities in the field of COVID-19 in more than half (68.8%) of the people hospitalized in Abasse Ndao. These associated with advanced age also was significantly associated with disease severity and a case fatality rate of 14.1%, hence the need for special attention to these specific groups.

Keywords

COVID-19, Comorbidities, Lethality, Senegal

1. Introduction

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by a virus of the Coronaviridae family, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1].

This emerging disease is a zoonosis whose causative virus was first reported in Wuhan City, Hubei Province, China, in December 2019. It spread rapidly, first throughout China and then worldwide, causing a pandemic since its announcement by the World Health Organization (WHO) on March 11, 2020 [2]. SARS-CoV-2 is a name of the Coronavirus Study Group of the International Committee on Taxonomy of Viruses.

Available epidemiological data show that elderly patients and those with chronic diseases, such as diabetes, hypertension, coronary artery disease, cerebrovascular disease, renal failure, and chronic obstructive pulmonary disease (COPD), are at greater risk of developing a severe form of COVID-19. Published prognostic studies identify age, male gender, and the presence of comorbidities, particularly diabetes, severe obesity, cardiovascular disease, and chronic lung disease, as factors for COVID-19-related mortality. These predictive factors could help clinicians identify patients with a poor prognosis at an early stage, thereby reducing COVID-19-related mortality and streamlining the use of limited medical resources [3].

Currently available studies suggest a high prevalence of hypertension in patients hospitalized for COVID-19, regardless of the geographic focus of the epidemic [4]-[6], ranging from 15 to over 50% in the literature. More generally, hypertension is the most frequently found comorbidity in lower respiratory infections, viral or bacterial, affecting up to 36% of this patient population [7]. If the characteristic of fatal forms of COVID-19 is acute respiratory distress syndrome (ARDS) [8], there is a close relationship between COVID-19 and myocardial damage attested by the frequency of cardiac complications encountered in practice: atherothrombotic acute coronary syndrome, heart failure [9] and ventricular arrhythmias [10]. Acute myocardial injury induced by SARS-CoV-2, defined by troponin elevation above the 99th percentile of the upper limit of normal, has been reported in 20% to 28% of patients hospitalized for COVID-19 [10] [11]. It is rather the high prevalence of hypertension in elderly subjects, in coronary patients

and in heart failure patients that explains the over-representation of hypertension in patients with severe or lethal forms of COVID-19 rather than a direct causal link between hypertension and COVID-19. However, hypertension, as the primary reversible risk factor for cardiovascular morbidity and mortality (associated with approximately 40% of ischemic heart disease and ischemic stroke) [12], contributes to the development of cardiovascular disease and acute myocardial injury, favoring severe and fatal forms of COVID-19.

Diabetic patients are at increased risk of developing certain types of infection (bacterial or viral) [13]. During the Middle East Respiratory Syndrome-related Coronavirus (MERS-CoV) pandemic, diabetes emerged as a major risk factor for mortality [14] [15]. Therefore, diabetes was quickly and unsurprisingly identified as one of the most prevalent comorbidities among patients hospitalized following COVID-19. From the beginning of the epidemic, scientific data indicated that in 25% of cases of death linked to COVID-19, there was a history of diabetes [16]-[18]. A recent meta-analysis clearly demonstrated that diabetes is associated with a risk greater than 2 of admission to an intensive care unit (ICU) and greater than 3 of death [19]. Diabetes essentially appears to be a prognostic factor for the severe form of the disease [20]-[22]. In intensive care units, the prevalence reached 36%.

This renal involvement is associated with the occurrence of major complications, including respiratory failure, the need for invasive mechanical ventilation and death, independently of comorbidities and other risk factors [23] [24]. Proximal tubular dysfunction is very common in patients with COVID-19, causing low molecular weight proteinuria (beta-2-microglobulinuria), aminoaciduria, hypophosphatemia and hypouricemia in a good number of cases. These abnormalities, exceptional in the general population, are specific to COVID-19 and are associated with an unfavorable prognosis. It is therefore highly likely that kidney damage by coronavirus can help with early diagnosis and is a reliable marker of the severity of COVID-19.

