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Coronavirus Pandemic

A comprehensive analysis of systematically screened laboratory tests: based on a COVID-19 cohort

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Abstract

Introduction: The study aimed at screening indicators with differential diagnosis values and investigating the characteristics of laboratory tests in COVID-19 patients.

Methodology: All the laboratory tests from COVID-19 patients and non-COVID-19 patients in this cohort were included. Test values from the groups during the course, days 1-7, and days 8-14 were analyzed. Mann-Whitney U test, univariate logistic regression analysis, and multivariate regression analysis were performed. Regression models were established to verify the diagnostic performance of indicators.

Results: 302 laboratory tests were included in this cohort, and 115 indicators were analyzed; the values of 61 indicators had significant differences ($p < 0.05$) between groups, and 23 indicators were independent risk factors of COVID-19. During days 1-7, the values of 40 indicators had significant differences ($p < 0.05$) between groups, while 20 indicators were independent risk factors of COVID-19. During days 8-14, the values of 45 indicators had significant differences ($p < 0.05$) between groups, and 23 indicators were independent risk factors of COVID-19. About 10, 12, and 12 indicators showed significant differences ($p < 0.05$) in multivariate regression analysis in different courses respectively, and the diagnostic performance of the model from them was 74.9%, 80.3%, and 80.8% separately.

Conclusions: The indicators obtained through systematic screening have preferable differential diagnosis values. Compared with non-COVID-19 patients, the screened indicators indicated that COVID-19 patients had more severe inflammatory responses, organ damage, electrolyte and metabolism disturbance, and coagulation disorders. This screening approach could find valuable indicators from a large number of laboratory test indicators.

Key words: COVID-19; laboratory test; respiratory disease.

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Introduction

The Coronavirus Disease 2019 (COVID-19) is a newly emerging and highly contagious respiratory disease [1,2] which has been declared a Public Health Emergency of International Concern by the World Health Organization [3]. COVID-19 is still spreading in many countries and regions around the world and poses a serious threat to people's health. COVID-19 patients could suffer fever, cough, dyspnea, diarrhea, and other symptoms [4-6], involving various organs such as the lung, gastrointestinal tract, heart, liver, kidney, and brain [7-9], which causes changes in the composition or content of blood cells, electrolytes, enzymes, urine, and other body fluids. Laboratory tests could objectively reflect the changes in the internal environment and the functions of organs, which plays an important role in understanding the pathological processes of COVID-19 and improving the level of diagnosis and therapy in COVID-19.

Current studies on laboratory tests for COVID-19 mainly focus on single or multiple indicators [10-12], and there is no systematic and comprehensive analysis. Some studies have reported the characteristics of laboratory tests in severe and non-severe patients [13,14], but comparative studies between COVID-19 and other respiratory diseases are limited [15]. Therefore, the existing studies are not conducive to comprehensively understanding COVID-19, nor to the

selection of appropriate indicators for the diagnosis and differential diagnosis for clinicians based on the comparative study.

This study will systematically describe and analyze the distributions and differences of laboratory test values during different courses of disease in COVID-19 and non-COVID-19 patients of this cohort to figure out the indicators with preferable diagnostic values. Through systematic research, we hope to reveal the changing rules of the laboratory tests and pathological processes of COVID-19 comprehensively, providing evidence for diagnosing COVID-19.

Methodology

Study design and participants

This study is an observational cohort study, and all COVID-19-suspected and confirmed patients admitted to the Xiangyang No.1 People's Hospital between January 23, 2020, and April 29, 2020. According to the real-time polymerase-chain-reaction (RT-PCR) result suspected patients with positive results were regarded as the COVID-19 group, and those with negative results in repeated tests were regarded as the non-COVID-19 group. The suspected, diagnosis and typing of COVID-19 were based on the Diagnosis and Treatment of Corona Virus Disease-19 (6th trial edition) issued by the National Health Commission and National Administration of Traditional Chinese Medicine [16]. This study was performed in accordance with the Declaration of Helsinki and relevant regulations and had been approved by the Ethics Committee of Xiangyang No. 1 People's Hospital (2020GCP012), and registered in the Chinese Clinical Trial Registry (ChiCTR2000031088). This study did not involve using any confidential patient data or anything greater than the minimum risk to the patients, and the informed consent had been exempted by the Ethics Committee of Xiangyang No. 1 People's Hospital.

Data collection

The clinical data were extracted from the hospital's medical information center, including (1) general information about the patients: name, age, sex, symptom onset time, admission time, diagnosis, chronic diseases, and outcome, etc.; (2) all laboratory tests results, including clinical chemistry tests, hematologic tests, cytological tests, immunologic tests, metabolic tests, microbiological tests, and molecular biology tests, etc.

The inclusion criteria of laboratory tests: All laboratory tests results in both groups from disease onset to discharge were included; The exclusion criteria of laboratory tests:(1) descriptive indicators of traits, such as the color of urine, fecal hardness, etc.; (2) drug sensitivity tests; (3) etiological tests related to the disease diagnosis of this cohort, such as COVID-19 antibody, influenza virus, respiratory syncytial virus, etc. (4) the indicators tested less than 13 times (indicators with frequency < 13 might reduce the efficiency of statistic and influence the reliability).

The first day of symptom onset was designated as the first day of one's course. The first 30 days in the COVID-19 group and the first 23 days in the non-COVID-19 group were defined as the whole course of the disease, and days 1-7 and the days 8-14 after onset were regarded as two independent stages according to the time from disease onset to admission, and the time of patients from moderate type to severe type of COVID-19 patients.

Indicators that need to integrate multiple indices when interpreting the results were combined into one indicator, for example, Hepatitis B virus (HBV) e antibody, HBV e antigen, HBVs antibody, HBVs antigen, and HBV core antibody were combined for HBV markers.

Statistical analysis

The statistical analyses were performed by SPSS 25, all statistical were used as two-sided test, $p < 0.05$ was considered a significant difference. The age and time were expressed as mean ± standard deviation (SD), and two independent sample T-test was used to compare the differences between groups. The continuous data of laboratory tests was expressed by median and interquartile range (IQR), and Mann-Whitney U test was used to compare the differences between groups. Categorical data were expressed by frequency (%), and Fisher's exact test or chi-square test was used to compare the differences between groups. The missing value was filled by multiple imputations.

Table 1. Demographics and clinical characteristics of patients in two groups.

	COVID-19 Group (N = 133)	Non-COVID-19 Group (N = 249)	t/chisq	*p* value
Gender (Male/Female)	64/69	119/130	0.004	0.95
Age (years)	49.39 ± 18.02	40.99 ± 20.92	-4.1	< 0.001
Chronic disease	63	117	0.005	0.94
Time from onset to discharge (days)	26.96 ± 9.42	17.18 ± 7.61		

The risk factors and diagnostic performance of laboratory indicators in COVID-19 were analyzed by univariate and multivariate binary logistic regression. The area under the receiver operating characteristic (ROC) curve (AUC) and 95% confidence interval (95% CI) was used to evaluate the predictive ability of laboratory indicators in the occurrence of COVID-19. A logistic regression model was established to verify the diagnostic performance of the selected indicators.

Results

General information and clinical characteristics of the patients

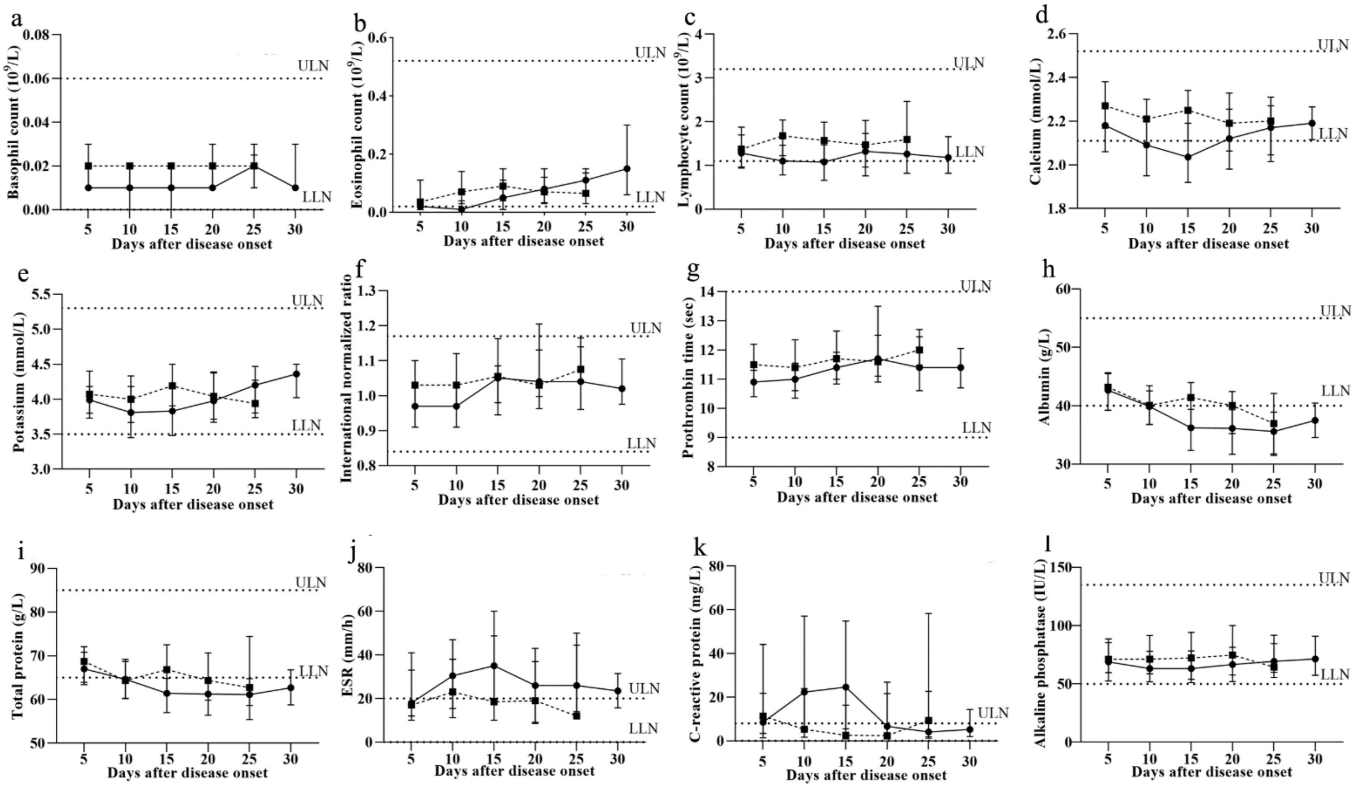
A total of 133 patients were included in the COVID-19 group. There were 4 mild cases, 89 moderate cases, 21 severe cases, 19 critical cases (including 10 deaths) and 63 patients had chronic diseases. A total of 249 patients were included in the non-COVID-19 group, and there were 171 patients with pulmonary infection, 65 patients with upper respiratory tract infection, 8 patients with bronchitis, and 5 patients with non-respiratory diseases. A total of 10 patients died and 117 patients had chronic diseases in the non-COVID-19 group. The chronic diseases in the two groups mainly included hypertension, coronary heart disease, diabetes, cerebrovascular disease, etc. There were no significant differences in gender and chronic disease between the two groups. The age of the patients in the COVID-19 group was older than that in the non-COVID-19 group ($p < 0.001$), and the univariate regression coefficient of age was 0.021 (Table 1).

