REVIEW ARTICLE

Analysis of the clinical characteristics, drug treatments and prognoses of 136 patients with coronavirus disease 2019

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Abstract

What is known and objective: Since the December 2019 discovery of several cases of coronavirus disease 2019 (COVID-19) in Wuhan, China, the infection has spread worldwide. Our aim is to report on the clinical characteristics, treatments and prognoses of COVID-19.

Methods: This was a retrospective, single-centre, case series of 136 patients who were diagnosed with COVID-19 at Wuhan Third Hospital in Wuhan, China, between 28 January 2020 and 12 February 2020. The clinical characteristics, laboratory tests, treatment features and prognoses were summarized.

Results and discussion: The 136 patients were divided into a moderate (M) group (n = 103, 75.7%) and a severe and critical (SC) group (n = 33, 24.3%). There were significant differences in the incidences of concomitant chronic medical illnesses (eg, hypertension, diabetes and cardiovascular disease), fever, dry cough and dyspnoea among the two groups (P < .05). Compared with those in the M group, lymphocyte count (LYM) decreased significantly in the SC group, while the serum levels of C-reactive protein (CRP), procalcitonin (PCT), creatinine (Cre), D-dimer, lactic dehydrogenase (LDH), myoglobin (MB) and troponin I (cTnI) increased significantly in the SC group (P < .05). The main therapeutic drugs were antivirals, antibiotics, glucocorticoids, immunomodulators, traditional Chinese medicine preparations and symptomatic support drugs. There were significant differences in the incidences of shock, myocardial injury, acute respiratory distress syndrome (ARDS) and renal injury among the two groups (P < .05). Among the 136 patients, 99 (72.7%) were cured, 14 (10.3%) were transferred to other hospital and 23 (16.9%) died.

What is new and conclusion: Elderly patients with chronic diseases are more likely to develop severe or critical COVID-19 with multiple organ damage or systemic injuries. The improvement of LYM and CRP may be associated with the prognoses of COVID-19. The combined use of three or more antiviral drugs is to be avoided. The combination of broad-spectrum antibacterial drugs is not recommended and the risk of drug-induced liver injury should be monitored. Throughout a patient's hospitalization,

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their treatment plan should be evaluated and adjusted according to their vital signs, clinical symptoms, laboratory tests and imaging changes. Patients should receive effective psychological counselling.

1 | WHAT IS KNOWN AND OBJECTIVE

In December 2019, several patients were diagnosed with COVID-19 in Wuhan, China. Since that time, COVID-19 has become a worldwide pandemic. Therefore, the National Health Commission (NHC) of China has classified COVID-19 as a management category B infectious disease and adopted the prevention and control measures of category A infectious diseases.[1-4] Wuhan Third Hospital was designated to treat COVID-19, and it developed several mobile cabins for this purpose. In this study, we analysed the clinical characteristics, laboratory test data, medication features and clinical prognoses of 136 patients with confirmed COVID-19, so as to provide reference data for frontline anti-pandemic control.

2 | METHODS

2.1 | Study population

A total of 599 patients with COVID-19 were admitted to Wuhan Third Hospital from 28 January 2020 to 12 February 2020. Of these, 136 patients were included in this study. These patients all had confirmed COVID-19 and were either discharged well, transferred to another hospital or died. Referring to the Diagnosis and Treatment Plan for COVID-19 (the 7th trial edition) issued by the NHC, COVID-19 was diagnosed by positive COVID-19 nucleic acid in fluorescent real-time polymerase chain reaction (RT-PCR) assays. The clinical typing of COVID-19 is described below: (a)

mild type: non-pneumonia; (b) moderate type: fever and respiratory symptoms, pneumonia manifestations in the imaging; (c) severe type: shortness of breath with respiratory rate (RR) ≥30 bpm or finger SpO_2 ≤93% at rest; (d) critical type: respiratory failure (requiring mechanical ventilation), shock or other organ failure (requiring ICU monitoring and treatment). The criteria for discharge were as follows: a normal body temperature for 3+ days; remarkable mitigation of respiratory symptoms; significant improvement of acute exudative lesions on lung imaging; and negative for COVID-19 nucleic acid on two successive respiratory sample tests.[1]

