Clinical course, biomarkers, management and outcomes of patients hospitalised due to COVID-19 in Colombia

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Abstract

Background: Coronavirus disease (COVID-19) represents an unprecedented challenge for both people and health systems. Latin America is the current epicentre of the pandemic; however, there is little published clinical information on the clinical characteristics and outcomes.

Objective: To analyse the clinic characteristics, risk factors and evolution of the first cohort of hospitalised patients with confirmed infection by COVID-19 in 5 Colombian institutions.

Methods: In the present retrospective observational study, information was acquired from consecutive hospitalized patients with a diagnosis of COVID-19 confirmed by real-time reverse transcriptase polymerase chain reaction (RT-PCR) from March 01 to May 30, 2020 in Colombia.

Results: A total of 44 patients were included. The median age was 62 years, and 65.9% of the patients were male. A total of 69.8% of the patients were overweight or obese, and 13.6% of the patients had high blood pressure and diabetes. The presence of systemic symptoms and cough were the most common. Ground-glass opacity was frequent finding upon chest imaging. The 30-day mortality rate was 47.7% with a median of 11 days. The composite outcome (critical care requirement, mechanical ventilation and death) occurred in 36.4% of the patients. The biomarkers associated with mortality risk included troponin higher than 14 ng/L (RR: 5.25; 95% CI 1.37-20.1, p = 0.004) and D-dimer higher than 1000 ng/ml (RR: 3.0; 95% CI 1.4-6.3, p = 0.008). Cardiovascular complications, acute respiratory distress syndrome (ARDS) and acute kidney injury were the most frequent comorbidities in patients with severe pneumonia.

Conclusion: The clinical course of SARS-CoV-2 infection diagnosis confirmed by RT-PCR in Colombian patients admitted to a high-complexity hospital was similar to that reported in the literature; however, the population was characterised by a more advanced stage of the infection.

Introduction

As of December 21, 2019, a group of cases of viral pneumonia had been identified in Wuhan, a metropolitan city in the province of Hubei, China, caused by a new single-stranded RNA virus (SARS-CoV-2) of possible animal origin that has been extensively spreading in humans and causing respiratory, enteric, hepatic and neurological diseases (1, 4). In February 2020, the World Health Organization designated the disease caused by this virus as COVID-19, which stands for coronavirus disease 2019 (1); COVID-19 has progressively spread and was declared a pandemic on March 11, 2020. COVID-19 has severe impact in terms of morbidity, mortality and costs (2).

Worldwide, approximately 15 million confirmed cases of COVID-19 have been reported on all continents, except Antarctica (3). Latin America and the Caribbean represent the current epicentre of the pandemic due to the vulnerability of some health care systems and considerable heterogeneity in economic, political and social development (4). Over 6.2 million people have been affected by the disease in this region; Brazil is the most affected country, followed by Peru, Mexico, Chile, Colombia and Argentina (3). SARS-CoV-2 disease (COVID-19) is predominantly manifested as a lung infection with a range of symptoms characteristic of a mild upper respiratory tract infection; however, 15 to 20% of patients develop severe pneumonia and acute respiratory distress syndrome (ARDS), and 5% of patients develop critical illness associated with shock, cytokine release syndrome, coagulation disorders with consequent multiple organ failure and death (5–7). The demographic, clinical and laboratory risk factors associated with worse outcomes have been described in the literature; however, the frequency and importance of these factors in the Latin American population have not been described. Our study aims to analyse the clinic

characteristics, risk factors and evolution of the first group of hospitalised patients with confirmed COVID-19 infection in 5 institutions in Colombia.

Materials And Methods

Design and population

This is a retrospective longitudinal study of adult patients (> 18 years) diagnosed with SARS-CoV-2/COVID-19 [+] confirmed by real-time reverse transcriptase polymerase chain reaction (RT-PCR) of a nasopharyngeal secretion sample hospitalised in 5 high-complexity hospitals in Colombia and discharged from March 1 to May 30, 2020. Patients were recruited consecutively based on compliance with inclusion criteria. Demographic variables, comorbidities, signs and symptoms at admission, chest images, laboratory test, biomarkers, treatment schedules, complications and discharge condition (alive or dead) were extracted from the clinical history.

Outcomes

The main outcome was the 30-day in-hospital mortality rate; in addition, the composite outcome, defined by a critical care requirement, mechanical ventilation and death, was considered. Other outcomes of interest included frequency of complications, variability in biomarkers and established drug treatment schedules.