Several studies indicate that asthmatics are at increased risk of viral infections [25].

As of January 31, 2023, it was estimated that 671 million people had been infected with the SARS-CoV-2 virus and that COVID-19 had caused the death of 6.71 million people worldwide. As of the same date, Senegal recorded 88,906 positive cases following four waves, including 86,937 recoveries and 1968 deaths, according to press release 1065 from the Ministry of Health and Social Action. Senegal has certainly gained some experience in combating infectious diseases, but COVID-19 has taken the world by surprise. Vaccines were urgently produced to better prevent the disease, but healthcare providers are encountering public reluctance in their implementation, among other things. Treatment centers for epidemic management have been opened in Dakar, Dalal Diam, Abass Ndao, in some local hotels, and at the Hangar des pèlerins.

The main objective of our work was to study the associated comorbidities in patients infected with SARS-CoV-2 and monitored at the Epidemic Treatment

Center (ETC) of the Abass Ndao Hospital Center in Dakar ETC and to identify risk factors for death in these patients. Specifically, our objectives were to:

- describe the epidemiological characteristics of patients infected with SARS-CoV-2 suffering from comorbidities;
- study the clinical and paraclinical aspects of patients infected with SARS-CoV-2 with comorbidities;
- study comorbidities;
- determine factors associated with death.

2. Study Setting

The study is being conducted at the CTE of the Abass Ndao Hospital Center in Dakar. The Medical Clinic II of the Abass Ndao University Hospital Center in Dakar (Senegal) includes the Marc Sankalé Diabetes Center, the Internal Medicine Department, and the Outpatient and Monitoring Unit for Internal Medicine and Endocrine Pathologies. It is a university hospital department staffed by medical and paramedical staff. The Epidemic Treatment Center was established in March 2021 and officially recognized by the Ministry of Health and Social Action on July 17, 2021. It is housed in a section of the Internal Medicine Department, specifically in Wing A. Patients are hospitalized at any time depending on bed availability. A national coordination system provides information on available places in each CTE.

3. Method

3.1. Type and Period of Study

This was an observational, retrospective, descriptive, and analytical study conducted at the Epidemic Treatment Center of Abass Ndao Hospital from March 1 to September 31, 2021 (7 months).

3.2. Study Population

This study consisted of patients with comorbidities and a strong suspicion or confirmation of SARS-CoV-2 infection and hospitalized at the CTE of Abass Ndao Hospital in Dakar.

Patients with incomplete records despite a confirmed COVID-19 diagnosis were not included. Data sources: consultation register, patient records, existing database

3.3. Parameters Studied

The database includes sociodemographic aspects, namely age, sex, and occupation; medical history: the concept of contagion, history of tuberculosis, alcohol or tobacco poisoning, exposure to chemicals; comorbidities: HIV status, hypertension, diabetes, asthma, etc.; reasons for consultation time elapsed between the onset of symptoms and hospitalization (time to hospitalization); clinical aspects; paraclinical aspects.

3.4. Statistical Analysis

Data were entered using Microsoft Excel 2019 software. The descriptive study was conducted by calculating frequencies and proportions for qualitative variables and means and standard deviations for quantitative variables. Data analysis was performed using SPSS (Statistical Package for Social Sciences) version 18.

Comparisons were made using the student t test, the chi-square test, the Mann-Whitney test, and the Fisher exact test, according to their applicable conditions. For all these tests, the significance threshold (p) was set at $p < 0.05$.

4. Ethical Considerations

Prior authorization from the head physician of the emergency department and coordinator of the Abasse Ndao ETC allowed us to conduct this survey. Anonymity and confidentiality were respected during this period. Data were collected anonymously and kept confidential.