2.2 | Study design

Mild patients were not included in this study. Moderate patients were treated as one group (M), and severe and critical patients were another group (SC). Moderate patients were given symptomatic treatment. Severe and critical patients were given active prevention of complications and multi-organ function support based on symptomatic treatment. The patient enrolment and outcomes were shown in Figure 1.

2.3 | Study measures

The patients' relevant data were collected on the hospital information system (HIS), including their past history, clinical symptoms and signs, laboratory test results, drug treatments, concomitant symptoms and their clinical outcome. Laboratory tests included
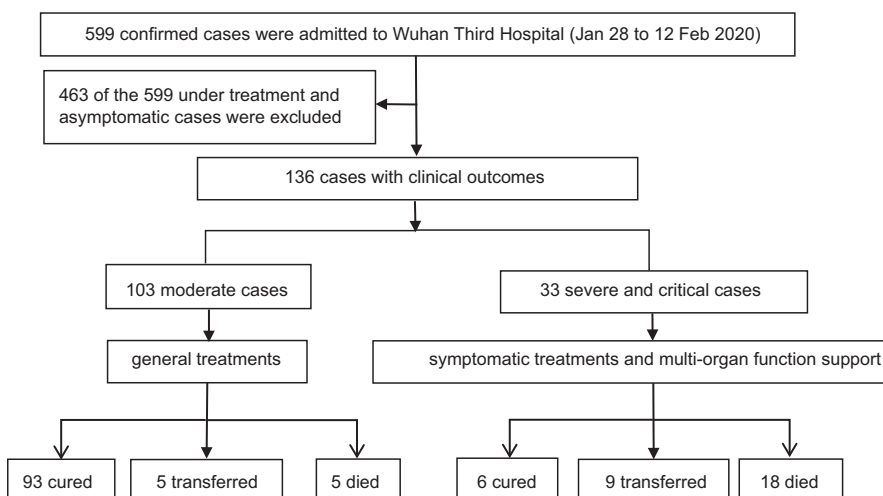

FIGURE 1 Patient enrolment and outcomes

TABLE 1 Comparison of clinical characteristics of 136 patients with COVID-19

	No. (%)			
	Total (n = 136)	M group (n = 103)	SC group (n = 33)	P value
Age, median (IQR), y	56 (44-64)	53.5 (40-63)	64 (59-72)	<.001
Sex				
Female	70 (51.5)	55 (53.4)	15 (45.5)	.427
Male	66 (48.5)	48 (46.6)	18 (54.5)	
Medical staff	7 (5.3)	7 (6.8)	0	.124
Comorbidities				
Hypertension	36 (27.1)	19 (18.4)	17 (51.5)	<.001
Cardiovascular disease	9 (6.6)	3 (2.9)	6 (18.2)	.002
Diabetes	20 (147)	10 (9.7)	10 (30.3)	.004
Cerebrovascular disease	1 (0.7)	0 (0)	1 (3.0)	.076
Malignancy	4 (2.9)	3 (2.9)	1 (3.0)	.972
Chronic kidney disease	4 (2.9)	70 (51.5)	3 (9.1)	.016
Chronic liver disease	8 (5.9)	6 (5.8)	2 (6.1)	.960
Signs and symptoms				
Fever				
<37.3°C	11 (8.1)	8 (7.8)	3 (9.1)	.808
37.3-38°C	36 (26.5)	28 (27.2)	8 (24.2)	.739
38.1-39°C	50 (36.8)	40 (38.8)	10 (30.3)	.376
39.1-40°C	33 (24.2)	25 (24.2)	8 (24.2)	.997
≥40°C	6 (4.4)	2 (1.9)	4 (12.1)	.013
Fatigue	53 (39.0)	36 (35.0)	17 (51.5)	.090
Dry cough	117 (86.0)	88 (85.4)	29 (87.9)	.725
Dizziness	12 (8.8)	8 (7.8)	4 (12.1)	.443
Anorexia	73 (53.7)	54 (52.4)	19 (57.6)	.606
Diarrhoea	22 (16.2)	21 (20.4)	1 (3.0)	.617
Chest congestion	47 (34.6)	30 (29.1)	17 (51.5)	.019
Dyspnoea	19 (14.0)	6 (5.8)	13 (39.4)	<.001
Insomnia	49 (36.0)	39 (37.86)	10 (30.3)	.431
Hospital admission (IQR), d	8.0 (5-10)	8.2 (6-10)	7.2 (5-8)	.077