Data analysis

The quantitative variables were analysed using frequency, mean and variance; the categorical data were analysed using proportional ratios. Bivariate analysis was performed using X^2-squared statistic tests for independence in 2x2 tables and Fisher's exact test for comparison. Hypotheses were confirmed or rejected at $p<0.05$, which was considered statistically significant. Survival functions of time until the event were used to analyse the complications and lethality by Kaplan-Meier curves starting from diagnosis at admission. Exploratory analysis of the associations between mortality and prognostic biomarkers at admission was performed by estimating the relative risk (RR) and odds ratios (OR) with 95% confidence intervals (95% IC).

Based on the collected information, the score on the national early warning score (NEWS) risk scale (8), Charlson comorbidity index (CCI) (9) corrected for age, APACHE II (10) and the sequential organ failure assessment (SOFA) (11) were estimated for each patient. All analyses are presented according to variable type.

Results

A total of 44 patients were admitted from March to May 2020 to 5 high-complexity hospitals in Colombia. The median age of the patients was 62 years (IQR: 53-72 years), and 79.5% of the patients were older than 50 years. Table 1 summarises the main demographic and admission characteristics of patients with SARS CoV-2/COVID-19 infection.

Table 1. Demographic and clinical characteristics of patients with COVID-19

	Total N (%)	Severe pneumonia N (%)
General	**44 (100)**	**37 (100)**
Sex		
Male	29 (65.9)	26 (70.3)
Age (years)		
20-29	2 (4.5)	2 (5.4)
30-39	4 (9.1)	4 (10.8)
40-49	3 (6.8)	3 (8.1)
50-59	11 (25)	9 (24.3)
60-69	8 (18.2)	5 (13.5)
70-79	13 (29.5)	13 (35.1)
80-89	3 (6.8)	1 (2.7)
BMI (n=43)		(n=36)
Normal	13 (30.2)	11 (30.6)
Overweight	15 (34.9)	12 (33.3)
Obesity I	8 (18.6)	7 (19.4)
Obesity II	4 (9.3)	3 (8.3)
Obesity III	3 (7.0)	3 (8.3)
Comorbidities		
High blood pressure (HBP)	18 (40.9)	15 (40.5)
Dyslipidaemia	15 (34.1)	13 (35.1)
Diabetes	8 (18.2)	8 (21.6)
COPD	8 (18.2)	6 (16.2)
CKD	7 (15.9)	5 (13.5)
Coronary artery disease	6 (13.6)	4 (10.8)
Other[a]	13 (29.5)	9 (24.3)
History of smoking	19 (43.2)	16 (43.2)
Number of comorbidities		
No comorbidity	5 (11.4)	4 (10.8)
One comorbidity	6 (13.6)	4 (10.8)
Two comorbidities	10 (22.7)	10 (27)
Three or more comorbidities	23 (52.3)	19 (51.3)
Diabetes + HBP	6 (13.6)	6 (16.2)

Symptoms at admission		
Systemic	42 (95.5)	36 (97.3)
Cough	41 (93.2)	35 (94.6)
Upper respiratory	40 (90.9)	35 (94.6)
Lower respiratory	40 (90.9)	34 (91.9)
Fever	31 (70.5)	26 (70.3)
Gastrointestinal	20 (45.5)	17 (45.9)
Anosmia	4 (9.1)	3 (8.1)
Chest X-ray		
Normal	2 (4.5)	0
Consolidation	8 (18.2)	7 (18.9)
Ground-glass opacity	17 (38.6)	15 (40.5)
Other	17 (38.6)	15 (40.5)
CAT scan of the chest		
Normal	11 (25)	9 (24.3)
Consolidation	2 (4.5)	2 (5.4)
Ground-glass opacity	25 (56.8)	22 (59.5)
Other	6 (13.6)	4 (10.8)
Vital signs at admission	**Median (IQR)**	**Median (IQR)**
Heart rate (bpm)	88 (78 - 100)	88 (78 - 98)
Respiratory rate (bpm)	20 (8 - 22)	20 (18 - 22)
Temperature (°C)	36.8 (36 - 38)	36.8 (36.1 - 37.6)
SBP (mmHg)	124 (108 - 143)	125 (110 - 141)
DBP (mmHg)	78 (69 - 87)	76 (65 - 87)
Saturation (%)	90 (87 - 92)	90 (87 - 92)
Fever (>=38) (n, %)	9 (20.5)	6 (16.2)
Laboratory tests at admission	**Median (IQR)**	**Median (IQR)**
Leukocytes (10^6 cells/mL)	8.7 (5.4 - 10.4)	8.82 (6.48 - 10.4)
Lymphocytes (10^6 cells/mL)	0.9 (0.7 - 1.3)	0.85 (0.65 - 1.08)
Neutrophils (10^6 cells/mL)	6.79 (4.2 - 8.7)	7.44 (5.24 - 8.72)
Platelets (10^6 cells/mL)	183.5 (163 - 263)	181 (164 - 246)
Haemoglobin (g/dL)	14.8 (13.6 - 16.2)	14.8 (13.2 - 16.2)
LDH (U/L)	304.5 (249 - 418.5)	311.9 (266.5 - 422)
CRP (mg/L)	134.5 (78.8 - 227.7)	166.11 (109.2 - 256.5)

