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Profile of SARS-CoV-2 Infected Patients Hospitalized at the Epidemic Treatment Center (ETC) in Saint-Louis, Senegal during the First Two Waves

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Abstract

Introduction: The SARS-CoV-2 infection is a major public health emergency. Several risk factors are involved in the occurrence of respiratory distress that can lead to death despite resuscitation measures. **Objectives:** The aim of this study was to describe the epidemiological, clinical, paraclinical, therapeutic, and evolution profile of patients infected with SARS-CoV-2 hospitalized at the CTE of Saint-Louis (Senegal) during the first two waves. **Patients and Methods:** We conducted a retrospective, cross-sectional, descriptive, and analytical study that included all patients hospitalized at the ETC of Saint-Louis (Senegal) with SARS-CoV-2 infection from March 2020 to April 2021. **Results:** A total of 358 cases were collected, 256 (71.5%) during the first wave and 102 (28.5%) during the second wave. The mean age was 49.5 years (±19.5). There was a male predominance (58.4%), with a sex ratio of 1.4. Hypertension was the main comorbidity, with 87 cases (24.3%). The most common functional signs were cough in 194 cases (54.2%), dyspnea in 143 cases (40%) and ageusia in 134 cases (37.4%). Thoracic CT scans were performed on 20 patients (5.6%), with severe involvement (50% - 75%) observed in 50% of cases. Hydroxychloroquine-azithromycin was prescribed to 351 patients (98%). Overall, 338 (94.4%) recovered and 17 (4.7%) died. In multivariate analysis, factors associated with death were male sex [OR = 2.645; 95% CI: 1.530 - 4.785; p = 0.011], age ≥ 60 years [OR = 1.039; 95% CI: 0.564 - 1.914; p = 0.002], the presence of comorbidities [OR = 2.171; 95% CI: 0.564 -

3.429; p = 0.033], SpO₂ (ambient air) ≤ 95% [OR = 2.061; 95% CI: 0.616 - 3.827; p = 0.03], acute respiratory distress syndrome (ARDS) [OR = 0.635; 95% CI: 0.316 - 1.275; p = 0.001], severe form [OR = 1.664; 95% CI: 0.298 - 2.478; p = 0.016], occurrence of complications [OR = 0.521; 95% CI: 0.287 - 0.944; p = 0.032], high creatinine levels [OR = 2.061; 95% CI: 1.616 - 3.827; p = 0.026], and lymphopenia [OR = 0.485; 95% CI: 0.370 - 0.636; p = 0.001].

Conclusion: In our series, infection with SARS-CoV-2 was associated with low lethality. Several risk factors were identified that need to be considered for successful management of patients.

1. Introduction

On December 31st, 2019, Chinese authorities reported to the World Health Organization (WHO) clusters of pneumonia cases with unknown etiology in Wuhan (China) [1] [2]. A new coronavirus, called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was identified as the cause of an epidemic zoonosis called coronavirus disease 2019 (COVID-19) [3]. Due to its rapid spread, the WHO declared a pandemic on March 11th, 2020. As of 29th December 2020, the COVID-19 pandemic had affected 79,693,677 people worldwide, resulting in 1,762,066 deaths [4]. The first case in Africa was recorded on 14th February 2020 in Egypt [5], while Senegal reported its first confirmed case on 2nd March 2020. As of 28th December 2020, Senegal had recorded 18,728 confirmed cases of COVID-19, with 17,031 recoveries and 390 deaths [6].

Typical symptoms of SARS-CoV-2 infection include fever, cough, fatigue, anosmia, ageusia, and in severe cases, dyspnea. The majority of cases were asymptomatic to moderate in 80%, especially in children and young adults, 14% were severe and 5% were critical, sometimes requiring respiratory resuscitation, especially in the elderly and/or those with comorbidities [7] [8]. Severe forms are associated with high lethality rates [9]. The main risk factors for severe forms, as reported in the literature, are advanced age, comorbidities (such as diabetes, hypertension, cancer, etc.), hematological disorders (leukocytosis, lymphopenia, etc.), and coagulation disorders (thrombocytopenia, increased D-dimers, fibrinogen, PT, etc.), elevation of certain biochemical parameters (LDH, CRP, procalcitonin, transaminase, creatinine, etc.) and a decrease in TCD4+ lymphocytes [10] [11] [12]. However, early and effective management of severe cases can improve the prognosis [13]. To control the spread, the WHO recommends both the adoption of barrier gestures and vaccination. However, the continued appearance of variants responsible for several epidemic waves could compromise the effectiveness of these vaccines [14]. In this context, we conducted a study to describe the epidemiological, clinical, paraclinical, therapeutic, and evolution pro-

file of patients infected with SARS-CoV-2 and hospitalized at the ETC of Saint-Louis (Senegal) during the first two waves of COVID-19.