Abbreviations: IQR, interquartile range.

P values indicate differences between the SC group and the M group, and *P* < .05 was considered statistically significant.

complete blood count (CBC), comprehensive metabolic panel (CMP), coagulation function tests and cardiac biomarkers. Drug treatments included antiviral drugs, antibacterial drugs, glucocorticoids, hepatoprotectants, Chinese herbal preparations and immunoregulants. The clinical outcomes were mainly evaluated by comparing the imaging data, laboratory test data and patient complications.

2.4 | Statistical analysis

SPSS 25.0 software was used for statistical analysis. The qualitative data were presented as percentage (%) and compared with a chi-squared test. The quantitative data were described with median (interquartile range [IQR]) and compared with a rank sum test; those of normal distribution were *t* test. *P* < .05 suggested that a difference was statistically significant.

3 | RESULTS

3.1 | Patient characteristics

Of the 136 patients with confirmed COVID-19, 70 (51.5%) were males and 66 (48.5%) were females with a median age of 56 years (IQR, 44-64; range, 24-85). Of those, 103 (75.7%) patients were in the M group and 33 (24.3%) patients were in the SC group. Seven (5.35%)

COVID-19 cases were the medical staff, all of which were in M group. Of the 136 patients, 51 (37.5%) had one or more concomitant chronic diseases. Hypertension (26.5%), diabetes (14.7%) and cardiovascular disease (6.6%) were the most common concomitant conditions. Compared with the patients in the M group, the patients in the SC group were older and a higher percentage had concomitant diseases. The common initial symptoms were fever (91.9%), dry cough (86.0%), anorexia (53.7%), fatigue (39.0%) and insomnia (36%). The time from symptom onset to hospitalization was 8.0 (5-10) days (Table 1).

3.2 | Laboratory test data

There was a 0.9 (0.7-1.2) × 10^9/L decrease in LYM, a 35.3 (14.2-83.3) mg/L increase of CRP, a 269 (207-355) U/L increase of LDH, and no significant change in WBC and NEU% in the 136 COVID-19 patients. Compared with the M group patients, the LYM and platelet count (PLT) of the SC group patients were significantly decreased ($P < .05$), while WBC, NEU%, CRP, PCT, activated partial thromboplastin time (APTT), D-dimer, aspartate aminotransferase (AST), Cre, LDH, MB and cTnI were markedly increased ($P < .05$) (Table 2).