D-dimer (ng/mL)	498 (368 - 851)	498 (368 - 844)
Troponin (ng/L)	8.5 (6.7 - 18.8)	8.57 (6.9 - 17.4)
AST (U/L)	48.65 (38.4 - 82.7)	48.65 (43 - 82.7)
ALT (U/L)	42.8 (22.3 - 60)	49.15 (31.5 - 60)
Bilirubin (mg/dL)	0.51 (0.4 - 0.7)	0.5 (0.41 - 0.6)
Lactate (mmol/L)	1.33 (1.2 - 1.7)	1.37 (1.2 - 1.6)
Creatinine (mg/dL)	0.97 (0.8 - 1.1)	0.97 (0.74 - 1.1)
Leukocyte/lymphocytes	7.6 (4.9 - 17.1)	8.5 (5.7 - 17.5)
Prognostic biomarkers	**N (%)**	**N (%)**
Lymphopenia (<0,8)	16 (36.4)	15 (40.5)
CRP (>10 mg/dL)	16 (36.4)	16 (43.2)
ALT (2 to 5 times)	3 (6.8)	2 (5.4)
AST (2 to 5 times)	5 (11.4)	4 (10.8)
D-dimer (>1000 ng/mL)	7 (15.9)	6 (16.2)
D-dimer (>3000 ng/mL)	2 (4.5)	1 (2.7)
Troponin (>14 ng/L)	8 (18.2)	7 (18.9)
Ferritin (>1000 ng/mL)	6 (13.6)	6 (16.2)
LDH (>350 U/L)	11 (25)	11 (29.7)
LDH (>214 U/L)	25 (56.8)	22 (59.5)

HBP: high blood pressure; COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease; Dis. disease; LDH: lactate dehydrogenase; CRP: C-reactive protein; ALT: alanine transaminase; AST: aspartate transaminase; CAT: computerised axial tomography. [a]Includes apnoea, heart failure, neoplasms, asthma, arthritis and chronic liver disease.

The median time between the onset of the symptoms and the first consultation at the emergency department was 7 days (IQR: 3-8 days). Systemic symptoms (general malaise, fatigue, myalgia, arthralgia and general deterioration) were reported in 95.5% of the patients, followed by cough (93.2%), high respiratory symptoms (odynophagia and rhinorrhea) (90.9%) and low respiratory symptoms (dyspnoea, retraction and wheezing) (90.9%). Gastrointestinal symptoms, such as diarrhoea, nausea, abdominal pain and emesis, were present in 45.5% of the patients. Anosmia was reported in 9.1% of the patients. Fever was reported by 70.5% of the patients but was documented on admission only in 20.5%.

The results of the majority of admission laboratory tests were normal. However, 36.4% of the patients had lymphopenia at admission and C-reactive protein (CRP) levels higher than 10 mg/L; 25% of the patients had lactate dehydrogenase (LDH) levels higher than 349.9 U/L, and 56.8% of the patients had LDH levels higher than 214 U/L; 16% of the patients had D-dimer levels higher than 1,000 ng/ml; 18.2% of the patients had troponin levels higher than 14 ng/L; and 13.6% of the patients had ferritin levels higher than 1,000 ng/mL. The temporal trend estimates of CRP, D-dimer and troponin are presented in Figure 1. During follow-up, CRP levels increased according to the reports of the first 4 measurements, and the levels decreased after peaking; the D-dimer levels increased regardless of the outcome

of the patients, but the highest values were observed in deceased patients. The follow-up of the troponin levels indicated differential results between living and deceased patients, with the troponin levels increasing slightly over time in living discharged patients.