2. Patients and Methods

This was a retrospective, descriptive, and analytical cross-sectional study conducted from March 2020 to April 2021, covering the first two waves of COVID-19. In Senegal, the first wave lasted from March 2020 to November 2020 (8 months), and the second wave from December 2020 to May 2021 (5 months).

The study included all patients infected with SARS-CoV-2 who were hospitalized at the ETC of Saint-Louis (Senegal) during the first two waves of COVID-19. Patients with incomplete or missing medical records were excluded.

The diagnosis of SARS-CoV-2 infection was based on positive PCR tests from nasopharyngeal swabs, positive antigen rapid tests, or suggestive CT scans for COVID-19.

Data was collected from the records of SARS-CoV-2 infected patients hospitalized in our ETC. After a literature review, we developed and tested a questionnaire. A trained medical doctoral student was responsible for collecting the data as part of his thesis. The questionnaire included the following parameters:

- Epidemiological data: Age, sex, occupation, marital status, health district of origin, co-morbidities.
- Clinical data: time from onset of symptoms to hospital admission, peripheral oxygen saturation on admission, clinical signs on admission, severity of forms. The Ministry of Health and Social Action (MSAS) of Senegal classifies the different forms of SARS-CoV-2 infection according to severity:
  - Mild forms: no pneumonia, normal heart rate (HR), respiratory rate (RR): 12 - 20 cpm, $SpO_2 \geq 95\%$, chest CT scan: 0% to 25% of lung parenchyma affected, Q-SOFA = 0, no comorbidity.
  - Moderate forms: mild to moderate pneumonia, HR normal or >90 bpm, RR: 20 - 29 cpm, SpO_2: 95% - 90%, chest CT scan: 25% to 50% involvement of lung parenchyma, Q-SOFA < 2, balanced comorbidities.
  - Severe forms: severe pneumonia, HR > 100 bpm, RR ≥ 30 cpm, $SpO_2 \geq$ 90%, chest CT scan: 50% - 75% lung parenchyma involvement, Q-SOFA ≥ 2, unbalanced or unstable comorbidities.
  - Critical forms: hypoxemic pneumonia, HR > 100 bpm or <50 bpm, RR > 30 cpm or <10 cpm, $SpO_2 \leq 90\%$, chest CT scan: involvement > 75% of lung parenchyma, Q-SOFA ≥ 2, unbalanced or unstable comorbidities.
- Paraclinical data: complete blood count, C-reactive protein, prothrombin time, liver enzymes, fasting blood glucose, glycosylated haemoglobin (HbA1C), creatinine, lipids, electrolytes, troponin, and chest CT scan.
- Therapeutic data: molecules prescribed.
- Evolution data: hospital stay and outcome.

Data was recorded and analyzed using Excel and Epi-info version 7 software. The Chi2 and Fisher tests were used to compare means and percentages, de-

pending on their applicability. Any difference less than 0.05 was considered statistically significant.

Information and medical records were managed with strict adherence to medical confidentiality.

3. Results

3.1. Epidemiological Data

During our study period, we collected 358 patients' files, of which 256 patients (71.5%) were hospitalized during the first period and 102 patients (28.5%) during the second period. The mean age was 49.5 years (±19.5). The most representative age group was between 21 and 40 years old, with 116 cases (32.4%). During the first wave, the mean age was 44.5 years (±19.1) and the age group between 21 and 40 years old was the most representative with 109 cases (42.6%). During the second wave, the mean age was 62 years (±13.7) and the age group between 61 and 80 years old was the most representative with 55 cases (54%) (Figure 1). There was a male predominance with 209 men (58.4%) compared to 149 women (41.2%), resulting in a sex ratio of 1.4. The most common comorbidity was hypertension with 87 cases (24.3%), followed by diabetes with 59 cases (16.5%) and asthma with 18 cases (5%) (Table 1).