In the COVID-19 group, the average time from onset to admission was 4.52 ± 3.11 days, to severe type, was 8.15 ± 5.29 days, to critical type, was 11.58 ± 5.79 days.

Collection of the laboratory test indicators

There was a total of 352 laboratory test indicators in both groups, 36 drug sensitivity tests, 10 etiological tests related to the disease diagnosis of this cohort and 4 descriptive indicators were excluded, the remaining 302 indicators. Then we removed the indicators tested less than 13 times. Finally, the COVID-19 group included 122 indicators and the non-COVID-19 group included 126 indicators. The two groups contained 115 identical indicators. As shown in Figure 1, several representative laboratory test indicators exhibited different changing tendencies between COVID-19 and non-COVID-19 groups during the disease.

Figure 1. The changing tendency of the mean values per 5 days of partial indicators. **a-l**: The representative indicators selected from the indicators with significant differences in univariate regression analysis.



ESR: erythrocyte sedimentation rate. Solid line: COVID-19 group; dotted line: non-COVID-19 group.

Table 2. The indicators with significant difference in Mann-Whitney U test between two groups.

		Whole course	Days 1-7	Days 8-14
		***p* value**	***p* value**	***p* value**
Arterial blood gas and acid-base balance	$AaDO_2$	0.001	ns	0.003
	a/APO_2	< 0.001	ns	0.006
	PaO_2	< 0.001	0.002	0.048
	SaO_2	< 0.001	0.002	0.049
	CO_2-CP	ns	< 0.001	<0.001
	$PaCO_2$	ns	ns	0.009
	pH	ns	0.014	ns
Blood routine tests	WBC	ns	< 0.001	ns
	BASO%	< 0.001	< 0.001	< 0.001
	BASO count	< 0.001	< 0.001	< 0.001
	EOS%	0.001	< 0.001	< 0.001
	EOS count	0.01	< 0.001	< 0.001
	LYMPH%	< 0.001	ns	< 0.001
	LYMPH count	< 0.001	0.006	< 0.001
	MONO%	0.001	ns	ns
	MONO count	0.03	0.003	ns
	NEUT%	< 0.001	ns	< 0.001
	NEUT count	< 0.001	0.001	0.013
	RBC	0.027	0.012	ns
	RDW-CV	ns	ns	0.013
	RDW-SD	ns	ns	< 0.001
	MCH	0.001	ns	ns
	MCHC	ns	ns	0.004
	MCV	0.013	ns	0.001
	Hematocrit	0.013	0.036	ns
	HGB	0.009	0.024	ns
Coagulation function	APTT	0.028	ns	ns
	INR	0.009	< 0.001	0.023
	PT	0.001	< 0.001	0.02
	TT	0.008	ns	ns
	Platelet	ns	< 0.001	< 0.001
	MPV	ns	ns	0.044
	PDW	ns	0.001	< 0.001
	P-LCR	ns	ns	0.001
	Thrombocytocrit	ns	< 0.001	< 0.001
	Calcium	< 0.001	< 0.001	< 0.001
	Fibrinogen	< 0.001	ns	0.046
	D-dimer	< 0.001	ns	ns
	FDP	< 0.001	ns	ns
Electrolyte tests	Magnesium	ns	ns	0.007
	Phosphorus	< 0.001	< 0.001	< 0.001
	Potassium	0.004	0.01	< 0.001
	Sodium	ns	< 0.001	0.048
	Chlorine	0.001	< 0.001	0.025
Inflammatory response	CRP	< 0.001	0.041	< 0.001
	Ferritin	0.039	0.01661	ns
	Procalcitonin	< 0.001	ns	0.016
	ESR	0.002	0.016	ns
Metabolism tests	Glucose	0.002	0.01	< 0.001
	Lactic acid	0.001	ns	ns
	TP	< 0.001	ns	< 0.001
	Albumin	< 0.001	ns	< 0.001
	Globulin	0.001	ns	ns
	ApoB	0.003	ns	ns
	LP(a)	0.019	ns	ns
	A/G	0.001	ns	ns
	Cholesterol	0.041	ns	ns
	Uric acid	< 0.001	ns	0.019
Organ function and damage	α-HBDH	< 0.001	< 0.001	< 0.001
	AST	< 0.001	< 0.001	< 0.001
	CK	< 0.001	0.048	ns
	CKMB	< 0.001	ns	ns
	Hs-TnI	0.033	ns	ns
	NT-proBNP	ns	0.026	ns
	ALP	< 0.001	0.017	0.002
	ALT	< 0.001	< 0.001	0.005
	TBil	< 0.001	ns	ns
	IBil	< 0.001	0.01	ns
	TBA	0.027	ns	ns
	LDH	< 0.001	< 0.001	< 0.001
	LDLC	0.011	ns	ns
	γ-GT	< 0.001	< 0.001	0.008
Urinalysis	Creatinine	0.036	< 0.001	0.046
	Urine HYAL	0.043	ns	ns
	Urine leukergy	0.019	ns	ns
	Urine protein	0.027	ns	ns
	Urine-SG	ns	0.041	ns

ns: Not significant. $AaDO_2$: alveolar to arterial oxygen partial pressure difference; a/APO_2: arterial-alveolar oxygen partial pressure ratio; PaO_2: pulmonary arterial oxygen tension: SaO_2: arterial oxygen saturation; CO_2-CP: carbon dioxide combining power; $PaCO_2$: partial pressure of carbon dioxide; pH: pondus hydrogenii; WBC: white blood cell; BASO%: percentage of basophil; BASO count: basophil count; EOS%: percentage of eosinophil; EOS count: eosinophil count; LYMPH%: percentage of lymphocyte; LYMPH count: lymphocyte; MONO%: percentage of monocyte; MONO count: monocyte count; NEUT%: percentage of neutrophil; NEUT count: neutrophil count; RBC: red blood cell; RDW-CV: red blood cell distribution width-coefficient of variation; RDW-SD: red blood cell distribution width-standard deviation; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; HGB: hemoglobin; APTT: activated partial thromboplastin time; INR: international normalized ratio; PT: prothrombin time; TT: thrombin time; MPV: mean platelet volume; PDW: platelet distribution width; P-LCR: platelet large cell ratio; FDP: fibrinogen degradation products; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; TP: total protein; LP(a): lipoprotein a; A/G: albumin-globulin ratio; α-HBDH: alpha-hydroxybutyrate dehydrogenase; AST: aspartate aminotransferase; CK: creatine kinase; CKMB: creatine kinase-MB; Hs-TnI: cardiac troponin I; NT-proBNP: N-terminal-pro-brain natriuretic peptide; ALP: alkaline phosphatase; ALT: alanine aminotransferase; TBil: total bilirubin; IBil: indirect bilirubin; TBA: total bile acid; LDH: lactate dehydrogenase; LDLC: low-density lipoprotein cholesterol; γ-GT: gamma-glutamyl transpeptidase; Urine HYAL: urine hyaline cast; Urine-SG: urine-specific gravity.

Result of test values

The Mann-Whitney U test result of 115 laboratory indicators showed that 61 indicators had significant differences ($p < 0.05$) between COVID-19 and non-COVID-19 groups (Table 2) in the whole course. And 40, 45 indicators had significant differences in the days 1-7 and days 8-14, respectively. All the results from 115 indicators were shown in Supplementary Table 1.

The univariate regression analysis

We calculated the mean value of 115 indicators for each patient in two groups and removed indicators with > 30% of their values missing (Supplementary Table 2). After that, a total of 62, 60, and 41 indicators in three different courses were analyzed by univariate logistic regression analysis, respectively. In the different courses, there were 23, 20, and 23 indicators in the COVID-19 group that were significantly different from the non-COVID-19 group ($p < 0.05$), respectively (Table 3). The percentage of accuracy from indicators in classifying the COVID-19 and non-COVID-19 groups is shown in Table 4. The complete results of univariate logistic regression analysis and diagnostic performance were shown in Supplementary Tables 3- 5.

The multivariate regression analysis

Indicators from each course with $p < 0.1$ in univariate regression model analysis were divided into three groups by the value of the regression coefficient. And multivariate regression analyses were conducted on them in different courses respectively. As shown in Table 5, in total 10, 12, and 12 indicators in different courses respectively had significant differences.

The output of the regression model

We established a logistic regression model in different course respectively through indicators from each course with $p < 0.05$ in their multivariate regression analysis. The result of the set data indicated that the percentage of accuracy in classifying the COVID-19 and non-COVID-19 patients, and sensitivity, specificity, and AUC was 74.9%, 52.6%, 86.7%, and 0.797 (95% CI 0.751-0.843) in the whole course, 80.3%, 62.2%, 89.3% and 0.84 (95% CI 0.791-

Table 3. The indicators with significant differences in univariate regression analysis between two groups.