In the follow-up period, 21 deaths occurred, representing a 30-day mortality rate of 47.7%; median time to fatal outcome was 11 days (IQR: 5-21) (Figure 2), and the average time was 15.9 days. A composite outcome (intensive care unit (ICU), mechanical ventilation and death) was present in 36.4% of the patients and was more frequent in men from 70 to 79 years of age with grade I obesity, a history of smoking, high blood pressure and dyslipidaemia. A total of 84.1% of patients required support in the ICU for a median of 2 days (IQR: 1-4) from admission to the emergency room to transfer to the ICU; 70.5% of the patients required invasive ventilator support for a median of 2 days (IQR: 1-4). A total of 27.3% patients required renal support therapy (RST), which corresponds to 12 patients with severe pneumonia. The outcomes are presented in Table 2.

Table 2. Outcomes and complications

Outcome	Total N (%)		
Mortality	21 (47.7)		
IMV	31 (70.5)		
ICU	37 (84.1)		
Composite	16 (36.4)		
Complications	**Total N (%)**	**Severe pneumonia N (%)**	**Mortality N (%)**
ARDS	29 (65.9)	27 (73)	19 (90.5)
Septic Shock	27 (61.4)	25 (67.6)	18 (85.7)
Cardiovascular	24 (54.5)	20 (54.1)	21 (100)
Multisystemic failure	23 (52.3)	21 (56.8)	17 (81)
Acute kidney injury	20 (45.5)	18 (48.6)	11 (52.4)
Neurological	20 (45.5)	19 (51.4)	9 (42.9)
Gastrointestinal	13 (29.5)	11 (29.7)	9 (42.9)
Thrombotic conditions	4 (9.1)	3 (8.1)	4 (19)

IMV: invasive mechanical ventilation; ICU: intensive care unit; ARDS: Acute respiratory distress syndrome

The most common complications included ARDS (65.9%), septic shock (61.4%), cardiovascular complications (54.5%), multiple systemic organ failure (52.3%), acute kidney injury (45.5%) and neurological complications (45.5%). A total of 72.2% patients with severe pneumonia had ARDS, and 51.4% of these patients died. All fatal cases had cardiovascular complications. A total of 55% of the patients with acute kidney injury died.

Exploratory analysis of mortality associated with biomarkers at admission indicated a higher risk associated with troponin levels higher than 14 ng/mL (RR: 5.25; 95% CI 1.37-20.1, p = 0.004), D-dimer levels higher than 1000 ng/ml (RR: 3.0; 95% CI 1.4-6.3) and CRP levels higher than 10 mg/L (RR: 5.5; 95% CI 0.42-1.6, p = 0.009); the results are presented in Table 3.

Table 3. Relative risk and odds ratio of death according to biomarkers of risk at admission

Biomarker	Mortality		RR (95% CI)	P	OR (95% CI)	P
	Yes	No				
Lymphopenia (<0.8)	7	9	0.83 (0.42 - 1.6)	0.6	0.71 (0.16 - 3.07)	0.6
No	12	11				
CRP (>10 mg/dL)	11	5	5.5 (0.85 - 35.4)	**0.009**	15.4 (1.32 - 755)	**0.009**
No	1	7				
ALT (2 to 5 times)	2	1	1.77 (0.64 - 4.93)	0.34	3.33 (0.13 - 215)	0.34
No	6	10				
AST (2 to 5 times)	3	2	1.68 (0.61 - 4.58)	0.34	2.7 (0.2 - 40.8)	0.34
No	5	9				
D-dimer (>1000 ng/mL)	6	1	3 (1.4 - 6.3)	**0.008**	15 (1.24 - 734.4)	**0.008**
No	6	15				
D-dimer (>3000 ng/mL)	2	0	2.6 (1.6 - 4.22)	0.09	NC	NC
No	10	16				
Troponin (>14 ng/mL)	6	2	5.25 (1.37 - 2.01)	**0.004**	18 (1.5 - 268.7)	**0.004**
No	2	12				
Ferritin (>1000 ng/mL)	3	3	1.5 (0.37 - 5.99)	0.55	2 (0.12 - 37.9)	0.55
No	2	4				
LDH (>350 U/L)	6	5	1.96 (0.78 - 4.9)	0.15	3.12 (0.5 - 19.8)	0.14
No	5	13				
LDH (>214 U/L)	10	15	1.6 (0.27 - 9.33)	0.33	2 (0.13 - 115.3)	0.56
No	1	3				

RR: relative risk; p: p-value; OR: odds ratio; NC: not calculated

Estimation of the risk scales at admission involved the CCI, which could be calculated for all patients; 32 had sufficient information for SOFA and APACHE-II, and 43 had enough information for the NEWS scale. The median NEWS value was 7 points (IQR: 5-8), the median SOFA score was 6 points (IQR: 2.5-10), the median APACHE-II score was 25 points (IQR: 15-40), and the median CCI was 2 points (IQR: 1-4). Nine patients were classified with zero points

on the CCI, 15 patients had CCI from 1 to 2, 11 patients had CCI from 3 to 4, and 9 patients had CCI of 5 or higher. According to the American Thoracic Society (ATS) classification, 96.6% of the patients had severe pneumonia, and the median time to death in these patients was 13.5 days (IQR: 8.5-21.5 days).