3.2. Clinical Data

The mean time from symptom onset to hospital admission was 8.4 days (±5). The mean SpO2 on admission was 94.7% (±7.4). Mild forms were predominant with 212 cases (59.2%), followed by severe forms with 106 cases (29.6%). Functional symptoms on admission were dominated by cough with 194 cases (54.2%), followed by dyspnea with 143 cases (40.2%) and ageusia with 134 cases (37.4%) (Table 2).
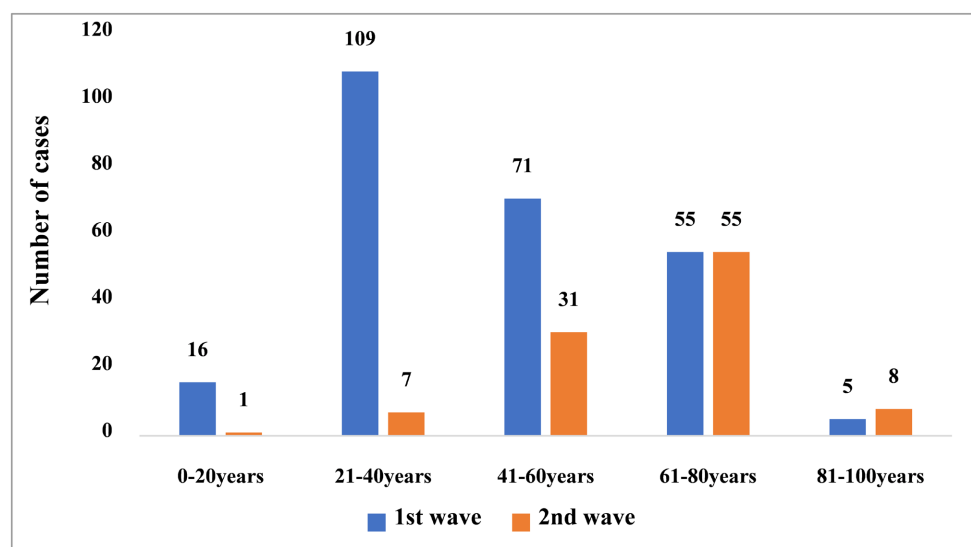
Figure 1. Age distribution of patients during the first and second waves.

Table 1. Distribution of patients according to epidemiological aspects.

Epidemiological data	Number	Percentage (%)
Sex (n = 358)		
Males	209	58.4
Females	149	41.6
Marital status (n = 316)		
Married	236	74.7
Single	67	21.2
Widowed	11	3.5
Divorced	2	0.6
Profession (n = 290)		
Formal sector	105	36.2
Informal sector	73	25.2
Housewives	48	16.6
Retirees	36	12.4
Students	24	8.3
Unemployed	4	1.4
Health district of origin (n = 358)		
Saint-Louis	247	69
Richard-Toll	88	24.6
Podor	14	3.9
Dagana	6	1.7
Louga	3	0.8
Comorbidities (n = 358)		
Hypertension	87	24.3
Diabetes mellitus	59	16.5
Asthma	18	5
Obesity	12	3.4
Sickle cell disease AS	7	2
Dyslipidemia	6	1.7
Pregnancy	3	0.8
Chronic kidney disease	2	0.6
Chronic viral hepatitis B	2	0.6
Rheumatoid arthritis	2	0.6
Biermer disease	1	0.3
Scleroderma	1	0.3
Vasculitis	1	0.3
Dementia	1	0.3

Table 2. Distribution of patients according to clinical aspects.