		Whole course			Days 1-7			Days 8-14		
		β	*p*	OR (95% CI)	β	*p*	OR (95% CI)	β	*p*	OR (95% CI)
Arterial blood gas	CO_2-CP	ns	ns	ns	-0.106	0.01	0.899 (0.829,0.975)	ns	ns	ns
Blood routine tests	WBC	ns	ns	ns	-0.29	< 0.001	0.748 (0.651,0.86)	ns	ns	ns
	BASO%	-2.723	< 0.001	0.066 (0.017,0.259)	-3.037	< 0.001	0.048 (0.01,0.223)	-2.527	< 0.001	0.08 (0.02,0.323)
	BASO count	-49.342	< 0.001	0.001 (0.001,0.001)*	-68.587	< 0.001	0.001 (0.001,0.001)*	-56.392	< 0.001	0.001 (0.001,0.001)*
	EOS%	-0.194	0.023	0.823 (0.697,0.973)	-0.417	< 0.001	0.659 (0.523,0.831)	-0.35	< 0.001	0.705 (0.583,0.852)
	EOS count	-3.317	0.015	0.036 (0.002,0.531)	-7.589	< 0.001	0.001 (0,0.03)	-6.239	< 0.001	0.002 (0,0.044)
	LYMPH%	-0.038	< 0.001	0.963 (0.943,0.983)	ns	ns	ns	-0.059	< 0.001	0.943 (0.921,0.966)
	LYMPH count	-0.815	< 0.001	0.443 (0.3,0.653)	-0.644	0.002	0.525 (0.347,0.794)	-1.455	< 0.001	0.233 (0.14,0.388)
	MONO%	0.15	0.002	1.162 (1.055,1.28)	ns	ns	ns	0.084	0.049	1.088 (1,1.184)
	MONO count	ns	ns	ns	-2.186	0.001	0.112 (0.03,0.421)	ns	ns	ns
	NEUT%	0.03	0.002	1.03 (1.011,1.05)	ns	ns	ns	0.048	< 0.001	1.049 (1.028,1.07)
	NEUT count	ns	ns	ns	-0.215	0.004	0.807 (0.696,0.935)	ns	ns	ns
	RBC	ns	ns	ns	0.528	0.023	1.696 (1.074,2.676)	ns	ns	ns
	RDW-SD	ns	ns	ns	ns	ns	ns	-0.083	0.027	0.921 (0.856,0.99)
Coagulation function	INR	-1.79	0.049	0.167 (0.028,0.989)	-3.761	0.003	0.023 (0.002,0.284)	ns	ns	ns
	PT	-0.223	0.023	0.8 (0.66,0.969)	-0.379	0.004	0.684 (0.528,0.887)	ns	ns	ns
	Platelet	ns	ns	ns	-0.006	0.002	0.994 (0.99,0.998)	-0.005	0.002	0.995 (0.992,0.998)
	PDW	ns	ns	ns	ns	ns	ns	0.137	0.009	1.147 (1.035,1.272)
	Thrombocytocrit	ns	ns	ns	-7.323	0.001	0.001 (0,0.042)	-5.416	0.001	0.004 (0,0.121)
	Calcium	-3.303	< 0.001	0.037 (0.013,0.108)	-2.4	< 0.001	0.091 (0.031,0.265)	-3.19	< 0.001	0.041 (0.011,0.159)
Electrolyte tests	Phosphorus	-2.184	< 0.001	0.113 (0.042,0.305)	-1.573	0.002	0.207 (0.076,0.563)	-1.883	0.001	0.152 (0.052,0.443)
	Potassium	-1.055	0.001	0.348 (0.191,0.636)	-0.992	0.002	0.371 (0.197,0.697)	-1.803	< 0.001	0.165 (0.083,0.327)
	Sodium	-0.119	0.023	0.888 (0.801,0.983)	-0.253	< 0.001	0.777 (0.697,0.866)	-0.126	0.015	0.881 (0.796,0.976)
Inflammatory response	CRP	0.01	0.027	1.01 (1.001,1.019)	ns	ns	ns	0.033	< 0.001	1.033 (1.02,1.047)
	ESR	0.016	0.002	1.016 (1.006,1.026)	ns	ns	ns	ns	ns	ns
Metabolism tests	Glucose	0.121	0.032	1.129 (1.011,1.26)	ns	ns	ns	0.265	0.001	1.303 (1.119,1.518)
	TP	-0.122	< 0.001	0.885 (0.849,0.923)	ns	ns	ns	-0.094	< 0.001	0.91 (0.869,0.953)
	Albumin	-0.142	< 0.001	0.868 (0.826,0.912)	ns	ns	ns	-0.105	0.001	0.9 (0.848,0.956)
	Globulin	-0.072	0.017	0.931 (0.878,0.987)	ns	ns	ns	-0.088	0.018	0.916 (0.851,0.985)
	A/G	-0.779	0.034	0.459 (0.223,0.943)	ns	ns	ns	ns	ns	ns
	Uric acid	-0.003	0.023	0.997 (0.995,1)	ns	ns	ns	ns	ns	ns
Organ function and damage	AST	ns	ns	ns	ns	ns	ns	0.022	0.027	1.022 (1.003,1.042)
	ALP	-0.009	0.005	0.991 (0.984,0.997)	-0.007	0.043	0.993 (0.987,1)	-0.013	0.008	0.987 (0.977,0.996)
	LDH	ns	ns	ns	0.003	0.01	1.003 (1.001,1.006)	ns	ns	ns

*: The value of OR and (95% CI) < 0.001; ns: Not significant, the *p* value of the univariate regression analysis > 0.05. CO_2-CP: carbon dioxide combining power; WBC: white blood cell; BASO%: percentage of basophil; BASO count: basophil count; EOS%: percentage of eosinophil; EOS count: eosinophil count; LYMPH%: percentage of lymphocyte; LYMPH count: lymphocyte count; MONO%: percentage of monocyte; MONO count: monocyte count; NEUT%: percentage of neutrophil; NEUT count: neutrophil count; RBC: red blood cell; RDW-SD: red blood cell distribution width-standard deviation; INR: international normalized ratio; PT: prothrombin time; PDW: platelet distribution width; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; TP: total protein; A/G: albumin-globulin ratio; AST: aspartate aminotransferase; ALP: alkaline phosphatase; LDH: lactate dehydrogenase.

0.890) in days 1-7, and 80.8%, 66.9%, 90.2% and 0.844 (95% CI 0.796-0.892) in days 8-14 (Figure 2).

Discussion

In total, we enrolled 302 laboratory tests in this study, and then 115 indicators, which covered common indicators in respiratory disease basically, were analyzed after indicators with low test frequency were removed. After that, the Mann-Whitney U test, univariate regression analysis, and multivariate regression analysis were performed on them consecutively to demonstrate the differences between the groups from multilevel comprehensively. Upon the multivariate regression analysis, about 10, 12, and 12 indicators were the independent risk factor the whole course, days 1-7 and days 8-14 respectively. The output of the models from these indicators has preferable accuracy, which indicated that based on the comprehensive collection and multilevel analysis, this screening approach can not only show differences between groups comprehensively but also figure out indicators with preferable diagnosis values from a mass

Figure 2. The ROC and AUC of the regression model in different courses of disease.

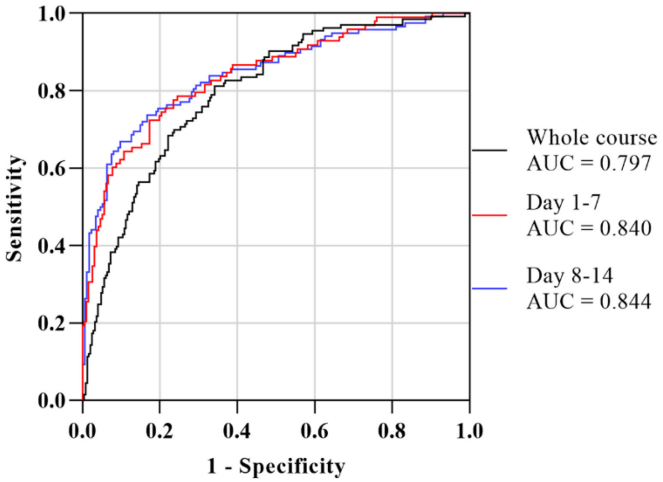


Table 4. The diagnostic performance of indicators with significant differences in univariate regression analysis.