3.3 | Treatments

The drug treatments mainly included antiviral drugs, antibacterial drugs, glucocorticoids, Chinese herbal preparations, symptomatic support drugs, immunoregulants and anticoagulants. All patients were treated with antiviral drugs. Most patients (>40%) were treated with three antiviral drugs (eg, Arbidol [0.2 g by mouth three times daily], α-interferon [500 wIU inhales twice daily] or lopinavir/ritonavir [400 mg/100 mg by mouth twice daily]) and >50% of patients were treated with two antibacterial drugs (eg, moxifloxacin [0.4 g by mouth or intravenously once daily] and cefoperazone sodium and sulbactam sodium [3 g intravenously every 12 hours]). One hundred and eight (79.4%) patients were treated with glucocorticoids; the daily dose of methylprednisolone was 80-160 mg in 27 (19.9%) patients. The use of glucocorticoids was higher in the SC group, and there was a statistically significant difference in daily doses between the two groups ($P < .05$). Concerning traditional Chinese medications: 129 (94.9%) patients ingested Chinese patent medications (predominantly Lianhua Qingwen Granules), 39 (28.7%) patients used Chinese herbal preparations, and 10 (7.4%) patients were injected with Xuebijing. As for symptomatic support treatments, the

TABLE 2 Comparison of laboratory tests in patients with COVID-19 at the time of hospital admission

		Median (IQR)			
		Total (n = 136)	M group (n = 103)	SC group (n = 33)	*P* value
Blood routine	Range				
WBC count, ×10^9/L	3.5-9.5	4.4 (3.4-5.6)	4.1 (3.4-5.3)	4.6 (3.3-6.5)	.018
LYM count, ×10^9/L	1.1-3.2	0.9 (0.7-1.2)	0.9 (0.8-1.3)	0.8 (0.5-0.9)	<.001
NEU%	40-75	68.6 (59.1-77.8)	65.9 (57.7-74.6)	77.8 (64.1-88.5)	.004
PLT count, ×10^9/L	125-350	173 (139-231)	176 (146-239)	147 (119-176)	.005
Indication of inflammation					
CRP, mg/L	0-5	35.3 (14.2-83.3)	27.1 (11.1-59.4)	88.4 (32.1-139.2)	<.001
PCT, ng/mL (%)	<0.05	49 (36.0)	28 (27.2)	21 (63.6)	<.001
Coagulation					
PT, s	10-13	11.8 (11.4-12.3)	11.6 (11.3-12.1)	12.1 (11.4-12.9)	.552
APTT, s	21-35	31.5 (28.1-36.3)	30.7 (26.7-34.6)	33.7 (25.6-39.1)	.047
D-dimer, g/L	0-0.5	0.5 (0.3-1.0)	0.5 (0.3-1.0)	0.9 (0.4-2.1)	<.001
Myocardial enzymes					
LDH, U/L	114-240	269 (207-355)	251 (201-327)	398 (231-453)	.002
MB, µg/L	0-110	53.9 (36.21-118.37)	45.16 (32.92-70.3)	112 (68.35-333.9)	.019
cTnI, ng/L (%)	0-0.04	69 (50.7)	40 (38.8)	29 (87.9)	<.001
Biochemical indication					
ALT, U/L	7-40	29 (20-41)	28 (20-41)	32 (23-28)	.498
AST, U/L	0-45	34 (26-49)	32 (25-44)	45 (28-63)	.035
Cre, µmol/L	40-105	67.9 (54.8-81.2)	64.7 (54.8-75.2)	71.2 (54.2-100.9)	<.001
Urea, mmol/L	3.1-7.2	4 (3.2-5.4)	3.7 (3.1-4.7)	6.3 (3.9-8.2)	.915

Abbreviations: ALT, alanine aminotransferase; APTT, active partial thromboplastin time; AST, asprate aminotransferase; CRP, C-reactive protein; LDH, lactic dehydrogenase; LYM, lymphocyte; MB, myoglobin; NEU, neutrophils; PCT, procalcitonin; PLT, platelet; PT, prothrombin; WBC, white blood cell.

P values indicate differences between the SC group and the M group, and *P* < .05 was considered statistically significant.