5. Results

5.1. Descriptives Aspects

During the study period, 340 patients were hospitalized at the ETC for COVID-19. Among them, 234 had comorbidities, representing a frequency of 69%. The mean age of patients was 60.6 ± 12 years, with a range from 30 to 91 years. The 50 - 59 and 60 - 69 age groups were the most represented, with 29.5% ($n = 69$) and 28.6% ($n = 67$) respectively. Women represented the majority, 57.7% ($n = 135$), with a sex ratio of 0.7. There were 33 deaths, representing 14.1%. The mean length of hospitalization was $8.2 \text{ days} \pm 4$ days, with a range from 4 to 26 days (**Table 1**). The main comorbidities found were endocrine ($n = 203$ or 82.05%), followed by cardiovascular ($n = 115$ patients or 46.2%) (**Table 2**), and renal ($n = 28$ or 11.96%). The majority of patients presented a single comorbidity ($n = 127$ or 54.3%). Possible associations ranged from 2 ($n = 86$ or 36.8%) to 5 comorbidities in the same patient. The main endocrine comorbidity was diabetes ($n = 193$ or 95.07%). Other comorbidities such as obesity, dyslipidemia, hypothyroidism, and acromegaly were less common. Hypertension ($n = 100$ or 86.95%) was the main cardiovascular comorbidity. Chronic kidney disease was the only renal comorbidity present, with 28 patients. Respiratory comorbidities present were asthma, atopy, and pneumonia. Other comorbidities were present in small proportions.

The main clinical signs were asthenia in 90.2% of cases ($n = 211$), dyspnea in 77.4% of cases ($n = 181$), cough in 65.4% of cases ($n = 153$), and fever in 65.4% of cases ($n = 153$). $\geq 38^\circ\text{C}$ in 47.0% of cases ($n = 110$), chest pain in 27.8% of cases ($n = 65$), headache in 37.2% of cases ($n = 87$), body aches in 53.0% of cases ($n = 124$), myalgia in 29.5% of cases ($n = 69$), and anorexia in 35.0% of cases ($n = 82$) (**Table 3**).

Of the 185 patients who underwent D-dimer measurement, 127 had a result > 1000 , or 64.3%. C-reactive protein testing was performed in all patients, and all had positive CRP. **Table 4** shows the distribution of patients according to D-dimer and CRP (**Table 4**).

Table 1. Characteristics of COVID-19 patients hospitalized in Abasse Ndao.

Variable	Effectifs n = 234	Percentage %
Mean age (years)	60.6 ans \pm 12 ans [30 - 91]	
Age group (years)	N = 219	
30- 39	11	4.7
40 - 49	29	12.4
50 - 59	69	29.5
60 - 69	67	28.6
70 - 79	41	17.5
80 - 89	14	6.0
90+	3	1.3
feminin	135	57.7%
Types of comorbidities	N = 219	
Renal	28	12.0
Endocrine	203	82.5
Respiratory	3	1.3
Cardiovascular	115	46.2
Other comorbidities	4	1.7
Average length of hospital stay (days)		
<7	95	43.6
7 - 15	102	47.9
>15	37	8.5

Table 2. Distribution of endocrine and cardiovascular comorbidities.

Type of comorbidities	Effectifs n = 234	Percentage (%)
Endocrine comorbidities	203	
Diabetes	193	95.07
Obesity	5	2.46
Hypothyroidism	2	0.98
Dyslipidemia	2	0.98
Acromegaly	1	0.48
Cardiovascular comorbidities	115	
Hypertension	100	86.95
Heart disease	8	6.95
Stroke	5	4.34
PAD (AOMI)	2	1.73

Continued

Renal	28	11.96
Respiratory	3	
Other comorbidities	4	

Table 3. Most frequent main clinical signs.

Signs	Effectifs	Percentage (%)
Asthenia	211	90.2
Dyspnea	181	77.4
Cough	153	65.4
Fever ($\geq 38^{\circ}\text{C}$)	110	47.0
Body aches	124	53.0
Headache	87	37.2
Anorexia	82	35.0
Chest pain	65	27.8
Myalgia	69	29.5
Rhinorrhea	30	12.8
Diarrhea	33	14.1
Odynophagia	13	5.6
Chills	17	7.3
Anosmia	17	7.3
Hiccups	13	5.6
Ageusia	8	3.4

Table 4. Distribution of patients according to D-dimer and CRP.