Clinical data	Effectif	Pourcentage (%)
Ambient air SpO$_2$ on admission (n = 328)		
<90%	68	20.7
91% - 95%	29	8.8
96% - 100%	231	70.4
Forms by severity (n = 358)		
Mild forms	212	59.2
Moderate forms	40	11.2
Severe forms	106	29.6
Critical forms	0	0

Continued

Functional signs (n = 358)

Cough	194	54.2
Dyspnea	144	40.2
Agueusia	134	37.4
Headache	115	32
Anosmia	88	24.6
Diarrhea	43	12
Thoracic pain	42	11.7
Odynophagia	31	8.7
Flu-like symptoms	30	8.4
Rhinorrhea	27	7.5
Vomiting	16	4.5
Dizziness	14	3.9
Abdominal pain	13	3.6
Nausea	5	1.4
Nasal congestion	3	0.8
Sneeze	3	0.8
Polyuria-polydipsia syndrome	3	0.8
Heart palpitations	1	0.3
Otalgia	1	0.3
Hemoptysis	1	0.3
Pyrosis	1	0.3
Hiccup	1	0.3

General signs (n = 358)

Fever	180	50.3
Asthenia	98	27.4
Body aches	80	22.3
Anorexia	52	14.5
Chills	44	12.3
Sweats	29	8.1
Lethargy	1	0.3

Physical signs (n = 358)

Pulmonary condensation syndrome	149	41.6
Acute respiratory distress syndrome	125	35
Obnubilation	3	0.8
Subicterus	2	0.6
Global congestive heart failure syndrome	2	0.6
Bronchial syndrome	1	0.3

3.3. Paraclinical Data

The mean leukocyte count was 6492/ul (±3658). Leukocytosis (>10,000/ul) was found in 38 out of 341 cases (11%). The mean lymphocyte count was 1846/ul (±1577). Lymphopenia (<1500/ul) was found in 141 out of 341 cases (41.3%). The mean creatinine level was 11.3 mg/L (±7.5). A creatinine level (>13 mg/l) was found in 61 out of 342 cases (17.8%). Thoracic CT scans were performed on 20 patients (5.6%). The majority of cases (50%) showed 50% to 75% parenchymal involvement (Table 3), depending on the extent of the lesions.

Table 3. Distribution of patients according to paraclinical aspects.

| Paraclinical data	Number	Percentage (%)
Hemogramm (n = 341)		
Leukocytosis (>10,000/ul)	38	11
Lymphopenia (<1500/ul)	141	41.3
Neutropenia (<1500/ul)	67	19.6
Thrombopenia (<150,000/ul)	25	7.3
Anemia (≤10 g/dl)	17	5
CRP ≥ 12 mg/l (n = 73)	61	83.6
Hyperglycaemia (≥1.26 g/l) (n = 316)	46	14.6
HbA1c > 7% (n = 41)	20	48.8
Creatininemia > 13 mg/l (n = 342)	61	17.8
Transaminases (n = 263)		
ALAT > 2N	17	6.5
ASAT > 2N	23	8.7
Hypertroponinemia > 60 ng/l (n = 123)	4	3.3
Lipide Profile (n = 171)		
Hypercholesterolemia > 2 g/l	55	32.2
High LDL-cholesterol levels > 1.6 g/l	26	15.2
Low HDL-cholesterol levels < 0.4 g/l	49	28.7
Hypertriglyceridemia > 1.6 g/l	21	12.3
Prothrombin levels < 70% (n = 322)	27	8.4
Electrolyte profile (n = 79)		
Hyponatremia < 135 meq/l	20	25.3
Hypochloremia < 100 meq/l	14	17.7
Hypokaliemia < 3.5 meq/l	11	14
CT scan lesions extent (n = 20)		
0% à 25%	3	15
25% et 50%	6	30
50% et 75%	10	50
>75%	1	5

3.4. Therapeutic Data

The hydroxychloroquine-azithromycin combination was prescribed to 351 patients (98%). Anticoagulation was prescribed to 280 patients (78.2%). Antibiotic therapy (excluding azithromycin) was prescribed to 128 patients (35.7%). Oxygen therapy was given to 106 patients (29.6%) (Table 4).

3.5. Evolution Aspects

The mean duration of hospital stay was 13.1 days (±3.9). Complications occurred in 97 patients (27%) during hospitalization, mainly dominated by the hypertensive crisis with 31 cases out of 97 (32%), followed by diabetic imbalances with 28 cases out of 97 (29%) and hepatic cytolysis with 6 cases out of 97 (6.1%). Overall, 338 patients recovered (94.4%) and 17 died (4.7%). Specifically, in the first wave, 254 out of 256 patients (99.2%) recovered and none died (0%). In the second wave, 84 out of 102 patients (82.4 %) recovered while 17 out of 102 patients (16.7 %) died (Figure 2).

