Risk factors on admission and condition at discharge of 529 consecutive COVID-19 patients at a tertiary care center in Santiago, Chile

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Abstract

Background: The first case of COVID-19 was reported in Chile on March 3, 2020. Public and private hospitals were managed in a centralized manner. On May 30, Chile had 99,668 cases, 1054 deaths, 1383 ICU patients, 1174 patients on invasive mechanical ventilation (IMV), and 51 patients on non-invasive ventilation (NIMV).

Research question: What are the variables associated with condition at discharge?

Method: We performed a retrospective cohort study of 529 patients with a positive RT-PCR for SARS CoV-2who were consecutively discharged between March 14 and June 4, 2020, at Clínica Dávila, Santiago. Patients were analyzed according to laboratory variables on admission, Quality-Adjusted Life Year (QALY) score, health insurance, and type of respiratory support. Condition at discharge was survivor, non-survivor, or transfer to another center. Differences were evaluated by Chi-square test, Student's t test, or Mann–Whitney U test. Logistic regression analysis was performed to identify variables that were predictive of condition at discharge.

Results: Median (interquartile range, IQR) age was 49 (37–62) years, and the median (IQR) stay in the hospital was 6 (3–10) days. A total of 352 patients (66.5%) had respiratory symptoms, 177 (33.4%) had other symptoms or diagnoses on admission, and 116 required ventilatory support; 448 (84.7%) were survivors, 54 (10.2%) were non-survivors, and 27 (5.1%) were transferred. The median ages of the survivors and non-survivors were 46 (36–59) and 75.5 (66–84), respectively.

Having state health insurance increased the risk of death by 2.8-fold (OR, 2.825; 95% CI: 1.383–5.772; P = 0.004). Multivariate analysis revealed the following predictive variables: age ≥ 60 years (OR, 15.3; 95% CI: 7.25–32.2; P = .001); PaO_2/FiO_2 on admission ≤ 200 vs > 200 (OR, 5,205; CI 95%: 1,942–13,94); high-sensitivity troponin, ≥ 15 vs <15 ng /L (OR, 5,163; 95% CI: 1.95–13,64; P = .001); and QALY ≤ 15 vs > 15 points (OR, 14,011; 95% CI: 4,826–40,679; P=.001).

Interpretation: The variables analyzed and patient's clinical evolution may allow assignment of ICU beds to patients with the greatest chance of survival, especially in countries or regions where this resource is limited.

Introduction

On March 3, 2020, the first case of COVID-19 was reported in Chile. Over the following days, a growing number of cases were reported in the central and southern zones of the country, reaching the Metropolitan Region in mid-March 2020. The Chilean Ministry of Health assumed centralized control of all beds in public and private hospitals. By May 30, 2020, in the country as a whole, 99668 patients were infected and 1054 had died. A total of 1383 patients were in intensive care units (ICUs); 1174 were on invasive mechanical ventilation (IMV) and 51 on non-invasive mechanical ventilation (NIMV). At the same time, the Chilean Society of Intensive Medicine reported that 253 patients were on IMV outside critically ill adult units. Clínica Dávila, Hospital San José, and Hospital Clínico de la Universidad de Chile are the main level III hospitals in the northern area of Santiago.

Before the pandemic Clínica Dávila had 647 beds, including beds for adult and pediatric cases of varying degrees of complexity.

By June 4, 2020, Clínica Dávila had 334 COVID-19 beds with an occupancy of 95.8%. The number of ICU beds for adult COVID-19 patients increased by 500%, from 12 to 62, including 15 ICU beds in surgical rooms with all patients on IMV. The number of intermediate care unit (IMCU) beds increased by 300%, from 24 to 72, with 68 hospitalized patients, of whom 30 were connected to NIMV, 16 were connected to high-flow nasal cannula (HFNC), and four were ventilated by tracheostomy (TQT) through adapted non-invasive ventilators.

Overall, 81% of COVID-19 infections are mild, 14% severe, and 5% require intensive care[1]. The mortality rates published by China, Italy, and the United States range from 1.4% among hospitalized patients[2] to 61.5% among critically ill patients[3].

Objectives

Primary objective: To analyze demographic, clinical, and laboratory characteristics at admission that may have prognostic value regarding the condition of patients at discharge.

Secondary objective: To analyze the type of ventilatory support used and condition at discharge.

Methods

Patients and method

This study was conducted in accordance with the Declaration of Helsinki[4] and approved by the Ethical and Scientific Committee of Clínica Dávila.

Patients and data collection

All patients with positive laboratory tests for SARS CoV-2, hospitalized and discharged between March 14, 2020 and June 04, 2020, were included in this study. The patients were discharged in the following sequence: in March, six patients; in April, 17 patients; in May, 452 patients (85.4%); and in the first 4 days of June, 54 patients.