Treatment of SARS-CoV-2 infection was achieved by implementation of the schemes based on antibiotics (90.9%) and antimalarial agents in combination with antiviral agents (72.7%). Two patients who had positive indications for influenza were treated with oseltamivir, and both patients died. A total of 37 patients had severe pneumonia; 30 of these patients received hydroxychloroquine plus ritonavir/lopinavir, and 36 patients were treated with antibiotics. In addition, 11 of the deceased patients received hydroxychloroquine plus ritonavir/lopinavir, and 19 patients received antibiotics. In patients with a composite outcome, 56.5% received hydroxychloroquine plus an antiviral agent, 62.5% received chloroquine plus an antiviral agent, and 93.8% received an antibiotic.

The median overall hospital stay was 13 days (IQR: 8-22.5 days). The average hospital stay was 6.4 days (SD: 6.8 days), and the average ICU stay was 11.6 days (SD: 11.5 days).

Discussion And Conclusions

In Colombia, the first case of SARS-CoV-2 infection was reported on March 6, and the first death occurred 10 days later; however, the clinical course of patients with SARS-CoV-2 infection has not been documented in Colombia. By mid-July 2020, 218,000 confirmed cases had been registered in Colombia, and 10% of the cases required admission to the hospital (12).

The baseline characteristics of the study population are similar to those of previously published epidemiological studies with a slightly higher age of hospitalisation than that reported in the initial studies in China (49 years in the initial Huang report (7) and from 55 to 56 years in the subsequent reports by Xu (13) and Wang (14)). In subsequent studies in Italy, Spain and New York, the median age of the population was the same as that reported in our study (6,15,16).

In patients admitted 7 days after the onset of the symptoms, the most common complaints included general discomfort, cough, fatigue, dyspnoea and, to a lesser extent, odynophagia, vomiting, headache and anosmia, which matches the symptoms reported in the studies in China (7,13,14). It should be noted that in our group of patients, fever was documented only in 20.5% of the patients on admission; however, 70% had fever previously. The frequency of fever varies among the studies; in the largest cohort in Europe, fever was present in 45.4% of the cases (15), while in China, fever was present in more than 80% of the cases (17–19). In a study of 1,099 hospitalised patients, Guan et al. reported the presence of fever in 44% of the cases at hospital admission (20). A total of 93% of the patients had a cough in our study; in other studies, the incidence of cough varied from 48.7% to 65.5% (15,17,19,21). Dyspnoea was present in 85% of the patients with severe pneumonia, in contrast with the meta-analysis and systematic review of Zhao et al., which reported dyspnoea in 44.2% of patients with severe pneumonia (95% CI: 7.8-80.6) and in 5.7% of patients with non-severe infection (95% CI: 0-10.7%) (22); moreover, dyspnoea has been reported as a marker of severe and progressive disease (23–25).

Strikingly, anosmia was only reported by 4 people; however, Menni et al. reported that loss of smell can be a frequent symptom, and anosmia accompanied by fever, fatigue, persistent cough, diarrhoea, abdominal pain and loss of appetite can predict COVID-19 with a specificity of 0.83 (95% CI: 0.81-0.86) and a sensitivity of 0.55 (95% CI: 0.50-0.59) (26). It is likely that the availability of additional information on the anamnesis of the disease will place a higher emphasis on this symptom and that the incidence of anosmia will be higher than that described in the present

study. Similarly, gastrointestinal symptoms occurred in less than 30% of the cases; however, it has been reported that diarrhoea and nausea can precede fever and lower respiratory tract symptoms (27).