Table 4. Distribution of patients according to therapeutic aspects.

Therapeutic data	Number	Percentage (%)
Hydroxychloroquine-azithromycin combination	351	98
Hydroxychloroquine	351	98
Azithromycin	358	100
Antibiotic therapy (excluding azithromycin)	128	35.7
Anticoagulation	280	78.2
Analgesic/antipyretic	307	85.8
Corticosteroid therapy	83	23.1
Oxygen therapy	106	29.6
Intubation	1	0.3
Vitamin C	345	96.4
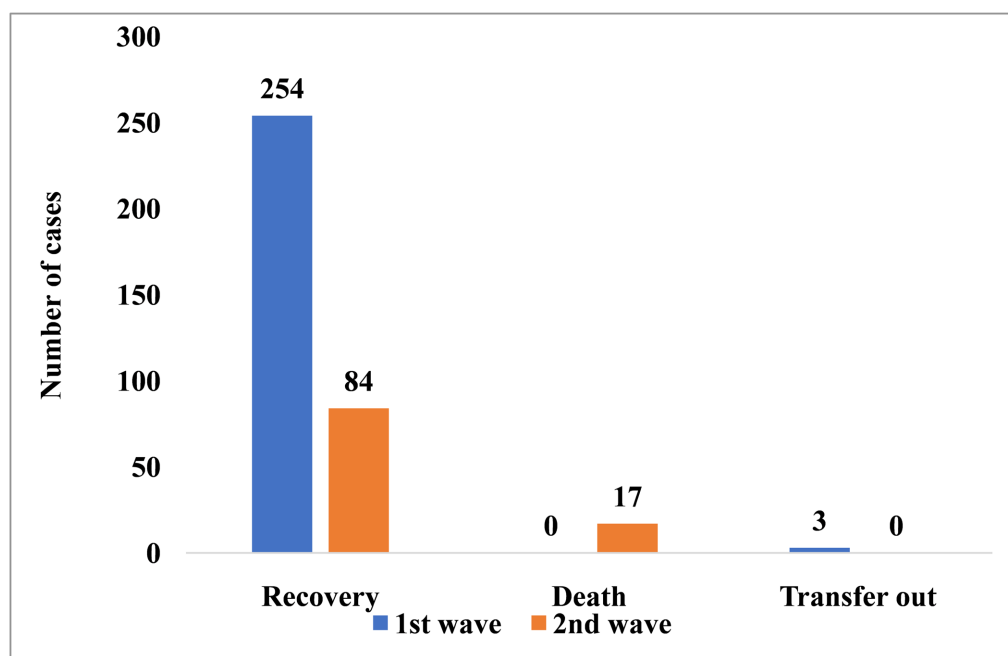
Figure 2. Distribution of patients according to the outcome during the 1st and 2nd waves of COVID-19.

3.6. Analytical Study

In multivariate analysis, factors associated with death were: male sex [OR = 2.645; 95% CI: 1.530 - 4.785; p = 0.011], age ≥ 60 years [OR = 1.039; 95% CI: 0.564 - 1.914; p = 0.002], the presence of comorbidities [OR = 2.171; 95% CI: 0.564 - 3.429; p = 0.033], SpO_2 (ambient air) ≤ 95% [OR = 2.061; 95% CI: 0.616 - 3.827; p = 0.03], acute respiratory distress syndrome (ARDS) [OR = 0.635; 95% CI: 0.316 - 1.275; p = 0.001], severe form [OR = 1.664; 95% CI: 0.298 - 2.478; p = 0.016], occurrence of complications [OR = 0.521; 95% CI: 0.287 - 0.944; p = 0.032], high creatinine levels [OR = 2.061; 95% CI: 1.616 - 3.827; p = 0.026] and lymphopenia [OR = 0.485; 95% CI: 0.370 - 0.636; p = 0.001] (Table 5).

Table 5. Factors associated with death in multivariate analysis.