COVID-19 disease was diagnosed based on guidelines from the World Health Organization (WHO). Confirmed cases were patients with positive results from real-time polymerase chain reaction (RT-PCR) test for SARS CoV-2, performed on samples of the upper respiratory tract harvested by nasopharyngeal swab[5]. Positive patients were entered into the mandatory notification system, Epivigila (https://epivigila.org.cl)[6], created by the Ministry of Health. The most frequent respiratory symptoms were dyspnea, odynophagia, cough, and chest pain. Other predominant symptoms were vomiting, diarrhea, abdominal pain, and myalgias.

Gender, age, health insurance, duration of symptoms before admission, and comorbidities (T2DM, HT, cancer, HIV, immunosuppression from other causes, heart failure, kidney failure, obesity, coronary heart disease, bronchial asthma, active smoking, and chronic obstructive pulmonary disease) were recorded. For all patients, the Quality-Adjusted Life Year (QALY) score was calculated. QALY is a generic measure of disease burden that is used to evaluate the impact of therapeutic measures on the quality of survival expected with or without an intervention. It considers the life expectancy of a country or region from which the patient's age number is subtracted; the resultant value is multiplied by 1 in the absence of comorbidities, or in the case of existing comorbidities, 0.1 is subtracted from factor 1 for each compensated comorbidity, 0.2 for each decompensated comorbidity (or in the case of a semi-dependent patient), and 0.3 if the patient was previously bedridden[7]. Also, duration of hospitalization and non-invasive and invasive ventilatory support (expressed in days) were recorded. The type of bed used by the patient before discharge or transfer to another center was also recorded.

Sample collection, ethological agent, and laboratory tests

Laboratory examinations on admission were taken in the emergency room, or within the first 3 hours of admission, including RT-PCR for SARS CoV-2, arterial blood sample for arterial gases, relationship between the arterial partial pressure of O_2 (expressed in mmHg) and the fraction of O_2 that the patient was breathing at the time the sample was obtained (PaO_2/FiO_2), ferritin, D Dimer, C-reactive protein (PCR), procalcitonin, platelet count, white blood cell count, viral panel by real-time PCR (identifying 17 viruses), bacterial panel by real-time PCR (identifying seven bacteria), urinary antigen for *Pneumococcus* and *Legionella*, blood cultures, and positive expectoration cultures.

Methods of administration of oxygen and ventilatory support used

Administration of O_2 was carried out as follows: 1. Through the nose at a flow rate of up to 4 L/min. 2. High-flow multi-vent mask with FiO_2 from 40% to 50%. 3. Non-rebreather mask that delivered an FiO_2 between 50% and 90%.

Administration of O_2 through a HFNC was performed using AIRVO 2 (Fisher & Paykel, New Zealand).

For NIMV, we used Philips Respironics V60, BiPAP Vision, Trilogy 100, and Trilogy 202 equipment. For IMV, we used Avea, Vela, Bellavista (VYAIRE Medical, INC), Engström Carestation (General Electric), MAQUET (Getinge group), Nellcor Puritan Bennett 840 (Medtronic), and GE Datex Ohmeda Aestiva 5 (General Electric) anesthesia machines. The duration of these two modalities of ventilatory support (NIMV and IMV) was measured in days.

Discharge conditions: survivor, non-survivor, or transfer to another institution.

Statistical analysis

A retrospective cohort study was performed on 529 patients with a positive RT-PCR for SARS CoV-2 consecutively discharged between March 14 and June 4, 2020 at Clínica Dávila, Santiago. Clinical information was obtained from the electronic medical record of Clínica Dávila and collected in a database designed to ensure that the identities of the patients was protected.

Categorical variables were described using absolute and relative frequencies, and quantitative variables were described using means and standard deviation for those with normal distributions and with median and interquartile range (Q1, Q3) for those without normal distributions. For the categorical variables, association with condition at discharge was evaluated using the Chi-square test, whereas for quantitative variable, association was evaluated using Student´s test (normal distribution) or Mann–Whitney U test (non-normal distributions). To assess risk factors for discharge status, we used univariate and multivariate logistic regression models. First, the variables were analyzed individually; those with a p-value less than 0.1 were incorporated into a stepwise model with "forward-selection", and variables with a Pearson correlation greater than 0.8 were excluded to avoid collinearity and choose variables with greater predictive capacity. Finally, univariate models were used with variables categorized according to clinical criteria, and variables with a p-value less than 0.1 were again incorporated into a stepwise model. Significance level (α) less than or equal to 0.05. All analyses were performed using STATA v14.2 IC software (StataCorp. LLC, USA).