Parameters	Effectifs	Percentage (%)
D-dimes		
<1000	58	24.8
>3000	28	12.0
1000 - 3000	99	42.3
Not available	49	20.9
CRP		
<50	109	46.6
>100	76	32.5
50 - 100	49	20.9

Chest CT scans were performed in all patients. Half of the patients had lung involvement less than 25% (low to moderate). However, lung lesions were critical in 36 patients, or 15.4%.

RT-PCR testing was performed on all patients and was positive in 202 patients, or 86.3%.

5.2. Analytical Study

The presence of comorbidities was significantly associated with the 60 - 69 age group ($p = 0.002$), oxygen requirements greater than 9 L ($p = 0.001$), patients admitted to intensive care ($p = 0.003$), and case fatality ($p = 0.024$) (**Table 5**).

Table 5. Risks linked to the presence of comorbidities on COVID-19.

Age group		Comorbidities		Total	P
		Non	Oui		
Age group					
<29	Effectif	2	0	2	0.624
	%	0.9%	0.0%	0.3%	
30 - 39	Effectif	22	11	33	0.000
	%	20.8%	4.7%	9.7%	
60 - 69	Effectif	14	67	81	0.002
	%	13.2%	28.6%	23.8%	
Sex					
F	Effectif	48	135	183	0.033
	%	45.3%	57.7%	53.8%	
M	Effectif	58	99	157	0.002
	%	54.7%	42.3%	46.2%	
Oxygen					
<9 L	Effectif	80	121	201	0.001
	%	76.2%	57.6%	63.8%	
>9 L	Effectif	25	89	114	0.001
	%	23.8%	42.4%	36.2%	
Resuscitation					
No	Effectif	86	152	238	0.003
	%	81.1%	65.0%	70.0%	
Yes	Effectif	20	82	102	0.003
	%	18.9%	35.0%	30.0%	
Death					
No	Effectif	100	201	301	0.024
	%	91.1%	86.3%	91.1%	

Continued

	%	94.3%	85.9%	88.5%
Yes	Effectif	6	33	39
	%	5.7%	14.1%	11.5%

6. Discussion**6.1. Limitations of the Study**

Our study presented some difficulties related to incomplete data for some patients. Furthermore, we were unable to assess the effect of treatment on hospitalized patients and follow-up after hospitalization. COVID-19 mortality may be underestimated as only the records of hospitalized patients were used.

6.2. Epidemiological Data

In total, we recorded 340 patients with COVID-19, of whom 234 had comorbidities, or 68.82%. Several studies have shown a lower frequency of comorbidities among hospitalized COVID-19 patients, particularly in Niger, Mali, and China, with 34.8%, 27.57%, and 24%, respectively [17] [26] [27]. This result may be explained by the fact that the ETC is located at a center with specialists in internal medicine, diabetology, and endocrinology. In our study, the female sex was predominant with a sex ratio of 0.70 and the mean age was 60.18 ± 12.78 years. In these same studies cited above, there was a male predominance with a sex ratio of 1.07 and 2.67; a mean age of 55 to 57 years [26] [27]. The results of our study showed that advanced age is a factor in disease severity. Several studies have reported that age was the most important predictor of severity and death in patients with COVID-19 [25] [28] [29]. This variation in the severity of COVID-19 according to age could be explained by a decrease in immune function.

6.3. Clinical Aspects

The main clinical signs were asthenia in 90.2%, dyspnea in 77.4%, cough in 65.4%, and fever $\geq 38^\circ\text{C}$ in 47.0% of patients. Dyspnea was found as the main sign in many studies, followed by asthenia and cough. An Algerian series found dyspnea in 79.6%, asthenia in 76.7%, cough in 61.25%, and fever in 57.9%, and body aches in 47.5% [28], and a series of Mali found dyspnea (40%) [30]. This difference may be due to the fact that their studies were conducted in a pulmonology department for the former and in intensive care for the latter. Nevertheless, our results confirm the consistency of dyspnea and cough found in the literature [31] [32].