TABLE 3 Comparison of drug treatments in patients with COVID-19 during hospitalization

	No. (%)			
	Total (n = 136)	M group (n = 103)	SC group (n = 33)	P value
Antiviral therapy				
Arbidol	82 (60.3)	63 (61.2)	19 (57.6)	0.714
α-interferon	45 (33.1)	19 (18.4)	26 (78.8)	<0.001
Oseltamivir	120 (88.2)	93 (90.3)	27 (81.8)	0.189
Lopinavir/ritonavir	62 (45.6)	33 (32.1)	29 (87.9)	<0.001
3 antiviral drugs	57 (41.9)	43 (41.7)	14 (42.4)	0.811
Antibiotic drug				
No antibiotic drug	3 (2.2)	3 (2.9)	0	0.321
Moxifloxacin	51 (37.5)	43 (41.7)	8 (24.2)	0.071
Cefoperazone Sodium/Sulbactam Sodium	88 (64.7)	61 (59.2)	27 (81.8)	0.018
Imipenem/cilastatin	4 (2.9)	0	4 (12.1)	<0.001
2 antibiotic drugs	76 (55.9)	55 (53.4)	21 (63.6)	0.303
3 antibiotic drugs	6 (4.4)	2 (1.9)	4 (12.1)	0.013
Glucocorticoid (Methylprednisolone)				
40 mg/d	55 (40.4)	28 (27.2)	27 (81.8)	0.006
(80-160) mg/d	27 (19.9)	15 (14.6)	12 (36.4)	<0.001
240 mg/d	26 (19.1)	12 (11.7)	14 (42.4)	<0.001
Traditional Chinese medicine				
Lianhua Qingwen Granules	129 (94.9)	100 (97.1)	29 (87.9)	0.037
Xuebijing Injection	10 (7.4)	3 (2.9)	7 (21.2)	<0.001
Chinese herbal medicine	39 (28.7)	31 (30.1)	8 (24.2)	0.518
Antitussives (Suhuang cough capsule)	51 (37.5)	46 (44.7)	5 (15.2)	0.002
Expectorant (Ambroxol injection or Acetylcysteine effervescent table)	33 (24.3)	19 (18.4)	14 (42.4)	0.005
Antiasthmatic (Doxofylline)	14 (10.3)	5 (4.9)	9 (27.3)	0.001
Hepatoprotectants (Diammonium glycyrrhizinate)	24 (17.6)	13 (12.6)	9 (27.3)	0.047
Acid-suppressive medicine (Pantoprazole)	41 (30.1)	25 (24.3)	16 (48.5)	0.008
Antidiarrhoeal (Smectite)	22 (16.2)	21 (20.4)	1 (3.0)	0.018
Microecological (Lactobacillus acidophilus)	20 (14.7)	18 (17.5)	2 (6.1)	0.107
Immune regulation (Human immunoglobulin)	52 (38.2)	29 (28.2)	23 (69.7)	<0.001
Anticoagulants (Low molecular weight heparin)	10 (7.4)	3 (2.9)	7 (21.2)	<0.001
Oxygen support				
No oxygen	40 (29.4)	40 (38.8)	0	<0.001
Oxygen	66 (48.5)	58 (56.3)	8 (24.2)	0.001
HFNC	5 (3.7)	0	5 (15.2)	<0.001
Non-invasive mechanical ventilation	25 (18.4)	5 (4.9)	20 (60.6)	<0.001

Abbreviations: HFNC, High nasal flow oxygen therapy.

P values indicate differences between the SC group and the M group, and P < .05 was considered statistically significant.

uses of antitussives (Suhuang cough capsule) and antidiarrhoeals (Smectite) were lower in the SC group than in the M group, while the uses of expectorants (eg, ambroxol injections and acetylcysteine effervescent tablets), antiasthmatics (doxofylline), hepatoprotectants (diammonium glycyrrhizinate) and acid-suppressive drugs (pantoprazole) were higher; there were statistically significant differences between the two groups (P < .05). Fifty-two (38.2%) patients were treated with immunoregulants and 10 (7.4%) patients were treated

with low molecular heparin (LMWH) for anticoagulation; a statistically significant difference was found between the two groups in utilization ($P < .001$). Eight (24.2%) patients in the SC group were given oxygen by nasal cannula, 5 (15.2%) patients were given high flow nasal cannula (HFNC) oxygen therapy, and 20 (60.6%) patients received non-invasive mechanical ventilation; the difference between the two groups was statistically significant ($P < .001$; Table 3).