		Whole course				Days 1-7				Days 8-14			
		Accuracy%	Sen	Spe	AUC	Accuracy%	Sen	Spe	AUC	Accuracy%	Sen	Spe	AUC
Arterial blood gas	CO_2-CP	ns	ns	ns	ns	67.00%	3.20%	97.90%	0.599	ns	ns	ns	ns
Blood routine tests	WBC	ns	ns	ns	ns	65.50%	14.40%	92.40%	0.667	ns	ns	ns	ns
	BASO count	66.20%	9.80%	96.70%	0.656	71.50%	30.90%	92.90%	0.725	69.60%	34.50%	93.90%	0.699
	BASO%	66.10%	6.80%	98.00%	0.649	70.00%	19.80%	96.20%	0.684	67.60%	38.40%	87.70%	0.672
	EOS count	64.90%	0.00%	100%	0.555	65.50%	0.00%	100%	0.724	64.50%	43.40%	79.10%	0.691
	EOS%	64.90%	0.00%	100%	0.554	65.50%	0.00%	100%	0.701	68.50%	45.10%	84.70%	0.684
	LYMPH count	64.40%	9.80%	93.90%	0.662	65.50%	2.10%	98.90%	0.649	69.90%	57.50%	78.50%	0.742
	LYMPH%	65.20%	8.30%	95.90%	0.611	ns	ns	ns	ns	62.70%	39.80%	78.50%	0.673
	MONO count	ns	ns	ns	ns	65.80%	4.10%	98.40%	0.627	ns	ns	ns	ns
	MONO%	63.90%	5.30%	95.50%	0.612	ns	ns	ns	ns	58.30%	6.20%	94.50%	0.578
	NEUT count	ns	ns	ns	ns	65.50%	0.00%	100%	0.604	ns	ns	ns	ns
	NEUT%	65.70%	7.50%	97.20%	0.592	ns	ns	ns	ns	63.40%	34.50%	83.40%	0.661
	RBC	ns	ns	ns	ns	66.20%	3.10%	99.50%	0.576	ns	ns	ns	ns
	RDW-SD	ns	ns	ns	ns	ns	ns	ns	ns	54.50%	1.80%	91.40%	0.583
Coagulation function	INR	64.70%	0.00%	100%	0.584	68.10%	1.20%	99.50%	0.648	ns	ns	ns	ns
	PT	64.70%	0.00%	100%	0.594	68.00%	1.20%	99.50%	0.646	ns	ns	ns	ns
	Platelet	ns	ns	ns	ns	64.40%	2.10%	97.30%	0.648	61.60%	21.20%	89.60%	0.628
	PDW	ns	ns	ns	ns	ns	ns	ns	ns	59.30%	15.00%	90.60%	0.599
	Thrombocytocrit	ns	ns	ns	ns	64.90%	5.20%	96.20%	0.673	63.90%	29.20%	88.20%	0.644
	Calcium	68.60%	30.80%	89.00%	0.729	68.30%	17.20%	92.80%	0.694	62.80%	43.00%	80.80%	0.722
Electrolyte tests	Phosphorus	66.60%	14.30%	95.10%	0.654	67.80%	2.20%	99.50%	0.62	62.60%	56.60%	68.00%	0.668
	Potassium	66.30%	6.90%	98.00%	0.589	68.50%	3.30%	99.50%	0.614	65.30%	62.20%	68.00%	0.701
	Sodium	63.80%	3.00%	97.10%	0.567	71.80%	23.70%	95.30%	0.671	61.80%	43.00%	79.00%	0.583
Inflammatory response	CRP	65.20%	6.00%	97.90%	0.617	ns	ns	ns	ns	66.10%	39.60%	86.70%	0.739
	ESR	63.70%	12.00%	92.80%	0.639	ns	ns	ns	ns	ns	ns	ns	ns
Metabolism tests	Glucose	65.20%	5.30%	97.50%	0.538	ns	ns	ns	ns	62.20%	36.90%	85.20%	0.631
	TP	66.00%	21.80%	89.80%	0.699	ns	ns	ns	ns	57.10%	50.90%	62.70%	0.645
	Albumin	66.00%	21.80%	89.80%	0.701	ns	ns	ns	ns	58.80%	44.60%	71.40%	0.646
	Globulin	65.10%	0.00%	100%	0.564	ns	ns	ns	ns	54.20%	41.10%	65.90%	0.558
	A/G	65.10%	0.00%	99.20%	0.568	ns	ns	ns	ns	ns	ns	ns	ns
	Uric acid	65.10%	0.80%	100%	0.578	ns	ns	ns	ns	ns	ns	ns	ns
Organ function and damage	AST	ns	ns	ns	ns	ns	ns	ns	ns	56.80%	22.30%	86.80%	0.615
	ALP	64.90%	0.00%	100%	0.575	67.60%	0.00%	100%	0.593	57.60%	51.80%	62.70%	0.599
	LDH	ns	ns	ns	ns	65.00%	2.20%	96.20%	0.67	ns	ns	ns	ns

ns: Not significant, the *p* value of the univariate regression analysis > 0.05. Sen: sensitivity; Spe: specificity; CO_2-CP: carbon dioxide combining power; WBC: white blood cell; BASO count: basophil count; BASO%: percentage of basophil; EOS count: eosinophil count; EOS%: percentage of eosinophil; LYMPH count: lymphocyte count; LYMPH%: percentage of lymphocyte; MONO count: monocyte count; MONO%: percentage of monocyte; NEUT count: neutrophil count; NEUT%: percentage of neutrophil; RBC: red blood cell; RDW-SD: ed blood cell distribution width-standard deviation; INR: international normalized ratio; PT: prothrombin time; PDW: platelet distribution width; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; TP: total protein; A/G: albumin-globulin ratio; AST: aspartate aminotransferase; ALP: alkaline phosphatase; LDH: lactate dehydrogenase.

of laboratory tests. Most of the reports studied the characteristics of laboratory tests in COVID-19, as well as their comparisons with non-COVID-19 patients or healthy volunteers. But they only investigated the changes and diagnostic value in partial indicators from COVID-19 [17,18].

The patients in the non-COVID-19 group of this cohort were suspected COVID-19 patients who were admitted to the hospital due to fever or respiratory symptoms, etc. but were finally ruled out by nucleic acid tests. Actually, 97.08% of patients in them had a pulmonary infection, upper respiratory tract infection or bronchitis, etc. A comprehensive comparison with the non-COVID-19 group is beneficial in improving the level of differential diagnosis and understanding the pathophysiological changes of COVID-19.

The Mann-Whitney U test showed that 61 indicators have significant differences between COVID-19 and non-COVID-19 groups in the whole course. Among them, changes in leukocyte differential count and inflammatory indexes indicated more severe inflammation in COVID-19 patients, which were consistent with the study reported that neutrophil (NEUT), basophil (BASO), lymphocytes, etc. were reduced in COVID-19 patients [19,20]. As reports demonstrated that COVID-19 patients suffered multiorgan damage [21], the changes in indicators of organ function and damage, and urinalysis in this study also showed that the injury might exist in the lungs, heart, liver, and kidney, etc. A study reported that the partial pressure of oxygen was lower in non-survivor of COVID-19 than those in survivors [22]. In this study, changes in arterial blood gas indicated severe damage in the lungs, and dysfunction in gas transfer, which induces hypoxemia, increased lactic acid in the blood, and reactive polycythemia. Moreover, severe inflammation and damage in multiorgan results in disorder in electrolyte tests, dysfunction in glycometabolism, proteometabolism, and coagulation [23].

Studies demonstrated that white blood cell (WBC) and urine protein were different between COVID-19 and COVID-19-negative patients in the early stage, but no differences were founded between them in platelet [24,25]. In this study, most of the indicators with significant differences during days 1-7 and days 8-14 were consistent with those in the whole course, while it indicated decreased WBC and platelet in days 1-7, and no indicators with urinalysis hypoproteinemia; During the days 8-14, no significant differences between groups in red blood cell (RBC)-associated indicators were founded, which indicated no reactive

Table 5. The indicators with significant differences in multivariate regression analysis between two groups.

		Whole course		Days 1-7		Days 8-14	
		β	*p*	β	*p*	β	*p*
Arterial blood gas and acid-base balance	CO_2-CP	ns	ns	-0.1	0.047	ns	ns
Blood routine tests	EOS%	ns	ns	-0.242	0.045	-0.187	0.032
	LYMPH%	-0.105	0.031	ns	ns	-0.091	0.047
	LYMPH count	-0.618	0.023	ns	ns	-0.993	< 0.001
	MONO%	0.166	0.006	ns	ns	0.138	0.005
	RBC	ns	ns	1.085	< 0.001	ns	ns
	RDW-SD	ns	ns	ns	ns	-0.138	0.003
	MCV	ns	ns	ns	ns	-0.053	0.031
	HGB	ns	ns	0.02	0.017	ns	ns
Coagulation function	INR	-3.89	< 0.001	-4.631	< 0.001	ns	ns
	PT	-0.473	< 0.001	ns	ns	ns	ns
	Platelet	ns	ns	-0.005	0.02	ns	ns
	PDW	ns	ns	ns	ns	0.148	0.013
	Calcium	-3.112	< 0.001	-1.98	0.003	-1.754	0.012
Electrolyte tests	Potassium	ns	ns	-0.941	0.013	-1.198	0.002
	Sodium	ns	ns	-0.233	< 0.001	ns	ns
Inflammatory response	CRP	ns	ns	ns	ns	0.026	0.001
	ESR	0.013	0.026	ns	ns	ns	ns
Metabolism tests	Glucose	ns	ns	ns	ns	0.229	0.002
	TP	-0.283	0.013	ns	ns	ns	ns
	Globulin	-0.107	0.002	ns	ns	ns	ns
Organ function and damage	α-HBDH	ns	ns	-0.021	0.018	ns	ns
	ALP	-0.01	0.01	-0.009	0.021	-0.015	0.007
	LDH	ns	ns	0.02	0.009	ns	ns

ns: Not significant, the *p* value of the multivariate regression analysis > 0.05. CO_2-CP: carbon dioxide combining power; EOS%: percentage of eosinophil; LYMPH%: percentage of lymphocyte; LYMPH count: lymphocyte count; MONO%: percentage of monocyte; RBC: red blood cell; RDW-SD: red blood cell distribution width-standard deviation; MCV: mean corpuscular volume; HGB: hemoglobin; INR: international normalized ratio; PT: prothrombin time; PDW: platelet distribution width; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; TP: total protein; α-HBDH: alpha-hydroxybutyrate dehydrogenase; ALP: alkaline phosphatase; LDH: lactate dehydrogenase.

polycythemia. There were also no differences in urinalysis, but in platelet and platelet-associated indicators.

In the univariate regression analysis, we removed the indicators missing value > 30% of its value, including arterial blood gas, urinalysis, blood lactic acid, ferritin, etc. which might contain indicators with differential diagnostic values. During the whole course, the classification of the indicators with significance was similar to the Mann-Whitney U test. While the number of the indicators decreased, especially indicators associated with organ damage, which might be because of regression analysis itself or indicators with missing values > 30% were removed. Compared with the whole course, the result during days 1-7 indicated decreased WBC, NEUT, platelet, and carbon dioxide combining power (CO_2-CP), and increased RBC, but no differences in inflammatory response or metabolism-related indicators. It was confirmed that no differences were founded in coagulation-related indicators, but in platelet and its associated indicators during days 8-14. Researchers conducted univariate analysis on blood routine tests and blood chemistry and then built a multivariate regression model through variables with significance in univariate analysis. According to their investigation, they found that C-reactive protein (CRP) and platelet were predictive for COVID-19 [26].

Multivariate regression revealed the decrease in leukocyte differential count after infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), accompanied by inflammation and cell damage for the increased erythrocyte sedimentation rate (ESR) and alkaline phosphatase (ALP). Moreover, decreased coagulation function and hypoproteinemia were founded. During days 1-7, decreased percentage of eosinophil (EOS%) in the COVID-19 patients, and disorder in electrolyte, acid-base balance, and coagulation, but no hypoproteinemia. During days 8-14, changes in leukocyte differential count and enzymes were similar to the whole course. Increased CRP indicated inflammatory response, low potassium and increased blood glucose in COVID-19 patients. Sun *et al*. reported that multivariate logistic regression analysis was performed through variables with statistical significance in difference analysis between COVID-19 and influenza patients, and the accuracy of the diagnostic model was 69.64% [27].