Older adults and people with pre-existing comorbidities, particularly cardiovascular diseases, high blood pressure and diabetes mellitus, have a significant risk of progression, complications and death (28–30). In our study, 79.5% of the patients were older than 50 years, and 75% of the patients were affected with more than 2 comorbidities; the most frequent comorbidities included obesity, high blood pressure, dyslipidaemia, diabetes and a history of smoking. The overall in-hospital mortality of the patients over 60 years of age was 66.7%. These data are similar to the results of Liu et al., who reported a higher risk of disease progression and death in people older than 60 years (OR: 8.5; 95% CI: 1.6-44.8), with a history of smoking (OR: 14.2; 95% CI: 1.5-25) and with respiratory failure (OR: 8.7; 95% CI: 1.9-40) (31). Similarly, Wu et al. reported a higher case-fatality rate among older adults: (≥80 years: 14.8%; 70-79 years: 8.0%; 60–69 years: 3.6%) and among patients with comorbidities, including 10.5% for cardiovascular diseases, 7.3% for diabetes, 6.3% for chronic respiratory diseases, 6.0% for high blood pressure and 5.6% for cancer (29). In a cohort study in the United States, the United States Centers for Disease Control and Prevention (CDC) COVID-19 response team reported higher mortality in people aged ≥85 years (range 10%-27%), followed by 3%-11% mortality for ages from 65 to 84 years (30). As of the current date (July 20, 2020), among all cases of death in Colombia (6,736), the most frequent comorbidities were diabetes mellitus (26.2%), chronic kidney disease (14.8%) and cancer (10.3%). A substantial increase in mortality was observed in older people (12).

Unlike reported previously in other studies, 37 (84.1%) of 44 patients in the present study developed severe pneumonia and required intensive care management, and 31 patients required mechanical ventilation within 2 days after admission to the hospital. These data differ from data in preliminary reports from China, which indicated a range of 26% to 32% of patients requiring ICU management (13,14,28). In the United States, the CDC reported an incidence of ICU admission from 7 to 26% (30), while in Italy, 12% of all detected cases of COVID-19 and 16% of all hospitalised patients were treated in the ICU (32,33).

The high incidence of ICU admission in our cohort of hospitalised patients may be related to a higher severity of clinical manifestations at admission; the majority of the patients were admitted 1 week after the onset of symptoms, which corresponds to the period of maximum alert for the risk of clinical deterioration (7,14,34,35). This situation has important implications for health care systems. The overall data for Colombia revealed that approximately 55% of deaths occurred within the first 10 days after hospitalisation (12), which reaffirms this finding and indicates a need for early detection of the patients at risk of complications. The mortality of the patients admitted to the ICU was 51.3%; however, mortality varied from 39% to 72% depending on the study and is associated with age, comorbidities and complications (27,28,34,35).

Similar to the cohorts reported in the previous studies, common laboratory test abnormalities of hospitalised patients with COVID-19 included lymphopenia and elevated levels of CRP, LDH and troponin (14,20,36). Lymphopenia is a marker of impaired cellular immunity and has been reported in 67-90% of the patients with COVID-19 (7,37,38). Elevated levels of D-dimer at admission, as in our patients, have been reported in 46% of hospitalised patients with a longitudinal increase during the hospital stay; in our study, D-dimer levels higher than 1000 ng/mL were significantly associated with an increased risk of mortality (20,28,34,39).

Similar to the previous reports, the radiographic findings mainly included ground-glass opacities and parenchymal consolidations, and only a single patient had normal chest radiography; however, reports of normal chest radiography at the beginning of the disease are frequent (20,40). On admission, 11 of the 44 patients in our cohort had a normal chest computed tomography (CT) result, and 9 of the patients had severe pneumonia with bilateral ground-glass

opacity, thus confirming previously reported observations (41–43). Considering the variability of the radiographic findings in the CT due to the evolution time and severity of the disease, the American College of Radiology does not recommend CT as a first-line test for the diagnosis of COVID-19 (44), and the Radiological Society of North America has suggested categorisation of the images to standardise the interpretation and reporting (45). These guidelines match the observations of the previous studies in critically ill patients (20,46–48). In patients who developed severe pneumonia, the mean time to dyspnoea ranged from 5 to 8 days, the median time to ARDS ranged from 8 to 12 days, and the mean time to admission to the ICU varied from 10 to 12 days (7,14,34,35).

Similar to previous reports, ARDS was the main complication in our patients. ARDS developed in 65.6% of the patients, and 26 patients required mechanical ventilation with 65.5% mortality, which was increased concomitant to the severity of the disease; older patients with comorbidities had a higher probability of mortality (5,39,49). Acute kidney injury was present in 45.4% of the cases, and renal replacement therapy was indicated in 27.2% of the cases; this is a frequent complication detected in approximately 20-40% of the patients admitted to the ICU (5,50,51). Therefore, prevention of nephrotoxicity and early detection are very important to establish a timely treatment that impacts morbidity and mortality.