3.4 | Prognoses and complications

Patient complications included shock (4.4%), ARDS (16.1%), MI (8.1%), liver dysfunction (13.2%), renal dysfunction (2.9%) and stress ulcer (SU; 0.73%). The SC patients were more susceptible to shock, ARDS, MI and renal dysfunction ($P < .05$). There was no statistically significant difference in the incidence rate of SU and liver dysfunction between the two groups. In this study, the median patient's hospital stay was 11 (9-13) days; 99 (72.7%) patients were discharged with the improvement of their medical conditions, 14 (10.3%) patients were transferred to Huoshenshan hospital or Leishenshan hospital, and 23 (16.9%) patients died. Compared to the M group, the patients in the SC group had worse prognoses ($P < .05$). A typical patient's lung imaging characteristics at admission and at discharge are shown in Figure 2. Compared with the laboratory test data at admission, the WBC, LYM and ALT of the M group patients were significantly increased after hospitalization, while CRP was decreased ($P < .05$). The SC group showed no statistically significant difference in laboratory test data before and after hospitalization with the exception of WBC (which was increased after treatment; Table 4).

4 | DISCUSSION

This study showed that SC group was older and more suffered from concomitant chronic underlying diseases (eg, hypertension and diabetes) than the M group. This indicates that increased age and comorbidities were likely risk factors for becoming severely or critically ill when suffering from COVID-19.[5] Fever, dry cough and anorexia were the most common initial symptoms. Some patients presented with fatigue and insomnia but did not have symptoms of an upper respiratory infection, such as nasal obstruction and rhinorrhea. Most patients in the SC group had chest pain and dyspnoea, which should be taken seriously in clinical practice.[2] About 1/3 (36%) of patients had poor sleep quality, perhaps due to anxiety and fear; thus, psychological counselling should be included in COVID-19 treatment.

The most significant laboratory test data at admission were decreased LYM and increased CRP and LDH. In the SC patients, there were decreased LYM and increased NEU%, CRP and PCT. The above changes in this study suggest that COVID-19 may have a cellular immune impairment process.[6,7] LDH, MB and cTnI in the SC patients were significantly higher than those of M patients, which might be due to COVID-19 infecting the myocardium followed by immune cell infiltration into the infected myocardium releasing fibrogenic cytokines and proinflammatory factors that cause myocardial injury. Coronavirus may influence the coagulation system; APTT was prolonged in partial patients, and D-dimer was significantly increased in critical patients. Some studies have shown that coronavirus can promote coagulation accentuation via inflammatory factors, which in turn contributes to immune escape.[2,7,8]
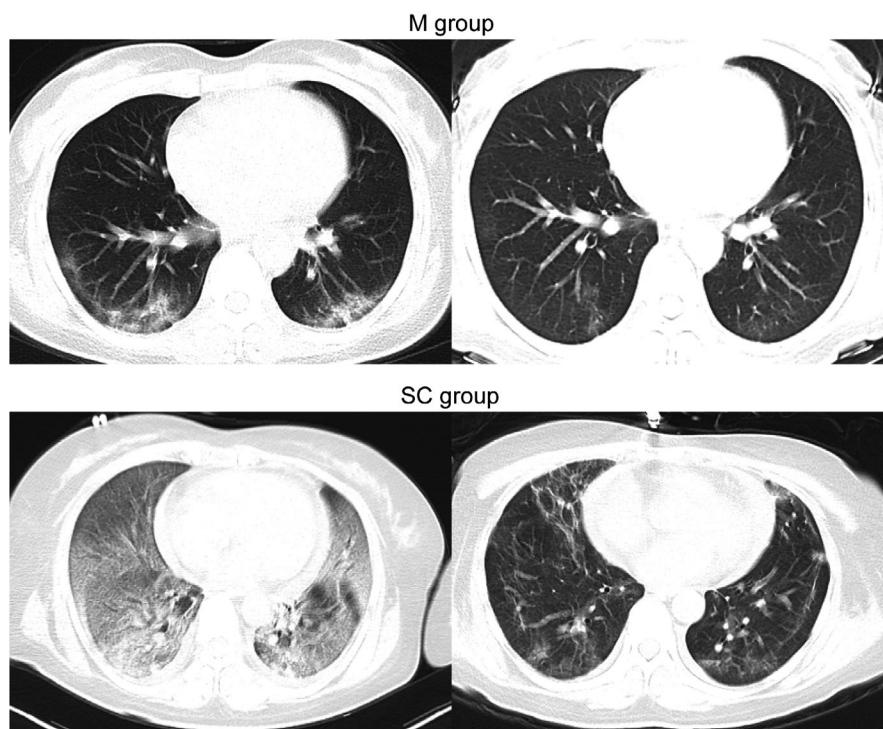
M group