Variables	OR	95% CI	p-value
Male sex	2.645	[1.530 - 4.785]	0.011
Age ≥ 60 years	1.039	[0.564 - 1.914]	0.002
Presence of Comorbidities	2.171	[0.564 - 3.429]	0.033
SpO$_2$ ≤ 95%	2.061	[0.616 - 3.827]	0.03
Acute respiratory distress syndrome	0.635	[0.316 - 1.275]	0.001
Severe form	1.664	[0.298 - 2.478]	0.016
Occurrence of complications	0.521	[0.287 - 0.944]	0.032
High creatinine levels	2.061	[1.616 - 3.827]	0.026
Lymphopenia	0.485	[0.370 - 0.636]	0.001

4. Discussion

Our study was limited by its retrospective nature, the insufficient number of thoracic CT scans performed, and the non-availability of certain biological tests such as D-dimer, gasometry, procalcitonin, etc. In the test results we received, the type of SARS-CoV-2 variants was not mentioned.

The mean age was 49.5 years (±19.5 years) in our series. The most representative age group was between 21 and 40 years (32.4%). These results were similar to those of Wu C *et al.* and Huang C *et al.*, who respectively found mean ages of 49 years and 51 years [15] [16]. In our series, the mean age was higher in the second wave (62 years) compared to the first wave (44.5 years). This could be explained by the fact that during the second wave, hospitalizations in Senegal's treatment centers prioritized at-risk individuals, particularly patients over 50 years old, those with comorbidities, or those with severe forms of COVID-19. In contrast, during the first wave, all positive cases were hospitalized regardless of severity, which led to a saturation of treatment centers and forced authorities to change strategies.

A male predominance (58.4%) was found. The same trend was observed by Wang D *et al.* and Ouedraogo A.R *et al.*, who had 54.3% and 64% males, respectively, in their studies [17] [18]. This male predominance could be explained by the fact that, in our societies, men are more mobile and their daily activities expose them to an increased risk of SARS-CoV-2 contamination.

Comorbidities were dominated by hypertension (24.3%), followed by diabetes mellitus (16.5%) in our series. In Burkina, Ouedraogo A.R. *et al.* found a predominance of hypertension (21.7%) followed by diabetes mellitus (8.3%) [18]. In China, this same trend was observed by Wang *et al.* who found hypertension and diabetes to be the main comorbidities with respective rates of 31.2% and 10.1% [17].

Functional symptoms were dominated by cough (54.2%), followed by dyspnea (40%) and ageusia (37.4%) in our study. This trend was also observed by Ouedraoga AR *et al.*, who found a predominance of cough (46.3%) and dyspnea (26.1%) [18]. Kadi A. *et al.* also found a predominance of cough (70.76%) and

dyspnea (26.15%) [19]. The frequency of respiratory symptoms could be explained by the pulmonary tropism of SARS-CoV-2. The prevalence of ageusia in COVID-19 patients varies in the literature. Vaira LA *et al.* (China) found ageusia in 5.6% of cases [20]. Some studies report a high expression of ACE-2 in the mucosa of the oral cavity and epithelial cells of the tongue. Lesions of these epithelial cells of the oral cavity may explain the ageusia observed in the early stages of the disease [21].

In our study, mild forms were the most common (59.2%), followed by severe forms (29.6%) and moderate forms (11.2%). According to the WHO's situation report on coronavirus disease 2019 (COVID-19) [8], 80% - 81% of COVID-19 patients have an asymptomatic to moderate form, 14% - 15% have a severe form, and 5% have a critical form. However, our study shows a significantly higher proportion of severe cases (29.6%) compared to the literature (14% to 15%). This can be explained, on the one hand, by delayed hospitalization, which can promote the progression to a severe form, and on the other hand, by the relatively high proportion of subjects over 60 years old (34.3%), especially during the second wave, where more than half of the patients (54%) were aged between 61 and 80 years.