The majority of the patients were treated with antiviral drugs and antibiotic therapy according to the recommendations approved and enforced during the period of the study. In vitro studies with chloroquine or hydroxychloroquine have shown antiviral activity; however, the available evidence has not confirmed the benefits of these antimalarial drugs in patients with SARS-CoV-2/COVID-19 infection (52–54). Support measures and comprehensive management in hospitalised patients can reduce complications and mortality (55).

Our study has certain limitations: (i) the study has inherent limitations by design since it is a purely descriptive study in a small sample without any permissible inference to the general population; however, it provides an overview of the epidemiological situation in hospitalised patients with SARS-CoV-2/COVID-19 infection in Latin America, mainly in Colombia; (ii) at the moment of data collection, Latin America was not at the epicentre of the pandemic; (iii) in the case of some estimates, information was not available for all patients, which may incur a bias because availability of this information can be related to more severe manifestation of the disease and/or transfer to the ICU, where strict monitoring of the patients is performed.

Conclusion:

The clinical course of SARS-CoV-2 infection diagnosis confirmed by RT-PCR in Colombian patients admitted to a high-complexity hospital was similar to that reported in the literature; however, the population was characterised by a more advanced stage of the infection. This report provides a snapshot of the pattern of the pandemic in Colombia and Latin America to guide strategic and clinical decision making and public health policies to ensure reduced potential impact for patients, institutions and the health system.

List Of Abbreviations

CI	Confidence interval
ALT	Alanine Transaminase
APACHE II	Apache-II Score
ARDS	Acute respiratory distress syndrome
AST	Aspartate transaminase
ATS	American Thoracic Society
BMI	Body Mass Index
CAT	Computed axial tomography
CCI	Charlson comorbidity index
CDC	Centers for Disease Control and Prevention
CKD	Chronic Kidney Disease
COPD	Chronic Obstructive Pulmonary Disease
CRP	C-reactive protein
CT	computed tomography
DBP	Diastolic blood pressure
SD	Standard deviation
HBP	High Blood Pressure
ICU	Intensive care unit
IMV	Invasive mechanical ventilation
IQR	Interquartile range
L/R	Lopinavir/Ritonavir
LDH	Lactate dehydrogenase
N	Number of people
NEWS	National Early Warning Score
OR	Odds ratio
RNA	Ribonucleic acid
RR	Relative Risk
RST	Renal support therapy
RT-PCR	Reverse transcription polymerase chain reaction
SBP	Systolic Blood Pressure
SOFA	Sequential Organ Failure Assessment
U/L	Units per litre

Declarations

Ethical approval and consent to participate: The research was approved by the ethics committee of the Clinica Colsanitas and the Fundacion Universitaria Sanitas (CEIFUS 464-20) in Bogotá, Colombia.

Consent for publication: Not applicable

Availability of data and materials: The data analysed during the study are available upon reasonable request.