Results

General characteristics, duration of symptoms, and cause of admission

In this cohort of 529 COVID-19 patients, the median age (Q1, Q3) was 49 (37–62) years: 353 patients (68.5%) were younger than 50 years, 68 (13%) were 70 years or older, 14 (2.6%) were minors, three were newborns, seven were infants, and four were children (aged 6, 7, 10, and 14 years). Women made up 45% of the cohort (238/529).

The median duration of symptoms before admission was 6 (3–10) days; 171 patients (32.3%) were hypertensive and 98 (18.5%) were diabetics. The median QALY score was 29.7 (16.8–43.7). In terms of insurance status, 317 patients (59.9%) had state health insurance, 195 (36.9%) had private health insurance, and 17 patients (3.21%) had no health insurance. Only 86 patients (16.2%) were registered as obese (BMI> 29.9). Active smoking was confirmed in 4% of patients (Table 1).

Of the 529 patients, 352 (66.5%) reported respiratory symptoms in the emergency department and had a chest CT scan with a COVID-19 pattern; on the other hand, in the remaining 177 patients (33.4%), the grounds for hospitalization were non-respiratory symptoms. Of those, 84 patients (15.9%) had digestive symptoms (nausea, vomiting, diarrhea, or difficult-to-control abdominal pain) or intense myalgia and headache that had not responded to outpatient management. Ninety-three patients (17.6%) had other grounds for admission, but the presence of SARS CoV-2 was confirmed due to the obligatory testing of all patients who were hospitalized during that period. Thirty-five were pregnant adult women hospitalized for pregnancy complications or in labor. Only two puerperal patients presented respiratory symptoms and required IMV. Both had pulmonary compromise on chest CT, and neither died. Thirty-two patients were admitted for other non-infectious causes (acute coronary syndrome, deep vein embolism thrombus, and others), and 23 were admitted for other concomitant infections (acute cholecystitis, acute pyelonephritis, cholangitis, and others) (Table 1).

The median duration of symptoms before admission was 6 days (3–8), and the median duration of hospital stay was 6 days (3–10).

Global lethality, according to age, QALY score, respiratory support, health insurance, and other conditions

At discharge, 448 patients (84.7%) were survivors, with a median age of 46 (36–59) years; 54 were non-survivors (10.2%) with a median age of 75.5 (66–84) years (p = 0.001). Of the 54 non-survivors, 45 (83.3%) were 60 years or older; the lethality in this group was 29% (Table 2).

The median QALY score of the survivors was 33 (9.7–44.7) points, and in non-survivors, the median was 4,4 (-2.2–12.3) points (p = 0.001). The median duration of hospitalization was 6 (4–10) days for survivors and 6.5 (4–13) days for non-survivors (p = 0.337) (Table 2).

Of 529 patients, 177 did not receive oxygen or ventilatory support, 236 received oxygen at variable rates or HFNC, and 116 received ventilatory support with NIMV or IMV. None of the patients underwent extracorporeal membrane oxygenation (Table 3).

Of the 116 patients who received support ventilation, 67 were discharged alive (57.8%), 28 died in the hospital (24%), and 21 were transferred to another hospital (18%) (Tables 2 and 3).

In terms of health insurance status, 317 patients had state health insurance, and 42 of these individuals died in the hospital (15.4%); their mean age (p25, p75) was 53.2 (40–66) years. A total of 195 patients had private insurance, and 10 of these individuals (5.12%) died in the hospital (p = 0.001); their mean age was 45 (33–57) years (Table 4 and 2). Thus, having state health insurance increased the risk of death by 2.8-fold (OR, 2.825; 95% CI: 1.383–5.772; P = 0.004) (Table 5).

In our cohort, obesity was not identified as a poor prognostic factor: 15.8% of those who survived and 16.7% of those who died were obese (p = 0.437) (Table 2).

Univariate and multivariate logistic analysis of demographics, comorbidities, and laboratory variables.

In the univariate analysis, the clinical variables on admission that differed significantly between survivors and non-survivors were age, hypertension, and diabetes. Laboratory variables that differed significantly were procalcitonin, ferritin, PaO_2/FiO_2 at admission, leukocytes, double dimer, and creatinine (Table 5).

Categorized variables results

We considered the results of published studies[2,3,8,9] and applied cut-off points for demographic and laboratory variables obtained on admission. We then analyzed its relationship with the condition at discharge. Univariate logistic analysis revealed that age (≥ 60 years), QALY score (≤ 15 vs. > 15 points), double dimer D (> 1 vs. ≤ 1 ug/ml), high-sensitivity troponin (≥ 15 vs. <15 ng/L), CRP (>8.2 vs. ≤ 8.2 mg/dl), procalcitonin (≥ 0.5 vs. < 0.5 ng/ml), and creatinine (> 1.4 vs. ≤ 1.4 mg%) were significantly associated with the risk of death at discharge (Table 6).