After the comprehensive collection, elimination of low-frequency tests, and multilevel screening, we built models that contained the whole course, days 1-7 and days 8-14 respectively to discriminate COVID-19 and non-COVID-19 patients. The diagnostic accuracies were preferable, but output from them showed inferior sensitivity and great specificity, which demonstrated that this approach could show the differences in laboratory tests between groups. Application of these indicators could discriminate the COVID-19 and non-COVID-19 patients preferably, understand the development and pathophysiology of COVID-19, and differences in changes of pathophysiology between COVID-19 and COVID-19-like non-COVID-19 deeply.

This study has several limitations. (1) The sample size of this cohort is limited, in the process of screening and regression analysis of the laboratory tests, we removed the indicators with a test frequency of less than 13 and had > 30% missing values, which may omit some valuable indicators; (2) The COVID-19 is a new disease lacking targeted test and systematic follow-up, which may affect the evaluation of indicators. (3) The study is an overall analysis of laboratory tests and, we did not conduct further analysis for single indicators.

Conclusions

The indicators obtained through a comprehensive collection and systematical screening have preferable differential diagnosis values. This systematic screening approach could find valuable indicators. Compared with non-COVID-19 patients, the screened indicators indicated that COVID-19 patients had more severe inflammatory responses, organ damage, electrolyte and metabolism disturbance, and coagulation disorders.

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Authors' Contributions

BP and YL designed the study, LC and GJQ accomplished data analysis and wrote the paper, JWC, and GXH collected the data, MLZ and DRW performed imaging processing. All authors read and approved the final manuscript.

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Annex – Supplementary Items

Supplementary Table 1. The result of Mann-Whitney U test between two groups in different courses.

	Whole course	Days 1-7	Days 8-14
	***p* value**	***p* value**	***p* value**
a/APO_2	< 0.001	0.09	0.006
A/G	0.001	0.645	0.174
$AaDO_2$	0.001	0.074	0.003
Albumin	< 0.001	0.637	< 0.001
ALP	< 0.001	0.017	0.002
ALT	< 0.001	< 0.001	0.005
Anti-TP	0.999	0.12	0.492
ApoA	0.192	0.65331	0.32291
ApoB	0.003	0.11231	0.38731
APTT	0.028	0.391	0.202
AST	< 0.001	< 0.001	< 0.001
Base excess	0.866	0.079	0.219
BASO count	< 0.001	< 0.001	< 0.001
BASO%	< 0.001	< 0.001	< 0.001
BEEcf	0.989	0.118	0.116
Bilirubin	0.999	0.27	-
BUN	0.68	0.325	0.154
Calcium	< 0.001	< 0.001	< 0.001
Chlorine	0.001	< 0.001	0.025
Cholesterol	0.041	0.09361	0.33591
CK	< 0.001	0.048	0.289
CK-MB	< 0.001	0.542	0.632
CO_2-CP	0.085	< 0.001	< 0.001
Creatinine	0.036	< 0.001	0.046
CRP	< 0.001	0.041	< 0.001
Cylinderuria	0.222	0.28	0.999
Cys C	0.142	0.37911	0.21291
DBil	0.071	0.964	0.091
D-dimer	< 0.001	0.508	0.665
EOS count	0.01	< 0.001	< 0.001
EOS%	0.001	< 0.001	< 0.001
ESR	0.002	0.016	0.181
FDP	< 0.001	0.244	0.498
Ferritin	0.039	0.01661	0.63891
Fibrinogen	< 0.001	0.229	0.046
Globulin	0.001	0.371	0.058
Glucose	0.002	0.01	< 0.001
HBV markers	0.067	0.209	0.611
HCO_3-	0.958	0.155	0.067
HCV-IgG	-	-	-
HDLC	0.714	0.84801	0.84901
Hematocrit	0.013	0.036	0.267
Hepatitis B PreS1	0.906	0.377	0.771
HGB	0.009	0.024	0.113
HIV-Ab	-	-	-
Hs-TnI	0.033	0.556	0.398
IBil	< 0.001	0.01	0.666
INR	0.009	< 0.001	0.023
Lactic acid	0.001	0.213	0.241
LDH	< 0.001	< 0.001	< 0.001
LDLC	0.011	0.06521	0.17341
LEU	0.106	0.247	0.215
LP(a)	0.019	0.48271	0.24141
LYMPH count	< 0.001	0.006	< 0.001
LYMPH%	< 0.001	0.521	< 0.001
Magnesium	0.246	0.718	0.007
MCH	0.001	0.264	0.103
MCHC	0.351	0.255	0.004
MCV	0.013	0.12	0.001
MONO count	0.03	0.003	0.802
MONO%	0.001	0.117	0.532
MPV	0.607	0.681	0.044
Mucous strands	0.264	0.344	0.999
Myoglobin	0.061	0.241	0.181
NEUT count	< 0.001	0.001	0.013
NEUT%	< 0.001	0.708	< 0.001
Nitrites	0.079	0.280	0.465
NT-proBNP	0.369	0.026	0.625
$PaCO_2$	0.802	0.401	0.009
PaO_2	< 0.001	0.002	0.048
PDW	0.251	0.001	< 0.001
pH	0.441	0.014	0.229
Phosphorus	< 0.001	< 0.001	< 0.001
Platelets	0.678	< 0.001	< 0.001
P-LCR	0.933	0.347	0.001
Potassium	0.004	0.01	< 0.001
Procalcitonin	< 0.001	0.239	0.016
PT	0.001	< 0.001	0.02
PT%	0.529	0.095	0.46
RBC	0.027	0.012	0.051
RDW-CV	0.554	0.789	0.013
RDW-SD	0.222	0.117	< 0.001
SaO_2	< 0.001	0.002	0.049
SB	0.915	0.053	0.179
Sodium	0.102	< 0.001	0.048
TBAb-IgG	0.999	0.381	0.999
TBil	< 0.001	0.06	0.999
TG	0.083	0.46521	0.84901

Thrombocytocrit	0.155	< 0.001	< 0.001
Total bile acid	0.027	0.354	0.989
TP	< 0.001	0.398	< 0.001
TT	0.008	0.589	0.272
UmALb	0.904	0.638	0.999
Urate crystals	0.343	0.69641	0.61771
Uric acid	< 0.001	0.084	0.019
Urine BACT	0.432	0.95	0.93491
Urine BACT/HPF	0.438	0.999	0.93491
Urine HYAL	0.043	0.999	0.56131
Urine KET	0.494	0.169	0.234
Urine leukergy	0.019	0.999	0.37661
Urine non-SQEP	0.999	0.68451	0.51251
Urine occult blood	0.203	0.193	0.212
Urine protein	0.027	0.084	0.136
Urine RBC	0.12	0.787	0.26711
Urine RBC/HPF	0.112	0.67511	0.37911
Urine SG	0.206	0.041	0.89651
Urine SQEP	0.093	0.192	0.44631
Urine WBC	0.077	0.378	0.77481
Urine WBC/HPF	0.182	0.378	0.77481
Urine YLC	0.257	0.999	0.999
Urine-pH	0.821	0.999	0.38251
Urobilinogen	0.604	0.222	0.999
WBC	0.818	< 0.001	0.375
α-HBDH	< 0.001	< 0.001	< 0.001
γ-GT	< 0.001	< 0.001	0.008

- : unable to calculate; a/APO_2: arterial-alveolar oxygen partial pressure ratio; A/G: albumin-globulin ratio; $AaDO_2$: alveolar to arterial oxygen partial pressure difference; ALP: alkaline phosphatase; ALT: alanine aminotransferase; Anti-TP: syphilis antibody; ApoA: apolipoprotein A; ApoB: apolipoprotein B; APTT: activated partial thromboplastin time; AST: aspartate aminotransferase; BASO count: basophil count; BASO%: percentage of basophil; BEEcf: base excess in extracellular fluid; BUN: blood urea nitrogen; CK: creatine kinase; CK-MB: creatine kinase-MB; CO_2-CP: carbon dioxide combining power; CRP: C-reactive protein; Cys C: cystatin C; DBil: direct bilirubin; EOS count: eosinophil count; EOS%: percentage of eosinophil; ESR: erythrocyte sedimentation rate; FDP: fibrinogen degradation products; HBV markers: hepatitis B virus markers; HCO_3-: concentration of bicarbonate; HCV-IgG: hepatitis C virus immunoglobulin G; HDLC: high-density lipoprotein cholesterol; Hepatitis B PreS1: hepatitis B preS1 antigen; HGB: hemoglobin; HIV-Ab: human immunodeficiency virus antibody; Hs-TnI: cardiac troponin I; IBil: indirect bilirubin; INR: international normalized ratio; LDH: lactate dehydrogenase; LDLC: low-density lipoprotein cholesterol; LEU: urinary leukocyte esterase; LP(a): lipoprotein a; LYMPH count: lymphocyte count; LYMPH%: percentage of lymphocyte; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; MONO count: monocyte count; MONO%: percentage of monocyte; MPV: mean platelet volume; NEUT count: neutrophil count; NEUT%: percentage of neutrophil; NT-proBNP: N-terminal-pro-brain natriuretic peptide; $PaCO_2$: partial pressure of carbon dioxide; PaO_2: pulmonary arterial oxygen tension; PDW: platelet distribution width; pH: pondus hydrogenii; P-LCR: platelet large cell ratio; PT: prothrombin time; PT%: percentage of prothrombin activity; RBC: red blood cell; RDW-CV: red blood cell distribution width-coefficient of variation; RDW-SD: red blood cell distribution width-standard deviation; SaO_2: arterial oxygen saturation; SB: standard bicarbonate; TBAb-IgG: tuberculosis immunoglobulin G antibody; TBil: total bilirubin; TG: triglyceride; TP: total protein; TT: thrombin time; UmALb: urine microalbumin; Urine BACT: urine bacteria; Urine BACT/HPF: urine bacteria per high-powered field; Urine HYAL: urine hyaline cast; Urine KET: urine ketone body; Urine non-SQEP: urine non-squamous epithelial cells; Urine RBC: urine red blood cell; Urine RBC/HPF: urine red blood cell per high-power field; Urine SG: urine-specific gravity; Urine SQEP: urine squamous epithelial cells; Urine WBC: urine white blood cell; Urine WBC/HPF: urine white blood cell per high-power field; Urine YLC: urine yeast like colony; Urine-pH: urine pondus hydrogenii; WBC: white blood cell; α-HBDH: alpha-hydroxybutyrate dehydrogenase; γ-GT: gamma-glutamyl transpeptidase.