SC group

FIGURE 2 Typical computed tomography images of a patient with COVID-19 at admission and discharge in two groups

TABLE 4 Comparison of complications and prognoses in patients with COVID-19 at discharge

	Total (n = 136)		M group (n = 103)		SC group (n = 33)		P value
In-hospital [Median (IQR)]	11 (8-12)		11 (9-13)		6 (4-10)		<.001
Cured (n, %)	99 (72.7)		93 (90.3)		6 (18.1)		<.001
Death (n, %)	23 (16.9)		5 (4.9)		18 (54.5)		<.001
Complications (n, %)							
Shock	6 (4.4)		0		6 (18.2)		<.001
ARDS	22 (16.1)		5 (4.9)		17 (51.5)		<.001
SU	1 (0.73)		0		1 (3.0)		.076
Myocardial injury	11 (8.1)		3 (2.9)		8 (24.2)		<.001
Liver dysfunction	18 (13.2)		13 (12.6)		5 (15.2)		.709
Renal dysfunction	4 (2.9)		1 (0.97)		3 (9.1)		0.016
Laboratory Parameters [Median (IQR)]	Admission	Discharge	Admission	Discharge	Admission	Discharge	
WBC count, ×10^9/L	4.4 (3.4-5.6)	5.2 (4.0-7.0)	4.1 (3.4-5.3)	5.0 (4.0-6.3)*	4.6 (3.3-6.5)	7.4 (4.4-10.7)*	.006
LYM count, ×10^9/L	0.9 (0.7-1.2)	1.1 (0.7-1.6)	0.9 (0.8-1.3)	1.3 (1.0-1.6)*	0.8 (0.5-0.9)	0.6 (0.3-0.9)	<.001
CRP (0-5)	35.3 (14.2-83.3)	9.0 (2.5-53.1)	27.1 (11.1-59.4)	5.9 (1.5-19.2)*	88.4 (32.1-139.2)	115.8 (47.2-221.8)	<.001
ALT, U/L (7-40)	29 (20-41)	33 (22-55)	28 (20-41)	34 (23-52)*	32 (23-28)	34 (22-69)	.274
AST, U/L (0-45)	34 (26-49)	30 (23-43)	32 (25-44)	29 (23-40)	45 (28-63)	46 (24-78)	.027
Cre, μmol/L (40-105)	67.9 (54.8-81.2)	65.3 (57.2-77.8)	64.7 (54.8-75.2)	64.4 (56.9-75.4)	71.2 (54.2-100.9)	80.3 (60.4-119.3)	.109

ARDS, acute respiratory distress syndrome; SU, stress ulcer.

*P < .05: P values indicate differences between the SC group and M group at discharge; P values indicate differences between admission and discharge within the two groups respectively.