The multivariate logistic analysis revealed that QALY score (≤ 15 vs. > 15 points), PaO_2/FiO_2 on admission (≤ 200 vs. > 200), and high-sensitivity troponin (≥ 15 vs. <15 ng/L) were risk factors of death at discharge (Table 6).

Discussion

In a previous series of 393 consecutive cases examined in New York city[10], the median age was 62.2 years (48.6–73.7) and 40 patients died, corresponding to an overall lethality of 10.2%. In our series, the lethality was the same (10.2%), but our patients were younger with a median age of 49 years (37–62). In the previously described series, 130 patients needed IMV (33%), and the lethality of that group was 14.6% (19 patients). In our series, 84 patients (15.9%) needed IMV, of whom 46 (54.7%) survived, 18 died (21.4%), and 20 (23.8%) were transferred to other centers (Table 2).

The strategy used in the New York group involved early IMV essentially without the use of HFNC or NIMV. In our series, patients who had no indication for intubation upon arrival at the emergency room received O_2 at increasing flow rates, with or without HFNC and NIMV. Lack of response led to IMV (Table 2).

In an analysis of a consecutive series of 78 patients, 11 patients (14.1%) presented with progression of respiratory failure and 62 improved or stabilized. Those who deteriorated were older, tended to be smokers, and had more comorbidities[11].

In our cohort, patients with state health insurance were 2.8 times more likely to die than patients with private health insurance. In part, this may have been because the mean age of patients with state insurance was 53.2 ± 17,8 years, whereas that of patients with private insurance was 45 ± 17.3 years (p = 0.001). In the group with state health insurance, 38% were ≥ 60 years old. Meanwhile, among the patients with private health insurance, only 19.4% of patients were ≥ 60 years old (Tables 5 and 6).

In patients with severe ARDS admitted to the ICU, PaO_2/FiO_2 has prognostic value[8]. In our clinical practice during the pandemic, we used $PaO_2/FiO_2 \leq 200$ on admission to identify patients who needed to enter the intermediate care unit for HFNC or NIMV. On the other hand, patients with $PaO_2/FiO_2 > 200$ were hospitalized in the general ward with supplementary oxygen. We retrospectively analyzed our series and found that this cut-off point had prognostic value.

In our patients, we categorized patients as QALY ≤ 15 or QALY > 15 points. In the multivariate analysis, this cut-off point showed a strong statistical significance for risk of death at discharge. Regardless of their clinical condition, we calculated the QALY score for all patients who were enrolled in our study. The purpose of this calculation was to identify patients who would benefit from an ICU bed in the clinical scenario of severe ARDS. This was important due to the limited number of these units and the need to transfer to another center with free ICU beds. Transfer was under the jurisdiction of the Centralized Bed Management Unit (UGCC) of the Chilean Ministry of Health. In our cohort, 27 patients were transferred to other centers with an available ICU bed.

One review of support modalities in acute respiratory failure in patients with COVID-19 recommend the use of HFNC in cases with mild respiratory insufficiency (PaO_2/FiO_2 between 200 and 300). In cases with moderate respiratory insufficiency (Pa/FiO_2 between 100 and 200), NIMV alone could be useful. The authors of that review also suggested that rotation between the two modes (HFNC and NIMV) may be a beneficial strategy when PaO_2/FiO_2 increases and respiratory rate or volume/minute improves [12]. However, the timely availability of IMV when this mixture fails depends on the center, as the prolonged use of NIMV without an evident clinical response and persistence of increased respiratory work can generate more damage[13].

Conclusions

Our analysis of 529 consecutive patients included patients who were younger than the cases reported in North America and Europe. Lethality was 10.2%. A third of patients who were hospitalized had no respiratory symptoms. The remaining two-thirds had varying degrees of respiratory failure. Of those, 116 (21.9%) required ventilatory support.

Patients over age of 60 or with QALY scores <15 were at higher risk of dying. From the admission laboratory, patients with $PaO_2/FiO2 < 200$, high-sensitivity troponin ≥ 15 ng/ml, or creatinine > 1.4 mg% also had a higher risk of dying.

Due to the reduced availability of ICU beds in the pandemic context, it was important to determine variables upon admission that allow clinicians to assign those beds to patients with the greatest chance of survival, especially in countries or regions where this resource is limited.