Supplementary Table 2. The indicators of the missing value > 30%.

Whole course	Days 1-7	Days 8-14
***n*=53**	***n*=55**	***n*=74**
a/APO_2	a/APO_2	a/APO_2
$AaDO_2$	$AaDO_2$	$AaDO_2$
Albumin	Anti-TP	Anti-TP
Anti-TP	ApoA	ApoA
ApoA	ApoB	ApoB
ApoB	Base excess	APTT
Base excess	BEEcf	Base excess
BEEcf	Bilirubin	BEEcf
Bilirubin	Cholesterol	Bilirubin
Cholesterol	Cylinderuria	BUN
Cylinderuria	Cys C	Chlorine
Cys C	Ferritin	Cholesterol
Ferritin	HBV markers	CK
HBV markers	HCO_3-	CK-MB
HCO_3-	HCV-IgG	CO_2-CP
HCV-IgG	HDLC	Creatinine
HDLC	Hepatitis B PreS1	Cylinderuria
Hepatitis B PreS1	HIV-Ab	Cys C
HIV-Ab	Hs-TnI	D-dimer
Hs-TnI	Lactic acid	ESR
Lactic acid	LDLC	FDP
LDLC	LEU	Ferritin
LEU	LP(a)	Fibrinogen
LP(a)	Mucous strands	HBV markers
Mucous strands	Nitrites	HCO_3-
Nitrites	NT-proBNP	HCV-IgG
NT-proBNP	$PaCO_2$	HDLC
$PaCO_2$	PaO_2	Hepatitis B PreS1
PaO_2	pH	HIV-Ab
pH	P-LCR	Hs-TnI
PT%	PT%	INR
SaO_2	SaO_2	Lactic acid
SB	SB	LDH
TG	TBAb-IgG	LDLC
UmALb	TG	LEU
Urate crystals	UmALb	LP(a)
Urine BACT	Urate crystals	Mucous strands
Urine BACT/HPF	Urine BACT	Myoglobin
Urine HYAL	Urine BACT/HPF	Nitrites
Urine KET	Urine HYAL	NT-proBNP
Urine leukergy	Urine KET	$PaCO_2$
Urine non-SQEP	Urine leukergy	PaO_2
Urine occult blood	Urine non-SQEP	pH
Urine protein	Urine occult blood	P-LCR
Urine RBC	Urine protein	Procalcitonin
Urine RBC/HPF	Urine RBC	PT
Urine SG	Urine RBC/HPF	PT%
Urine SQEP	Urine SG	SaO_2
Urine WBC/HPF	Urine SQEP	SB
Urine YLC	Urine WBC	TBAb-IgG
Urine-pH	Urine WBC/HPF	TG
Urobilinogen	Urine YLC	TT
γ-GT	Urine-pH	UmALb
	Urobilinogen	Urate crystals
	γ-GT	Uric acid
		Urine BACT
		Urine BACT/HPF
		Urine HYAL
		Urine KET
		Urine leukergy
		Urine non-SQEP
		Urine occult blood
		Urine protein
		Urine RBC
		Urine RBC/HPF
		Urine SG
		Urine SQEP
		Urine WBC
		Urine WBC/HPF
		Urine YLC
		Urine-pH
		Urobilinogen
		α-HBDH
		γ-GT

a/APO2: arterial-alveolar oxygen partial pressure ratio; AaDO2: alveolar to arterial oxygen partial pressure difference; Anti-TP: syphilis antibody; ApoA: apolipoprotein A; APTT: activated partial thromboplastin time; BEEcf: base excess in extracellular fluid; Cys C: cystatin C; HBV markers: hepatitis B virus markers; CK: creatine kinase; CK-MB: creatine kinase-MB; HCO3-: concentration of bicarbonate; CO2-CP: carbon dioxide combining power; HCV-IgG: hepatitis C virus immunoglobulin G; HDLC: high-density lipoprotein cholesterol; Hepatitis B PreS1: hepatitis B preS1 antigen; HIV-Ab: human immunodeficiency virus antibody; Hs-TnI: cardiac troponin I; ESR: erythrocyte sedimentation rate; FDP: fibrinogen degradation products; LDLC: low-density lipoprotein cholesterol; LEU: urinary leukocyte esterase; LP(a): lipoprotein a; NT-proBNP: N-terminal-pro-brain natriuretic peptide; PaCO2: partial pressure of carbon dioxide; PaO2: pulmonary arterial oxygen tension; pH: pondus hydrogenii; P-LCR: platelet large cell ratio; PT%: percentage of prothrombin activity; INR: international normalized ratio; SaO2: arterial oxygen saturation; SB: standard bicarbonate; LDH: lactate dehydrogenase; TG: triglyceride; TBAb-IgG: tuberculosis immunoglobulin G antibody; LDLC: low-density lipoprotein cholesterol; UmALb: urine microalbumin; LEU: urinary leukocyte esterase; Urine BACT: urine bacteria; Urine BACT/HPF: urine bacteria per high-powered field; Urine HYAL: urine hyaline cast; Urine KET: urine ketone body; Urine non-SQEP: urine non-squamous epithelial cells; Urine RBC: urine red blood cell; PT: prothrombin time; Urine SG: urine-specific gravity; Urine RBC/HPF: urine red blood cell per high-power field; Urine SQEP: squamous epithelial cells; Urine YLC: urine yeast like colony; Urine WBC: Urine white blood cell; Urine-pH: urine pondus hydrogenii; Urine WBC/HPF: Urine white blood cell per high-power field; TT: thrombin time; γ-GT: gamma-glutamyl transpeptidase; Urine BACT: urine bacteria; α-HBDH: alpha-hydroxybutyrate dehydrogenase.

Supplementary Table 3. The results of the univariate regression analysis between two groups in the whole course

	β	*p* value	OR (95% CI)	Accuracy% (sen, spe)	AUC
A/G	-0.779	0.034	0.459 (0.223, 0.943)	65.10% (0.00%, 99.20%)	0.568
Albumin	-0.142	< 0.001	0.868 (0.826, 0.912)	66.00% (21.80%, 89.80%)	0.701
ALP	-0.009	0.005	0.991 (0.984, 0.997)	64.90% (0.00%, 100.00%)	0.575
ALT	0.004	0.128	1.004 (0.999, 1.009)	64.60% (0.80%, 99.20%)	0.667
APTT	0.018	0.308	1.018 (0.983, 1.054)	64.80% (0.80%, 99.60%)	0.537
AST	0.001	0.514	1.001 (0.999, 1.002)	65.00% (0.80%, 99.60%)	0.59
BASO count	-49.342	< 0.001	0.001 (0.001,0.001)*	66.20% (9.80%, 96.70%)	0.656
BASO%	-2.723	< 0.001	0.066 (0.017, 0.259)	66.10% (6.80%, 98.00%)	0.649
BUN	0.04	0.298	1.04 (0.966, 1.121)	58.10% (3.00%, 98.30%)	0.497
Calcium	-3.303	< 0.001	0.037 (0.013, 0.108)	68.60% (30.80%, 89.00%)	0.729
Chlorine	-0.009	0.605	0.991 (0.958, 1.025)	64.10% (0.00%, 99.60%)	0.569
CK	0	0.89	1 (0.999, 1.001)	63.80% (0.00%, 100.00%)	0.436
CK-MB	-0.014	0.209	0.986 (0.964, 1.008)	60.80% (0.00%, 100.00%)	0.572
CO_2-CP	-0.05	0.157	0.951 (0.888, 1.019)	65.00% (0.80%, 100.00%)	0.537
Creatinine	0.002	0.153	1.003 (0.999, 1.006)	65.10% (1.50%, 99.20%)	0.574
CRP	0.01	0.027	1.01 (1.001, 1.019)	65.20% (6.00%, 97.90%)	0.617
DBil	-0.002	0.934	0.998 (0.952, 1.046)	64.90% (0.00%, 100.00%)	0.508
D-dimer	0.053	0.46	1.055 (0.916, 1.215)	63.20% (0.00%, 99.10%)	0.568
EOS count	-3.317	0.015	0.036 (0.002, 0.531)	64.90% (0.00%, 100.00%)	0.555
EOS%	-0.194	0.023	0.823 (0.697, 0.973)	64.90% (0.00%, 100.00%)	0.554
ESR	0.016	0.002	1.016 (1.006, 1.026)	63.70% (12.00%, 92.80%)	0.639
FDP	0.015	0.161	1.015 (0.994, 1.036)	63.80% (2.30%, 99.10%)	0.567
Fibrinogen	0.039	0.597	1.04 (0.9, 1.201)	64.70% (0.00%, 100.00%)	0.576
Globulin	-0.072	0.017	0.931 (0.878, 0.987)	65.10% (0.00%, 100.00%)	0.564
Glucose	0.121	0.032	1.129 (1.011, 1.26)	65.20% (5.30%, 97.50%)	0.538
Hematocrit	-2.598	0.25	0.074 (0.001, 6.202)	65.00% (100.00%, 0.00%)	0.532
HGB	-0.007	0.244	0.993 (0.981, 1.005)	64.80% (0.00%, 100.00%)	0.53
IBil	-0.05	0.186	0.951 (0.882, 1.025)	65.10% (0.00%, 100.00%)	0.523
INR	-1.79	0.049	0.167 (0.028, 0.989)	64.70% (0.00%, 100.00%)	0.584
LDH	0.001	0.123	1.001 (1, 1.003)	64.00% (2.30%, 98.70%)	0.637
LYMPH count	-0.815	< 0.001	0.443 (0.3, 0.653)	64.40% (9.80%, 93.90%)	0.662
LYMPH%	-0.038	< 0.001	0.963 (0.943, 0.983)	65.20% (8.30%, 95.90%)	0.611
Magnesium	-1.838	0.192	0.159 (0.01, 2.512)	64.60% (0.00%, 100.00%)	0.529
MCH	-0.059	0.134	0.943 (0.873, 1.018)	65.30% (1.50%, 100.00%)	0.568
MCHC	-0.006	0.387	0.994 (0.979, 1.008)	64.80% (0.00%, 100.00%)	0.506
MCV	-0.026	0.142	0.974 (0.94, 1.009)	65.10% (1.50%, 99.60%)	0.568
MONO count	0.535	0.386	1.707 (0.509, 5.725)	64.90% (0.00%, 100.00%)	0.524
MONO%	0.15	0.002	1.162 (1.055, 1.28)	63.90% (5.30%, 95.50%)	0.612
MPV	-0.158	0.12	0.853 (0.699, 1.042)	64.80% (0.00%, 100.00%)	0.533
Myoglobin	0.006	0.06	1.006 (1, 1.012)	65.80% (6.90%, 98.40%)	0.53
NEUT count	0.084	0.082	1.088 (0.989, 1.196)	65.40% (3.80%, 98.80%)	0.516
NEUT%	0.03	0.002	1.03 (1.011, 1.05)	65.70% (7.50%, 97.20%)	0.592
PDW	0.009	0.867	1.009 (0.912, 1.116)	64.80% (0.00%, 100.00%)	0.506
Phosphorus	-2.184	< 0.001	0.113 (0.042, 0.305)	66.60% (14.30%, 95.10%)	0.654
Platelet	-0.001	0.467	0.999 (0.996, 1.002)	64.90% (0.00%, 100.00%)	0.511
P-LCR	-0.016	0.253	0.984 (0.958, 1.011)	63.40% (0.00%, 100.00%)	0.523
Potassium	-1.055	0.001	0.348 (0.191, 0.636)	66.30% (6.90%, 98.00%)	0.589
Procalcitonin	0.004	0.968	1.004 (0.818, 1.233)	62.80% (0.00%, 100.00%)	0.531
PT	-0.223	0.023	0.8 (0.66, 0.969)	64.70% (0.00%, 100.00%)	0.594
RBC	-0.092	0.633	0.912 (0.625, 1.331)	64.90% (0.00%, 100.00%)	0.519
RDW-CV	-0.005	0.945	0.995 (0.856, 1.156)	64.80% (0.00%, 100.00%)	0.477
RDW-SD	-0.02	0.525	0.98 (0.922, 1.042)	64.80% (0.00%, 100.00%)	0.515
Sodium	-0.119	0.023	0.888 (0.801, 0.983)	63.80% (3.00%, 97.10%)	0.567
TBAb-IgG	-0.54	0.513	0.583 (0.116, 2.938)	62.90% (0.00%, 100.00%)	0.505
TBil	-0.027	0.185	0.973 (0.935, 1.013)	64.90% (0.00%, 100.00%)	0.519
Thrombocytocrit	-1.816	0.234	0.163 (0.008, 3.237)	64.90% (0.00%, 100.00%)	0.538
Total bile acid	-0.024	0.312	0.976 (0.931, 1.023)	64.90% (0.00%, 100.00%)	0.511
TP	-0.122	< 0.001	0.885 (0.849, 0.923)	66.00% (21.80%, 89.80%)	0.699
TT	-0.014	0.697	0.986 (0.919, 1.058)	64.70% (0.00%, 100.00%)	0.468
Uric acid	-0.003	0.023	0.997 (0.995, 1)	65.10% (0.80%, 100.00%)	0.578
WBC	-0.007	0.883	0.993 (0.909, 1.086)	64.90% (0.00%, 100.00%)	0.547
α-HBDH	0.002	0.088	1.002 (1, 1.004)	63.60% (2.30%, 98.30%)	0.602