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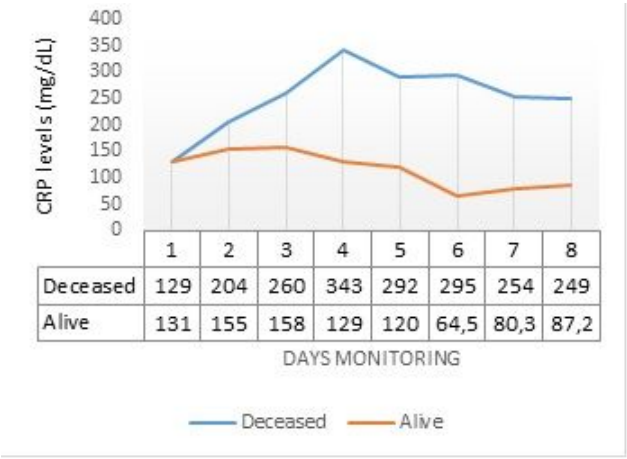
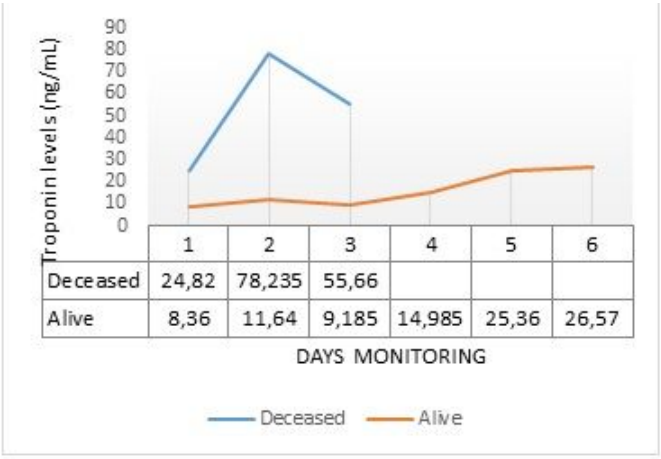
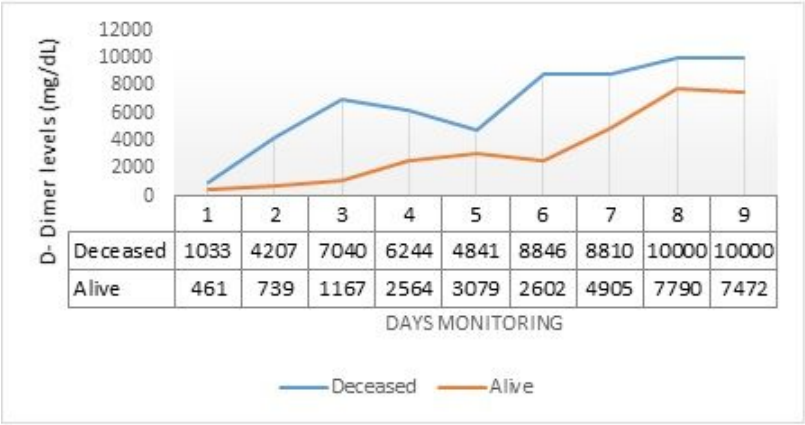
Figures



1A. C-Reactive protein (CRP) levels classified by the outcome condition



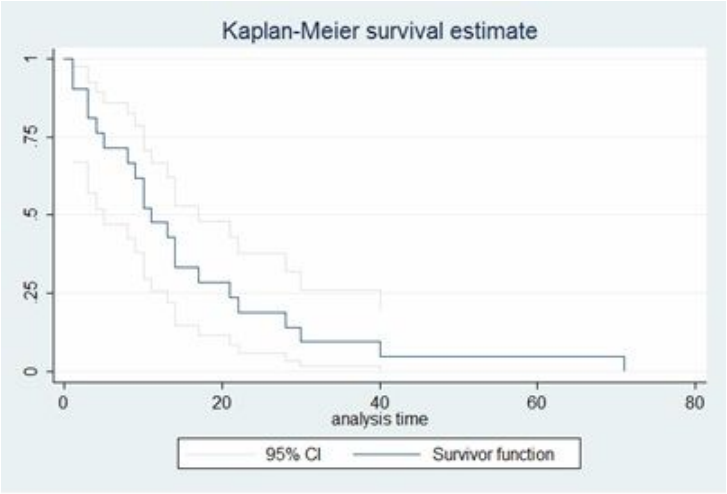
1C. Troponin levels classified by the outcome condition



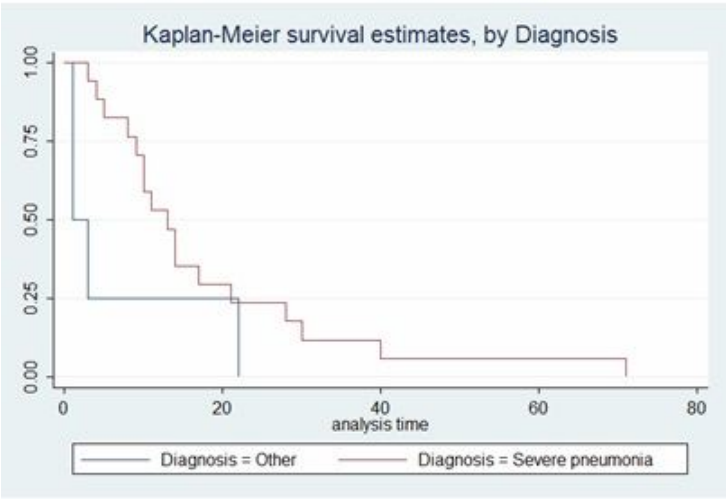
1B. D-dimer levels classified by the outcome condition.

Figure 1

Time-dependant changes in C-reactive protein, D-dimer and troponin levels in hospitalised patients with SARS-CoV-2/COVID-19



A. Overall survival curve



B. Survival by diagnosis at admission

Figure 2

Overall survival and survival classified by diagnosis at admission curves in patients with SARS-CoV-2/COVID-19