The differences in the prognosis that we observed between patients with state health insurance and private health insurance were related to the older age and higher burden of disease, expressed by the QALY score, in the former group.

Research limitations

We did not register the severity of the lung involvement in the lung CT SCAN of patients and follow-up laboratory variables. The only variable that we registered post-admission was the determination of PaO_2/FiO_2 before connection to NIMV or IMV. We consider that the tobacco habit was under registered. Information about obesity was absent in some patients.

Declarations

Conflicts of interest

The authors have no conflicts of interest related to this study.

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Tables

Table 1. Characteristics of COVID-19 patients (n= 529)

Variables		Absolute freq/ Average/ median	Relative freq/ Standard dev/ IQR
Sex	Female	238	45.0
	Male	291	55.0
Age range	<18	14	2.6
	19–39	151	28.5
	40–49	102	19.3
	50–59	100	18.9
	60–69	94	17.8
	≥70	68	12.9
BMI*	<30	244	46.1
	>29.9	86	16.3
Smoking	No	506	95.7
	Yes	21	4.0
Comorbidities	Arterial hypertension	171	32.3
	Diabetes mellitus	98	18.5
Health insurance	State health insurance	317	59.9
	Private health insurance	195	36.9
	Without health insurance	17	3.2
Motive for admission	Symptoms respiratory due to COVID-19	352	66.5
	Digestive symptoms, myalgias, and headache due to COVID-19	84	15.9
	Gyneco–obstetric cause	35	6.6
	Other infectious processes	23	4,3
	Other non-infectious processes	32	6,0
	Newborn	3	0,6
Condition	Age (years)	49	(37–62)
	QALY** score (points)	27.7	(16.8–43.7)
	Days with symptoms	6	(3–8)
	Days in hospital	6.0	(3–10)
Laboratory	PaO_2/FiO_2 at admission	304	(231–355)
	PaO_2/FiO_2 pre-mechanical ventilation	157.7	53.0
	Ferritin (ng/ml)	785	(362–1524)
	Double dimer (µg/ml)	0.3	(0.2–0.6)
	High-sensitivity troponin (ng/L)	6.9	(4.4–12.5)
	C-reactive protein (mg/dl)	7.1	(2.9–14.4)
	Procalcitonin (ng/ml)	0,1	(0.1–0.3)
	Platelets, × 10^9/L	230	(180–295)
	Leukocytes, × 10^9/L	7.4	(5.5–10.5)
	Creatinine (mg%)	0.8	(0.7–1.0)

* Body mass index, expressed in kg/m^2.

† Quality-adjusted life year (QALY) score is a generic measure of disease burden.

Table 2. Demographic characteristics, health insurance, laboratory, motive of admission, and support type given, according to discharge condition

CATEGORY/ VARIABLE		Survivors		Non-survivors		Transferred		p-value
		Absolute freq Average Median	Relative freq Standard dev IQR	Absolute freq Average Median	Relative freq Standard dev IQR	Absolute freq Average Median	Relative freq Standard dev IQR	
	N	448	84.7	54	10.2	27	5.1	–
	Median age (IQR), years	46	(36–59)	75.5	(66–84)	56	(39–61)	<.001
	QALY† score (points)	33	(19.7–44.7)	4.4	(-2.2–12.3)	23,7	(18.2–37.5)	<.001
	Days with symptoms	6	(3–8)	5.0	(3–7)	7.0	(5–10)	.80
	Days in hospital	6	(4–10)	6.5	(4–13)	2.0	(1–4)	.33
Laboratory	PaO_2/FiO_2 at admission	316	(261–360)	167	(80–268)	212	(130–291)	<.001
	PaO_2/FiO_2 pre-mechanical ventilation	148.0	47.0	127.7	62.7	103.2	46.2	.09
	Ferritin (ng/ml)	764	(337–1445)	695	(399–2176)	1060	(546–1875)	.46
	Double dimer (µg/ml)	0.3	(0.2–0.5)	0,8	(0.4–2.0)	0,3	(0.2–0.6)	<.001
	High-sensitivity troponin (ng/ml)	5.8	(4.1–9.3)	22.8	(15.1–44.9)	7.3	(5.8–12.5)	<.001
	C-reactive protein (mg/dl)	6.3	(2.3–13)	13.9	(6.7–26.0)	14.2	(6.1–24.6)	<.001
	Procalcitonin (ng/ml)	0.1	(0.1–0.2)	1.0	(0.3–1.8)	0.2	(0.1–0.5)	<.001
	Platelets, × 10^9/L	230.0	(183–293)	229.0	(152–335)	229.0	(162–278)	.675
	Leukocytes, × 10^9/L	7.2	(5.4–9.8)	9.8	(6.5–14.7)	7.7	(6.1–11)	<.001
	Creatinine (mg%)	0.8	(0.7–1.0)	1.16	(0.8–1.8)	0.8	(0.7–1.1)	<.001
Sex	Female	205	45,8	24	44.4	9	33.3	.45
	Male	243	54.2	30	55.6	18	66.7	
Age range	<18	14	3.1	0	0.0	0	0.0	<.001
	19–39	141	31.5	3	5.6	7	25.9	
	40–49	97	21.7	2	3.7	3	11.1	
	50–59	87	19.4	4	7.4	9	33.3	
	60–69	81	18.1	8	14.8	5	18.5	
	≥ 70	28	6.3	37	68.5	3	11.1	
BMI*	<30	214	47.8	20	37.0	10	37.0	.43
	>29.9	71	15.8	9	16.7	6	22.2	
Smoking	No	430	96.0	53	98.1	23	85.2	.011
	Yes	16	3.6	1	1.9	4	14.8	
Health insurance	State health insurance	255	56.9	42	77.8	20	74.1	.001
	Private health insurance	183	40.8	10	18.5	2	7.4	
	Without health insurance	10	2.2	2	3.7	5	18.5	