In this study, antiviral drugs were used in all patients, and 40% of patients were treated with 3 antiviral drugs. However, there are no specific drugs for COVID-19, and thus, clinical studies of new drugs are urgently needed. More than 50% of the patients in this study were treated with two antibacterial drugs, and the use of subsequent antibacterial drugs was decreased as the disease was better understood; thus, it is not recommended to blindly or improperly use antibacterial drugs, especially not broad-spectrum antibacterial drugs in combination.[1] Most patients in our study were treated with methylprednisolone at an initial daily dose of 1-2 mg/kg, and glucocorticoids were administered to severely ill patients to reduce systemic damage caused by cytokine storm. However, their abuse use might lead to immunosuppression.[9] Therefore, the administration of glucocorticoids should be cautiously considered with reference to the patient's clinical symptoms, imaging progression and laboratory test data. Gamma globulin can be applied to treat several inflammatory reactions and autoimmune diseases.[10] Its selective use depends on the disease progression. In this study, some severe patients were treated with LMWH 5,000 U for short-term anticoagulation, which reduces the risk of formation of microthrombi and prevents pulmonary embolisms. Chinese herbal preparations were also used in a high proportion, but the efficacy of these treatments needs further evaluation.

In this study, 99 patients were cured, 14 were transferred to another hospital, and 23 died. The mortality rate was 3.8% (23/599), which was higher than the 2.3% reported by CDC.[11] This may be related to the study structure, which excluded mild patients and thus had a high rate of SC patients.

Comparisons of laboratory data before and after treatment showed that LYM was significantly increased after treatment and CRP was markedly decreased after treatment in the M group patients; neither LYM nor CRP had obvious changes after treatment in the SC group patients. This indicates that the improvement of LYM and CRP may be associated with the prognoses of COVID-19.

The severe and critical patients were more susceptible to shock, ARDS and other serious complications. It was found that 18 patients who had normal liver function tests at admission developed increased liver enzymes of different degrees at Day 8 (5-14) after admission. ALT was increased by ≥3× baseline in ≥60% of patients. The known adverse reactions of many of the drugs (eg,

lopinavir/ritonavir, moxifloxacin and methylprednisolone) used to treat patients include liver dysfunction.[12,13] The combinations of these drugs may have been one of the causes of abnormal liver function. In addition, the combination of drugs that are metabolized by the hepatic CYP3A4 enzyme (eg, methylprednisolone and lopinavir/litonavir) further increases the risk of liver dysfunction. Because the induction and inhibition of liver drug enzymes or their competition with substrates affect the drug metabolism, using multiple medications which are metabolized by the same enzyme may slow drug metabolism resulting in an increase of those medications in the body.[14] Therefore, the drug factor may be one of the causes for liver dysfunction in COVID-19 patients. Systemic cytokine storm and multiple organ failure may also be responsible for liver function damage.[15,16]

5 | WHAT IS NEW AND CONCLUSION

Middle-aged and elderly patients previously diagnosed with underlying diseases are more susceptible to severe and critical COVID-19 with multiple organ failure or systemic injury. The improvement of LYM and CRP may be associated with the prognoses of COVID-19. There are no specific drugs for COVID-19, except symptomatic support medications. The efficacy of antiviral drugs must be further followed up and evaluated. It is recommended to avoid the combined use of three or more antiviral drugs, the blind or improper use of antibacterial drugs, especially the combination of broad-spectrum antibacterial drugs, and to vigilantly monitor for drug-induced liver injury. During treatment, patients' medication plans should be evaluated and adjusted according to their vital signs, clinical symptoms, laboratory tests and imaging changes. Psychological counselling of patients should be strengthened.

CONFLICT OF INTEREST
None.

AUTHOR CONTRIBUTION
All authors contributed substantially to the conception and design of the study, and data analysis and interpretation. All authors contributed to the drafting and editing of the article and have granted their approval of the submitted manuscript.

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