*: The value of OR and (95% CI) < 0.001; Sen: sensitivity; Spe: specificity; A/G: albumin-globulin ratio; ALP: alkaline phosphatase; ALT: alanine aminotransferase; APTT: activated partial thromboplastin time; AST: aspartate aminotransferase; BASO count: basophil count; BASO%: percentage of basophil; BUN: blood urea nitrogen; CK: creatine kinase; CK-MB: creatine kinase-MB; CO2-CP: carbon dioxide combining power; CRP: C-reactive protein; DBil: direct bilirubin; EOS count: eosinophil count; EOS%: percentage of eosinophil; ESR: erythrocyte sedimentation rate; FDP: fibrinogen degradation products; HGB: hemoglobin; IBil: indirect bilirubin; INR: international normalized ratio; LDH: lactate dehydrogenase; LYMPH count: lymphocyte count; LYMPH%: percentage of lymphocyte; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; MONO count: monocyte count; MONO%: percentage of monocyte; MPV: mean platelet volume; NEUT count: neutrophil count; NEUT%: percentage of neutrophil; PDW: platelet distribution width; P-LCR: platelet large cell ratio; PT: prothrombin time; RBC: red blood cell; RDW-CV: red blood cell distribution width-coefficient of variation; RDW-SD: red blood cell distribution width-standard deviation; TBAb-IgG: tuberculosis immunoglobulin IgG antibody; TBil: total bilirubin; TP: total protein; TT: thrombin time; WBC: white blood cell; α-HBDH: alpha-hydroxybutyrate dehydrogenase.

Supplementary Table 4. The results of the univariate regression analysis between two groups in the days 1-7.

	β	*p* value	OR (95% CI)	Accuracy% (sen, spe)	AUC
A/G	0.069	0.863	1.071 (0.49, 2.339)	68.80% (0.00%, 100.00%)	0.499
Albumin	-0.016	0.567	0.985 (0.934, 1.038)	67.60% (0.00%, 100.00%)	0.539
ALP	-0.007	0.043	0.993 (0.987, 1)	67.60% (0.00%, 100.00%)	0.593
ALT	0.004	0.345	1.004 (0.995, 1.014)	67.60% (0.00%, 100.00%)	0.644
APTT	0.01	0.627	1.01 (0.969, 1.053)	68.10% (0.00%, 100.00%)	0.547
AST	0.008	0.221	1.008 (0.995, 1.02)	66.90% (0.00%, 99.00%)	0.637
BASO count	-68.587	< 0.001	0.001 (0.001,0.001)*	71.50% (30.90%, 92.90%)	0.725
BASO%	-3.037	< 0.001	0.048 (0.01, 0.223)	70.00% (19.80%, 96.20%)	0.684
BUN	0.067	0.156	1.069 (0.975, 1.172)	60.80% (2.20%, 97.90%)	0.549
Calcium	-2.4	< 0.001	0.091 (0.031, 0.265)	68.30% (17.20%, 92.80%)	0.694
Chlorine	-0.021	0.29	0.98 (0.943, 1.018)	66.70% (0.00%, 99.50%)	0.649
CK	0.001	0.375	1.001 (0.999, 1.002)	66.50% (1.10%, 99.50%)	0.544
CK-MB	0.005	0.592	1.005 (0.987, 1.024)	63.90% (0.00%, 100.00%)	0.524
CO_2-CP	-0.106	0.01	0.899 (0.829, 0.975)	67.00% (3.20%, 97.90%)	0.599
Creatinine	0.003	0.163	1.003 (0.999, 1.008)	67.80% (1.10%, 99.50%)	0.629
CRP	0.002	0.629	1.002 (0.994, 1.01)	66.40% (0.00%, 100.00%)	0.577
DBil	-0.004	0.887	0.996 (0.946, 1.049)	67.60% (0.00%, 100.00%)	0.5
D-dimer	-0.104	0.459	0.901 (0.685, 1.186)	67.00% (0.00%, 100.00%)	0.508
EOS count	-7.589	< 0.001	0.001 (0, 0.03)	65.50% (0.00%, 100.00%)	0.724
EOS%	-0.417	< 0.001	0.659 (0.523, 0.831)	65.50% (0.00%, 100.00%)	0.701
ESR	0.01	0.075	1.01 (0.999, 1.021)	66.80% (1.30%, 98.80%)	0.597
FDP	-0.016	0.48	0.984 (0.94, 1.029)	66.80% (0.00%, 100.00%)	0.522
Fibrinogen	-0.029	0.723	0.971 (0.827, 1.141)	67.90% (0.00%, 100.00%)	0.473
Globulin	-0.028	0.376	0.973 (0.915, 1.034)	67.80% (0.00%, 100.00%)	0.53
Glucose	0.092	0.069	1.097 (0.993, 1.211)	68.20% (4.30%, 99.00%)	0.553
Hematocrit	4.083	0.109	59.33 (0.401, 8779.537)	65.60% (1.00%, 99.50%)	0.562
HGB	0.012	0.079	1.012 (0.999, 1.026)	65.00% (0.00%, 99.50%)	0.57
IBil	-0.069	0.092	0.933 (0.861, 1.011)	67.80% (0.00%, 100.00%)	0.583
INR	-3.761	0.003	0.023 (0.002, 0.284)	68.10% (1.20%, 99.50%)	0.648
LDH	0.003	0.01	1.003 (1.001, 1.006)	65.00% (2.20%, 96.20%)	0.67
LYMPH count	-0.644	0.002	0.525 (0.347, 0.794)	65.50% (2.10%, 98.90%)	0.649
LYMPH%	-0.01	0.386	0.99 (0.969, 1.012)	65.50% (0.00%, 100.00%)	0.531
Magnesium	-0.79	0.581	0.454 (0.027, 7.506)	67.30% (0.00%, 100.00%)	0.532
MCH	-0.019	0.709	0.981 (0.89, 1.083)	65.40% (0.00%, 100.00%)	0.521
MCHC	0.013	0.253	1.013 (0.991, 1.035)	65.40% (0.00%, 100.00%)	0.554
MCV	-0.022	0.302	0.978 (0.939, 1.02)	65.40% (0.00%, 100.00%)	0.553
MONO count	-2.186	0.001	0.112 (0.03, 0.421)	65.80% (4.10%, 98.40%)	0.627
MONO%	0.034	0.398	1.035 (0.956, 1.12)	65.50% (0.00%, 100.00%)	0.529
MPV	-0.132	0.188	0.876 (0.72, 1.067)	65.50% (0.00%, 100.00%)	0.534
Myoglobin	0.005	0.254	1.005 (0.997, 1.013)	66.30% (2.90%, 97.80%)	0.557
NEUT count	-0.215	0.004	0.807 (0.696, 0.935)	65.50% (0.00%, 100.00%)	0.604
NEUT%	0.011	0.291	1.011 (0.991, 1.031)	65.50% (0.00%, 100.00%)	0.538
PDW	0.08	0.115	1.083 (0.981, 1.195)	65.10% (0.00%, 99.50%)	0.582
Phosphorus	-1.573	0.002	0.207 (0.076, 0.563)	67.80% (2.20%, 99.50%)	0.62
Platelet	-0.006	0.002	0.994 (0.99, 0.998)	64.40% (2.10%, 97.30%)	0.648
Potassium	-0.992	0.002	0.371 (0.197, 0.697)	68.50% (3.30%, 99.50%)	0.614
Procalcitonin	-0.475	0.208	0.622 (0.297, 1.303)	66.70% (0.00%, 100.00%)	0.536
PT	-0.379	0.004	0.684 (0.528, 0.887)	68.00% (1.20%, 99.50%)	0.646
RBC	0.528	0.023	1.696 (1.074, 2.676)	66.20% (3.10%, 99.50%)	0.576
RDW-CV	-0.042	0.647	0.959 (0.803, 1.146)	65.40% (0.00%, 100.00%)	0.498
RDW-SD	-0.041	0.265	0.96 (0.893, 1.032)	65.40% (0.00%, 100.00%)	0.545
Sodium	-0.253	< 0.001	0.777 (0.697, 0.866)	71.80% (23.70%, 95.30%)	0.671
TBil	-0.031	0.156	0.97 (0.929, 1.012)	67.60% (0.00%, 100.00%)	0.56
Thrombocytocrit	-7.323	0.001	0.001 (0, 0.042)	64.90% (5.20%, 96.20%)	0.673
Total bile acid	-0.01	0.674	0.99 (0.945, 1.037)	67.60% (0.00%, 100.00%)	0.476
TP	-0.018	0.389	0.982 (0.943, 1.023)	67.60% (0.00%, 100.00%)	0.539
TT	-0.036	0.372	0.964 (0.89, 1.044)	67.90% (0.00%, 100.00%)	0.517
Uric acid	0.001	0.294	1.001 (0.999, 1.004)	67.50% (0.00%, 100.00%)	0.544
WBC	-0.29	< 0.001	0.748 (0.651, 0.86)	65.50% (14.40%, 92.40%)	0.667
α-HBDH	0.003	0.069	1.003 (1, 1.006)	66.60% (2.20%, 98.40%)	0.644