Motive of admission	Respiratory and non-respiratory symptoms due to COVID-19	360	80.4	49	90.7	27	100.0	.12
	Gyneco–obstetric cause	35	7.8	0	0.0	0	0.0	
	Other infectious processes	22	4.9	1	1.9	0	0,0	
	Other non-infectious processes	28	6.3	4	7.4	0	0,0	
	Newborn	3	0.7	0	0.0	0	0.0	
Type of support and prognosis	Only environmental O_2	174	38.8	1	1.9	2	7.4	.001
	Only supplementary O_2	179	40.0	20	37.0	3	11.1	
	Only HFNC‡	28	6.3	5	9.3	1	3.7	
	HFNC + NIMV§	11	2.5	2	3.7	0	0.0	
	Only NIMV	10	2.2	8	14.8	1	3.7	
	NIMV + IMV‖	2	0.4	6	11.1	6	22.2	
	IVM	44	9.8	12	22.2	14	51,9	
Last bed	BASIC	441	98.4	25	46.3	7	25.9	.001
	MEDIUM	4	0.9	6	11.1	2	7.4	
	ICU	0	0.0	16	29.6	16	59.3	
	IMCU¶	3	0.7	7	13.0	2	7.4	

* Body mass index, expressed in kg / m^2.

† Quality-adjusted life year (QALY) score is a generic measure of disease burden.

‡ High-flow nasal cannula.

§ Non-invasive mechanical ventilation.

‖ Invasive mechanical ventilation.

¶ Intermediate care unit.

Table 3. Type of support delivered, age, PaO_2/FiO_2 at admission, prognosis at discharge, and lethality in patients with COVID-19.

Support	Total	Age (years)	Standard dev	PaO_2/FiO_2 at admission	Standard dev	Survivors	Non-survivors	Transferred	Lethality (%)
Environmental air	177	40.7	17.5	363.3	50.4	174	1	2	0.6
O_2* to HFNC†	236	56.5	20.5	378	9.9	207	25	4	10.6
NIMV‡ and/or IMV§	116	55.8	15.08	229.5	91	67	28	21	24.1
TOTAL	529	49.8	18.0	287.6	93.1	448	54	27	10.2

*O_2 for oxygen low flow nasal cannula, multi-vent mask and non-rebreathed mask with reservoir.

†High-flow nasal cannula.

‡Non-invasive mechanical ventilation.

§Invasive mechanical ventilation.

Table 4. Description of demographic variables, QALY score, laboratory results, time of symptoms, PaO_2/FiO_2 at admission, and pre-mechanical ventilation, according to health insurance.