In our series, the hematological disorders found were: leukocytosis (11%), lymphopenia (41.3%), neutropenia (19.6%), anemia (5%) and thrombocytopenia (7.3%). Ouedraogo AR *et al.* found hyperleukocytosis in 12.3% of cases [18]. Sandoval Y *et al.* found lymphopenia in 83.2% of cases [22]. Ketfi A *et al.* reported an anaemia in 38.7% of cases [23]. Sandoval Y *et al.* found thrombocytopenia in 36.2% of cases [22]. Haematological abnormalities are common in patients with severe COVID-19. The pathophysiology is not fully understood [24]. Lymphopenia may be related to a defective immune response to the virus, while leukocytosis found in a minority of patients appears to indicate bacterial infection or superinfection [24]. Thrombocytopenia, associated with consumptive coagulopathy, is a significant indicator of severe illness in COVID-19 patients [24]. Anemia is mainly due to inflammation, sometimes associated with iron and/or vitamin deficiencies [25]. Our study found an elevation in creatinine levels in 17.3% of patients. Ketfi A *et al.* and Ouedraogo AR *et al.* found an elevation in creatinine levels in 10.7% and 18.9% of cases, respectively [23] [18]. Wu C *et al.* from China reported a lower rate of renal failure of 4.5% [15]. In the initial cohort studies of Chinese patients infected with SARS-CoV-2, the prevalence of acute kidney injury ("AKI") was found to be insignificant [26]. AKI is a risk factor independent of the severity of COVID-19 and therefore of the risk of death [27]. Pathophysiologically, acute renal failure is thought to be due to hypoperfusion-induced tubular damage associated with sepsis and the cytokine storm, and to tubular toxicity caused directly by SARS-CoV-2 [27].

In our series, the hydroxychloroquine-azithromycin combination was prescribed to almost all patients (98%). Following the initial reports on the potential effectiveness of this regimen, many countries, including Senegal, observed a sig-

nificant use of this treatment [28]. Despite the WHO's recommendation against the use of hydroxychloroquine in COVID-19 patients, many countries continued to use it [28]. Ketfi *et al.* reported the use of hydroxychloroquine-azithromycin combination in all their patients [23]. In a study conducted by Taieb F *et al.* in Senegal, it was found that 72.8% of patients were administered a combination of hydroxychloroquine and azithromycin. The proportion of patients who were discharged from the hospital on day 15 was significantly higher in patients who received this combination compared to those who did not receive both drugs simultaneously [28]. Gautret *et al.*'s study demonstrated a virological cure rate of 100% in patients treated with a combination of hydroxychloroquine and azithromycin on the sixth day after inclusion. In comparison, patients treated with hydroxychloroquine alone had a cure rate of 57.1%, while the control group had a cure rate of 12.5% [29].

The mean hospital stay of our patients was 13.1 days (±3.9), which is consistent with the findings of Guan W and Wu C who reported mean hospital stays of 12 and 13 days, respectively [15] [30]. In our series, the mortality rate was 4.7%. Samake D *et al.* (Mali) reported a mortality rate of 5.7% [31]. Lower rates were found by Guan W and Wu Z, with rates of 1.4% and 2.3%, respectively [30] [32]. This could be explained by the low proportion of severe cases (18.6% and 14%) in these two studies [30] [32].

In our series, the main factors associated with death were: male sex, age (≥60 years), the presence of comorbidities, SpO_2 (air ambient) ≤ 95% at admission, SDRA at admission, severe forms, the occurrence of complications during hospitalization, high levels of creatinine and lymphopenia. Peckham H *et al.* [33] found that men had a higher risk of death compared to women. This may be due to a stronger innate antiviral response to interferon and an increased adaptive immunity to viral antigens in women linked to the X chromosome and to female sexual hormones [33]. Regarding age, older individuals are at higher risk of death due to immunosenescence as well as the high prevalence of comorbidities in this population [34] [35]. According to Acar HC *et al.*, oxygen desaturation suggests severe lung involvement and increases the risk of death by 2.81 times in patients with SpO2 between 89% and 94% [36]. Yang X *et al.*'s study reported high mortality rates among patients with severe SARS-CoV-2 pneumonia [37]. According to Rosenthal *et al.*, acute complications such as sepsis, hyperkalemia, acidosis, acute liver injury, and neurological disorders were associated with an increased risk of COVID-19-related deaths [38]. Meanwhile, renal failure and lymphopenia are poor prognostic factors that can lead to death [39].