6.4. Paraclinical Aspects

Half of the patients had mild to moderate pulmonary involvement (<25%). However, 15.4% of patients had involvement with critical lesions (>75%). These results differ from those found in other studies, with minimal involvement in 11.9% and critical lesions in 2.3%. CT-scanned involvement was mainly moderate to severe

(39.2%) to significant (29.9%) or even severe (14.3%) with bilateral involvement (91.6%) and ground-glass lesions (540/572, 94.4%).

In total, 36% of patients developed a severe form of COVID-19, of which 9.6% died. The extent of lesions on CT was correlated with prognosis, with 66/95 (69.5%) patients with >50% involvement developing severe disease, compared with 70/306 (22.9%) patients with ≤25% involvement (odds ratio = 7.6; 95% confidence interval; $p < 0.01$) [14] [25] [33]-[41]. There was no difference in age or comorbidities according to the degree of involvement on CT. Patients with >50% involvement had significantly higher mean CRP than those with ≤25% lesions (164 mg/L versus 80 mg/L, $p < 0.01$).

Bilateral involvement and the presence of consolidations on CT were poor prognostic factors ($p < 0.01$). None of the 14 patients with a normal CT scan developed severe disease. The mean time between the onset of symptoms and CT scan was 6.6 ± 3.4 days. CT scans had prognostic value regardless of the duration of disease progression, but were more discriminating in patients with symptoms for 5 to 10 days. Chest CT scans, in addition to being a diagnostic tool, may have prognostic value through the quantification of pulmonary involvement, which appears to be correlated with early severe involvement. The time between the onset of symptoms and CT scans should be taken into account in their interpretation.

6.5. Comorbidities

In our study, most of our patients had one or more associated comorbidities. A study conducted in Italy found 23.5% of patients had a single comorbidity, 26.6% had two comorbidities, and 48.6% had three or more comorbidities [42].

In our study, diabetes remained the most common comorbidity with 82.5%, followed by hypertension with 44%, and chronic kidney disease with 11.96%. A study conducted in Africa (Niger) [25] revealed that hypertension was the most common with 24.5% of cases followed, diabetes in 17.9%, respiratory diseases in 3.66%, and other diseases (obesity, dyslipidemia, gout, renal failure) with 3%. Although the frequency of comorbidities in this study [25] differs from our results, the high prevalence of diabetes found in our study is explained by the fact that Abass Ndao has a diabetes department. In Mali, 10% of patients 10% had diabetes or hypertension comorbidity [30].

In other studies, diabetes is the second most common comorbidity after hypertension [25]. Risk factors for diabetes (particularly metabolic syndrome) were not studied due to a lack of data related to the retrospective nature of our study.

In our study, hypertension is the second most common comorbidity after diabetes, accounting for 44%. It remains the most common comorbidity in several studies. The main clinical signs were asthenia in 90.2% of cases ($n = 211$), dyspnea in 77.4% of cases ($n = 181$), cough in 65.4% of cases ($n = 153$), and fever $\geq 38^\circ\text{C}$ in 47.0%, which could be explained by the advanced age of the patients. Patients with hypertension and cardiovascular disease should be closely monitored due to

their susceptibility to severe forms of COVID-19, their increased risk of acute cardiovascular complications, or decompensation of chronic cardiovascular disease.

Hypertension is an independent and powerful prognostic risk factor in patients with COVID-19. In a study of 72,314 people with COVID-19, the case fatality rate was 2.3% in the overall study population, but significantly higher among patients with hypertension (6.0%), diabetes (7.3%), and cardiovascular disease (10.5%) [43]. In a retrospective cohort study of 3,988 COVID-19 patients, hypertension was the most common comorbidity, and its presence significantly increased the risk of mortality [44]. The OpenSAFELY analysis of 17,278,392 patients in England found that hypertension was associated with a significantly increased risk of death in COVID-19 patients [3]. Furthermore, older age was strongly associated with hypertension, as evidenced by a higher risk of hypertension in people up to the age of 70.