Health	Variable	N	mean	SD	min	p25	p50	p75	max
State health insurance	Age (years)	317	53.2	17.8	0	40	54	66	97
	QALY* score (points)	317	26.7	17.8	-13.04	13.23	25.7	39.7	80.7
	PaO_2/FiO_2 at admission	238	275.4	101.4	47	222	300	350	476
	PaO_2/FiO_2 pre-mechanical ventilation	74	125.7	51.9	47	82.2	129	160	256
	Ferritin (ng/ml)	227	1153.2	1472.9	11	383	785	1515	14146
	Double dimer (ug/ml)	254	0.8	1.4	0.13	0.19	0.335	0.7	8.36
	High-sensitivity troponin (ng/L)	219	16.6	64.2	3	4.6	7.3	14.1	933.5
	C-reactive protein (mg/dl)	292	11.8	11.5	0.03	3.66	8.405	15.735	60.22
	Procalcitonin (ng/ml)	51	1.7	8.6	0.05	0.05	0.06	0.45	60.97
	Platelets, × 10^9/L	295	255.5	111.3	21.1	185	239	308	824
	Leukocytes, × 10^9/L	295	9.7	7.7	2.7	5.7	7.9	11.2	65
	Creatinine (mg%)	273	1.0	0.8	0.15	0.68	0.8	1.01	9.79
	Days with symptoms	317	6.1	4.5	0	3	6	8	30
	Days in hospital	317	7.5	6.4	1	3	5	10	42
Private health insurance	Age (years)	195	45.0	17.3	0	33	45	57	93
	QALY score (points)	195	34.4	17.4	-8.61	22.7	33.93	46.7	80.7
	PaO_2/FiO_2 at admission	124	309.4	73.0	69.2	261.25	315	365.85	471
	PaO_2/FiO_2 pre-mechanical ventilation	34	154.0	47.0	73	115	152	187	283
	Ferritin (ng/ml)	121	1004.6	847.9	7.43	255	756	1624	3761
	Double dimer (µg/ml)	143	0.9	3.0	0.15	0.16	0.3	0.5	33.2
	High-sensitivity troponin (ng/L)	125	11.8	16.7	3	4.1	6	9.7	128.6
	C-reactive protein (mg/dl)	174	8.1	8.5	0.03	1.47	5.42	12.81	53.73
	Procalcitonin (ng/ml)	32	1.1	3.9	0.05	0.05	0.085	0.185	21
	Platelets, × 10^9/L	174	235.7	94.7	60	178	223.5	271	648
	Leukocytes, × 10^9/L	175	7.5	3.8	5.7	5.3	6.9	8.9	29.4
	Creatinine (mg%)	151	1.0	0.8	0.37	0.7	0.88	1.03	6.45
	Days with symptoms	192	5.5	3.9	0	3	5	8	17
	Days in hospital	195	8.8	9.8	1	3	6	11	88
Without health insurance	Age (years)	17	43.2	16.4	18	33	38	56	86
	QALY score (points)	17	36.8	17.1	–5.3	24.7	42.7	47.7	62.7
	PaO_2/FiO_2 at admission	14	300.3	70.7	140	250	302	354	412

	PaO_2/FiO_2 pre-mechanical ventilation	8	150.3	68.1	53	94.5	149.5	209.5	242
	Ferritin (ng/ml)	13	1007.8	809.1	119	301	889	1196	2451
	Double dimer (µg/ml)	16	0.5	0.8	0.15	0.16	0.345	0.575	3.32
	High-sensitivity troponin (ng/L)	13	9.4	7.1	3	3.6	7.6	13.5	28.1
	C-reactive protein (mg/dl)	17	10.9	12.3	0.48	3.02	6.97	14.17	47.2
	Procalcitonin (ng/ml)	6	5.8	12.8	0.05	0.05	0.185	2.6	31.83
	Platelets, × 10^9/L	17	255.5	112.4	115	169	247	304	549
	Leukocytes, × 10^9/L	17	10.1	6.0	4.3	5.6	6.9	12.4	22.5
	Creatinine (mg%)	17	0.9	0.2	0.46	0.74	0.78	1.02	1.37
	Days with symptoms	17	7.2	6.3	0	3	5	8	24
	Days in hospital	17	6.4	4.2	1	3	5	10	14
Total	Age (years)	529	49.8	18.0	0	37	49	62	97
	QALY score (points)	529	29.9	18.0	– 13.04	16.83	29.7	43.7	80.7
	PaO_2/FiO_2 at admission	376	287.6	93.1	47	231	304	355	476
	PaO_2/FiO_2 pre-mechanical ventilation	116	135.7	53.0	47	92.5	135	170	283
	Ferritin (ng/ml)	361	1098.2	1276.2	7.43	362	785	1524	14146
	Double dimer (µg/ml)	413	0.8	2.1	0.13	0.18	0.32	0.59	33.2
	High-sensitivity troponin (ng/L)	357	14.7	51.3	3	4.4	6.9	12.5	933.5
	C-reactive protein (mg/dl)	483	10.4	10.7	0.03	2.93	7.06	14.37	60.22
	Procalcitonin (ng/ml)	89	1.8	7.6	0.05	0.05	0.08	0.29	60.97
	Platelets, × 10^9/L	486	248.4	105.9	21.1	180	230	295	824
	Leukocytes, × 10^9/L	487	8.9	6.5	5.7	5.5	7.4	10.5	65
	Creatinine (mg%)	441	1.0	0.8	0.15	0.69	0.82	1.02	9.79
	Days with symptoms	526	5.9	4.4	0	3	6	8	30
	Days in hospital	529	7.9	7.8	1	3	6	10	88

* Quality-adjusted life year (QALY) score is a generic measure of disease burden.