*: The value of OR and (95% CI) < 0.001; Sen: sensitivity; Spe: specificity. A/G: albumin-globulin ratio; ALP: alkaline phosphatase; ALT: alanine aminotransferase; APTT: activated partial thromboplastin time; AST: aspartate aminotransferase; BASO count: basophil count; BASO%: percentage of basophil; BUN: blood urea nitrogen; CK: creatine kinase; CK-MB: creatine kinase-MB; CO2-CP: carbon dioxide combining power; CRP: C-reactive protein; DBil: direct bilirubin; EOS count: eosinophil count; EOS%: percentage of eosinophil; ESR: erythrocyte sedimentation rate; FDP: fibrinogen degradation products; HGB: hemoglobin; IBil: indirect bilirubin; INR: international normalized ratio; LDH: lactate dehydrogenase; LYMPH count: lymphocyte count; LYMPH%: percentage of lymphocyte; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; MONO count: monocyte count; MONO%: percentage of monocyte; MPV: mean platelet volume; NEUT count: neutrophil count; NEUT%: percentage of neutrophil; PDW: platelet distribution width; PT: prothrombin time; RBC: red blood cell; RDW-CV: red blood cell distribution width-coefficient of variation; RDW-SD: red blood cell distribution width-standard deviation; TBil: total bilirubin; TP: total protein; TT: thrombin time; WBC: white blood cell; α-HBDH: alpha-hydroxybutyrate dehydrogenase.

Supplementary Table 5. The results of the univariate regression analysis between two groups in the days 8-14.

	β	*p* value	OR (95% CI)	Accuracy% (sen, spe)	AUC
A/G	-0.541	0.257	0.582 (0.229, 1.482)	52.50% (20.50%, 81.50%)	0.548
Albumin	-0.105	0.001	0.9 (0.848, 0.956)	58.80% (44.60%, 71.40%)	0.646
ALP	-0.013	0.008	0.987 (0.977, 0.996)	57.60% (51.80%, 62.70%)	0.599
ALT	0.003	0.372	1.003 (0.996, 1.01)	50.80% (4.50%, 92.10%)	0.586
AST	0.022	0.027	1.022 (1.003, 1.042)	56.80% (22.30%, 86.80%)	0.615
BASO count	-56.392	< 0.001	0.001 (0.001,0.001)*	69.60% (34.50%, 93.90%)	0.699
BASO %	-2.527	< 0.001	0.08 (0.02, 0.323)	67.60% (38.40%, 87.70%)	0.672
Calcium	-3.19	< 0.001	0.041 (0.011, 0.159)	62.80% (43.00%, 80.80%)	0.722
CRP	0.033	< 0.001	1.033 (1.02, 1.047)	66.10% (39.60%, 86.70%)	0.739
DBil	0.044	0.202	1.045 (0.977, 1.117)	55.50% (14.30%, 92.10%)	0.57
EOS count	-6.239	< 0.001	0.002 (0, 0.044)	64.50% (43.40%, 79.10%)	0.691
EOS%	-0.35	< 0.001	0.705 (0.583, 0.852)	68.50% (45.10%, 84.70%)	0.684
Globulin	-0.088	0.018	0.916 (0.851, 0.985)	54.20% (41.10%, 65.90%)	0.558
Glucose	0.265	0.001	1.303 (1.119, 1.518)	62.20% (36.90%, 85.20%)	0.631
Hematocrit	0.398	0.88	1.49 (0.008, 264.115)	0.59% (0.00%, 100.00%)	0.51
HGB	0.004	0.624	1.004 (0.989, 1.018)	58.90% (0.00%, 100.00%)	0.528
IBil	-0.022	0.525	0.978 (0.913, 1.047)	52.70% (0.00%, 99.20%)	0.481
LYMPH count	-1.455	< 0.001	0.233 (0.14, 0.388)	69.90% (57.50%, 78.50%)	0.742
LYMPH%	-0.059	< 0.001	0.943 (0.921, 0.966)	62.70% (39.80%, 78.50%)	0.673
Magnesium	-1.718	0.215	0.179 (0.012, 2.708)	54.70% (36.00%, 72.10%)	0.554
MCH	-0.049	0.268	0.953 (0.874, 1.038)	59.30% (4.40%, 97.50%)	0.542
MCHC	0.004	0.631	1.004 (0.989, 1.018)	58.50% (0.00%, 99.40%)	0.576
MCV	-0.037	0.069	0.964 (0.926, 1.003)	57.80% (5.30%, 94.40%)	0.584
MONO count	-0.335	0.597	0.715 (0.207, 2.478)	59.10% (0.00%, 100.00%)	0.513
MONO%	0.084	0.049	1.088 (1, 1.184)	58.30% (6.20%, 94.50%)	0.578
MPV	0.083	0.451	1.087 (0.875, 1.349)	58.60% (0.00%, 100.00%)	0.522
NEUT count	0.079	0.124	1.082 (0.979, 1.196)	60.90% (8.00%, 97.50%)	0.527
NEUT%	0.048	< 0.001	1.049 (1.028, 1.07)	63.40% (34.50%, 83.40%)	0.661
PDW	0.137	0.009	1.147 (1.035, 1.272)	59.30% (15.00%, 90.60%)	0.599
Platelet	-0.005	0.002	0.995 (0.992, 0.998)	61.60% (21.20%, 89.60%)	0.628
Potassium	-1.803	< 0.001	0.165 (0.083, 0.327)	65.30% (62.20%, 68.00%)	0.701
Procalcitonin	-1.883	0.001	0.152 (0.052, 0.443)	62.60% (56.60%, 68.00%)	0.668
RBC	0.203	0.357	1.225 (0.795, 1.888)	58.70% (0.00%, 99.40%)	0.532
RDW-CV	-0.152	0.118	0.859 (0.711, 1.039)	58.90% (0.00%, 100.00%)	0.562
RDW-SD	-0.083	0.027	0.921 (0.856, 0.99)	54.50% (1.80%, 91.40%)	0.583
Sodium	-0.126	0.015	0.881 (0.796, 0.976)	61.80% (43.00%, 79.00%)	0.583
TBil	0.003	0.899	1.003 (0.963, 1.044)	52.90% (0.00%, 100.00%)	0.539
Thrombocytocrit	-5.416	0.001	0.004 (0, 0.121)	63.90% (29.20%, 88.20%)	0.644
Total bile acid	-0.015	0.592	0.985 (0.933, 1.04)	52.90% (0.00%, 100.00%)	0.5
TP	-0.094	< 0.001	0.91 (0.869, 0.953)	57.10% (50.90%, 62.70%)	0.645
WBC	-0.045	0.338	0.956 (0.871, 1.049)	59.10% (0.00%, 100.00%)	0.578

*: The value of OR and (95% CI) < 0.001; Sen: sensitivity; Spe: specificity. A/G: alveolar to arterial oxygen partial pressure difference; ALP: alkaline phosphatase; ALT: alanine aminotransferase; AST: aspartate aminotransferase; BASO count: basophil count; BASO%: percentage of basophil; CRP: C-reactive protein; DBil: direct bilirubin; EOS count: eosinophil count; EOS%: percentage of eosinophil; HGB: hemoglobin; IBil: indirect bilirubin; LYMPH count: lymphocyte count; LYMPH%: percentage of lymphocyte; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MCV: mean corpuscular volume; MONO count: monocyte count; MONO%: percentage of monocyte; MPV: mean platelet volume; NEUT count: neutrophil count; NEUT%: percentage of neutrophil; PDW: platelet distribution width; RBC: red blood cell; RDW-CV: red blood cell distribution width-coefficient of variation; RDW-SD: red blood cell distribution width-standard deviation; TBil: total bilirubin; TP: total protein; WBC: white blood cell.