Acute kidney injury (AKI) is commonly observed in critically ill hospitalized COVID-19 patients. In this context of severe forms, acute kidney injury (AKI) is relatively common and increases the overall risk of morbidity and mortality. The incidence of AKI in patients with COVID-19 is between 3 and 6%, reaching 15 to 58% in critically ill patients [45] [46]. This incidence also varies depending on the definition of AKI in the study, the criteria for admission to intensive care and the criteria for hospitalization. In our study, renal involvement is the third most represented comorbidity with 11.96%. Studies in the United States have suggested an incidence as high as 37% to 40% < [45]-[47]. AKI in hospitalized patients is associated with a poor prognosis [48], prolonged length of stay and increased healthcare costs [49]. Patients who survive AKI appear to have an increased risk of death and incidence of chronic kidney disease (CKD) [5].

Several studies have drawn attention to the association between viral infections and asthma [50]. However, it appears that coronavirus infections play a minor role in asthma exacerbations. In our study, the frequency of asthma and other underlying respiratory diseases was 1.3%. This observation has been made by several studies, particularly in China [31] [51]-[54]. Of the 1,590 patients hospitalized for COVID-19 from 575 hospitals across mainland China between December 11, 2019, and January 31, 2020, asthma was not reported as a comorbidity [50]. In a single-center retrospective study of 138 patients hospitalized in Wuhan, China, for COVID-19, from January 1 to January 28, 2020, asthma was not associated with severe forms of COVID-19 [52]. The 548 patients with COVID-19 admitted to Tongji Hospital (China) from January 26, 2020 to February 5, 2020 were enrolled and followed up until March 3, 2020. Asthma was present with similar frequencies among non-severe and severe forms, respectively 2 cases out of 279 (0.7%) and 3 cases out of 269 (1.1%) [53]. Of 710 patients with SARS-CoV-2 pneumonia, 52 adult patients were admitted to the intensive care unit (ICU) in Wuhan (China) between the end of December 2019 and January 26, 2020. Chronic lung diseases were less frequent in the “non-survivor” group (6%) than in the “survivor” group (10%) [31]. Of the 242 patients hospitalized between January 16 and

February 3, 2020, in Wuhan, China, clinically diagnosed with “viral pneumonia,” 140 patients were extracted and analyzed. No asthmatic patients were identified in this case series, and only a few patients presented with drug hypersensitivity and self-reported urticaria [54].

Hypotheses have been formulated to explain the low prevalence of asthma among the comorbidities associated with COVID-19 and its severe forms. An underestimation of asthma in COVID-19 patients is likely, especially since respiratory comorbidities are often referred to broadly without asthma being specifically addressed. Background asthma treatments may have a protective effect against SARS-CoV-2. Indeed, *in vitro* models, inhaled corticosteroids alone or in combination with bronchodilators have been shown to inhibit coronavirus viral replication and cytokine production [38]. Several publications have already reported that dual therapies used in the treatment of severe asthma reduce asthma-related exacerbations [34]. Oral corticosteroids, frequently used during acute exacerbations, inhibit virus-induced cytokines but do not inhibit interferon production, which contributes to antiviral defense [55].

6.6. Evolution

The average length of hospitalization was 8 days \pm 4.70 days. In a study conducted in Mali, the average length of hospitalization was 8.70 days [30]. The case fatality rate was 14.1%. This result is lower than those of Italy, France and Mali with respectively 13.14%, 10.72% and 9.28% [5] [8] [30]. This could be explained by the high prevalence of comorbidities and the advanced age of our patients.

7. Conclusion

Our results show a high frequency of comorbidities in the field of COVID-19 in more than half (68,8%) of the people hospitalized in Abasse Ndao. These are associated with advanced age were also significantly associated with disease severity and a case fatality rate of 14.1%, hence the need for special attention to these specific groups. Strengthening the management policy for non-communicable diseases by creating specialized care centers, improving patient access to care in healthcare facilities through a good outreach policy, and reducing the incidence of these conditions is essential.

Author's Contributions

N. F. NG., D. S., NSF., and O. K. contributed to the design and development of the study protocol, data collection, statistical analyses, manuscript writing, and review. F. A. F., to be completed, contributed to reviewing the manuscript. All authors have read and approved the submitted version of the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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