Table 5. Variables at admission with risk for death in COVID-19 patients, (N=529).

Variables		Univariate Analysis				Multivariate Analysis			
		OR	p-value	95% CI		OR	p-value	95% CI	
Sex	Female	1	–	–	–				
	Male	1.025	0.932	0.582	1.806				
Conditions	Age (years)	1.116	0.001	1.087	1.146	0.922	0.734	0.579	1.4370
	QALY† score (points)	0.888	0.001	0.863	0.914	0.897	0.001	0.861	0.934
Age range	19–39	1	–	–	–				
	40–49	0.987	0.988	0.162	6.011				
	50–59	2.056	0.352	0.450	9.387				
	60–69	4.589	0.027	1.186	17.760				
	70 or more	58.882	0.001	17.063	203.192				
BMC*	<30	1	–	–	–				
	>29.9	1.309	0.524	0.572	2.997				
Comorbidities	Arterial hypertension	8.370	0.001	4.345	16.124	1,026	0.969	0.289	3.639
	Diabetes mellitus	5.197	0.001	2.882	9.374	1.828	0.394	0.457	7.315
Health insurance	Private health insurance	1	–	–	–				
	State health insurance	2.825	0.004	1.383	5.772				
	Without health insurance	2.467	0.271	0.495	12.301				
Laboratory	PaO_2/FiO_2 at admission	0.988	0.001	0.985	0.992	0.992	0.001	0.988	0.996
	PaO_2/FiO_2 pre-mechanical ventilation	0,996	0.405	0.988	1.005				
	Ferritin (ng/ml)	1.000	0.017	1.000	1.000	1.000	0.84	1.000	1.001
	Double dimer (µg/ml)	1.165	0.042	1.006	1.349	1.227	0.23	0.879	1.713
	High-sensitivity troponin (ng/ml)	1.068	0.001	1.045	1.092	1.017	0.13	0.994	1.040
	C-reactive protein (mg/dl)	1.059	0.001	1.036	1.082	1.003	0.91	0.956	1.052
	Procalcitonin (ng/ml)	1.120	0.041	1.005	1.248				
	Platelets, × 10^9/L	1.000	0.28	1.000	1.000				
	Leukocytes, × 10^9/L	1.000	0.001	1.000	1.000	1.000	0.016	1.000	1.000
	Creatinine (mg%)	1.758	0.001	1.302	2.373				

*Body mass index, expressed in kg/m^2.

† Quality-adjusted life year (QALY) score is a generic measure of disease burden.

Table 6. Categorized variables at admission, and risk for death in COVID-19 patients, (N=529)

Variables at admission		Univariate analysis				Multivariate analysis			
		OR	p-value	95% CI		OR	p-value	95% CI	
Condition	Age (≥ 60 years vs. < 60 years)	15.299	0.001	7.259	32.243	–	–	–	–
	QALY* score (≤ 15 vs. > 15 points)	24.628	0.001	11.857	51.155	14.011	0.001	4.826	40.679
Laboratory	PaO_2/FiO_2 at admission (≤ 200 vs. > 200)	11.605	0.001	5.872	22.938	5.205	0.001	1.942	13.949
	PaO_2/FiO_2 pre-mechanical ventilation (≤ 100 vs. > 100)	1.813	0.21	0.716	4.595				
	Ferritin (≥ 1000 vs. < 1000 ng/ml)	1.120	0.73	0.578	2.168				
	Double dimer (> 1 vs. ≤ 1 µg/ml)	4.648	0.001	2.396	9.014	1.728	.34	0.552	5.406
	High-sensitivity troponin (≥ 15 vs. <15 ng/ml)	22.287	0.001	10.425	47.647	5.163	0.001	1.953	13.648
	C-reactive protein (> 8.2 vs. ≤ 8.2 mg/dl)	3.005	0.001	1.622	5.567				
	Procalcitonin (≥ 0.5 vs. < 0.5 ng/ml)	12.545	0.001	2.730	57.648				
	Platelets, [< 100 × 10^9/L vs. ≥ 100 × 10^9/L]	0.286	0.071	0.073	1.116				
	Leukocytes, [≥ 4.0 × 10^9/L vs. < 4.0 × 10^9/L]	1.978	0.35	0.460	8.497	1.448	0.67	0.256	8.205
	Creatinine (> 1.4 vs. ≤ 1.4 mg%)	14.330	0.001	6.834	30.046				

* Quality-adjusted life year (QALY) score is a generic measure of disease burden.