5. Conclusions

The study found that SARS-CoV-2 infection primarily affected male patients aged between 61 and 80 years in the Saint-Louis CTE, with a predominance of severe forms during the first two waves. The two most common comorbidities were hypertension and diabetes mellitus. Mortality was higher in the second

wave. Several factors associated with death were identified. Knowledge of these factors could improve patient care.

Authors Contribution

List of authors who contributed to the study:
- Papa Latyr Junior Diouf contributed to the English traduction;
- Bourama Diémé contributed to the analysis, interpretation, and correction;;
- Moustapha Diedhiou contributed to the proofreading;
- Diatou Dia-Gueye contributed to the proofreading;
- Amadou Diop Dia contributed to the proofreading;
- Samba Niang contributed to the proofreading;
- Ibrahima Louis Martin Dieng contributed to the proofreading;
- Ameth Dieng contributed to the proofreading;
- Seynabou Lô contributed to the proofreading;
- Ndéye Méry Dia-Badiane contributed to the proofreading.

Conflict of Interest

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

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Appendix: Questionnaire to Determine the Profile of Patients Hospitalized at the Saint-Louis ETC (Senegal) during the First Two Waves

- **Questionnaire no.:** _____
- **Part I. Epidemiological aspects**

Age: |__|__| (years); Sex: Male/Female; Marital status: Married/Single/Divorced/Widowed

Occupation: _____; Health district of origin: Saint-Louis: Yes/No; Richard-Toll: Yes/No; Podor: Yes/No; Dagana: Yes/No; Other: Yes/No; specify: _____

Comorbidities: Hypertension: Yes/No; Diabetes: Yes/No; Asthma: Yes/No; Cancer: Yes/No; Other; If yes, specify: _____

- **Part II. Clinical aspects**

Date of onset of symptoms: |__|__|__| Date of hospitalization: |__|__|__|

Functional symptoms on admission: Cough: Yes/No; Dyspnea: Yes/No; Headache: Yes/No; Agueusia: Yes/No; Anosmia: Yes/No; Odynophagia: Yes/No; Other signs: Yes/No; If yes, specify: _____

General signs on admission: Physical asthenia: Yes/No; Diffuse pain: Yes/No; Anorexia: Yes/No; Arthralgia: Yes/No; Other signs: Yes/No; specify: _____

Physical signs on admission: Pulmonary condensation syndrome: Yes/No; Acute respiratory distress syndrome: Yes/no; Obnubilation: Yes/No; Other: Yes/No; If yes, specify: _____

SpO2: ____ (%); Clinical severity: Simple form: Yes/No; Moderate form: Yes/No; Severe form: Yes/No; Critical form: Yes/No

- **Part III. Paraclinical aspects**

Hemogramm: Yes/No; Haemoglobin: _____g/dl; Leukocytes: _____/mm^3; Platelets: _____/mm^3; Neutrophils: _____/mm^3; Lymphocytes: _____/mm^3; Glycaemia: _____g/l; HbA1C: _____%; CRP: _____mg/L; Creatininemia: _____mg/L; ALAT: _____UI/L; ASAT: _____UI/L; Troponinemia: _____ng/mL; Cholesterolemia: _____g/L; Triglyceridemia: _____g/L; HDL-cholesterol: _____g/L; LDL-cholesterol: _____g/L; Natremia: _____mmol/L; Kaliemia: _____mmol/L; Chloremia: _____mmol/L ; Thoracic CT scan: Yes/No; CT scan lesions extent: 0% - 25%: Yes/No ; 25% - 50%: Yes/No; 50% - 75%: Yes/No; 75% - 100%: Yes/No

- **Part IV. Therapeutic aspects**

Hydroxychloroquine-azithromycin combination: Yes/No; Hydroxychloroquine (only): Yes/No; Azithromycin (only): Yes/No; Anticoagulation: Yes/No; Vitamin C: Yes/No; Analgesic/antipyretic: Yes/No; Antibiotic therapy (excluding azithromycin): Yes/No; Oxygen therapy: Yes/No; Intubation: Yes/No; Corticosteroid therapy: Yes/No; Other: Yes/No, If yes, specify: _____

- **Part V. Evolutionary aspects**

Recovery: Yes/No; Death: Yes/No; Transfer: Yes/No; Complications: Yes/No; If yes, specify: _____

Length of hospital stay: _____ (days)