Supplementary Appendix

Predictors of Fatality including Radiographic Findings in Adults with COVID-19

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Table S1. Demographics and baseline characteristics of the subset of patients included in the analysis of CT within the first week after symptom onset

	Total (n=32)	Non-survivor (n=11)	Survivor (n=21)	p value
Characteristics				
Age, years	58(40-70)	69(57-78)	51(33-70)	0.020
<65	20 (62%)	5 (45%)	15 (71%)	0.149
≥65	12 (38%)	6 (55%)	6 (29%)	
Sex				0.266
Female	13 (41%)	3 (27%)	10 (48%)	
Male	19 (59%)	8 (73%)	11 (52%)	
Any Comorbidity	13 (41%)	6 (55%)	7 (33%)	0.246
Diabetes	5 (16%)	2 (18%)	3 (14%)	0.773
Hypertension	9 (28%)	5 (45%)	4 (19%)	0.115
Coronary heart disease	1 (3%)	1 (9%)	0 (0%)	0.344
Chronic obstructive pulmonary disease	1 (3%)	1 (9%)	0 (0%)	0.344
Malignancy	0 (0%)	0 (0%)	0 (0%)	..
Chronic liver disease	1 (3%)	0 (0%)	1 (5%)	1.000
Other	8 (25%)	4 (36%)	4 (19%)	0.283
Current smoker	3 (9%)	1 (9%)	2 (10%)	0.968
Symptoms and signs				
Fever	30 (94%)	10 (91%)	20 (95%)	0.631
Highest temperature, °C	38.6(38.0-39.0)	38.6(37.6-39.0)	38.5(38.0-39.0)	0.611
Chills	7 (22%)	3 (27%)	4 (19%)	0.593
Cough	23 (72%)	9 (82%)	14 (67%)	0.365
Sputum	8 (25%)	5 (45%)	3 (14%)	0.053
Dyspnea	16 (50%)	5 (45%)	11 (52%)	0.710
Hemoptysis	2 (6%)	1 (9%)	1 (5%)	0.631
Chest pain	2 (6%)	1 (9%)	1 (5%)	0.631
Headache	3 (9%)	1 (9%)	2 (10%)	0.968
Fatigue	8 (25%)	2 (18%)	6 (29%)	0.519
Nausea	1 (3%)	0 (0%)	1 (5%)	1.000
Diarrhea	5 (16%)	3 (27%)	2 (10%)	0.189
Myalgia	7 (22%)	3 (27%)	4 (19%)	0.593
Systolic pressure, mm Hg	129.0(114.0-144.0)	144.0(125.0-171.0)	126.0(112.0-139.0)	0.074
Heart rate, beats per minute	95.0(81.0-110.0)	103.0(86.0-111.0)	86.0(80.0-109.0)	0.367
Respiratory rate	20.0(20.0-24.0)	24.0(20.0-25.0)	20.0(20.0-22.0)	0.022
>20 breaths per min	14 (44%)	8 (73%)	6 (29%)	0.017
Time from symptom onset to hospital admission, days	10.0(7.0-13.0)	8.0(6.0-14.0)	10.0(7.0-13.0)	0.639

Data are median (IQR), n (%), or n/N (%), where N is the total number of patients with available data. χ^2 test, Fisher's exact test, or Mann-Whitney U test were used to compare the values between survivors and non-survivors as appropriate.

Table S2. Laboratory findings of the subset of patients included in the analysis of CT within the first week after symptom onset

	Normal range	Total (n=32)	Non-survivor (n=11)	Survivor (n=21)	p value
White blood cell count, × 10⁹/L	4.00-10.00	5.2(4.2-8.3)	9.1(6.2-11.8)	4.7(4.1-5.4)	0.000
<4		4 (13%)	0 (0%)	4 (19%)	0.002
4–10		23 (72%)	6 (55%)	17 (91%)	
>10		5 (15%)	5 (45%)	0 (0%)	
Neutrophil count, × 10⁹/L	1.80-6.30	3.5(2.8-6.9)	8.0(3.5-11.3)	2.9(2.7-4.3)	0.000
Lymphocyte count, × 10⁹/L	1.10-3.20	0.8(0.5-1.2)	0.7(0.4-1.5)	0.9(0.6-1.2)	0.307
<1·1		22 (69%)	8 (73%)	14 (67%)	0.725
≥1·1		10 (31%)	3 (27%)	7 (33%)	
Hemoglobin, g/L	130.0-175.0	126.5(120.0-140.0)	120.0(110.0-135.0)	129.0(122.5-141.5)	0.113
Platelet count, × 10⁹/L	125.0-350.0	162.0(124.0-242.0)	124.0(87.0-242.0)	175.0(133.8-287.0)	0.066
<125		8/31 (26%)	6 (55%)	2/20 (10%)	0.007
≥125		23/31 (74%)	5 (45%)	18/20 (90%)	
Lactate dehydrogenase, U/L	135-225	328.0(197.5-541.8)	570.0(440.0-671.0)	261.0(194.5-379.5)	0.001
≤225		9 (28%)	1 (9%)	8 (38%)	0.083
>225		23 (72%)	10 (91%)	13 (62%)	
D-dimer, μg/mL	≤0·5	0.9(0.5-2.0)	2.3(1.6-22.0)	0.6(0.4-0.9)	0.000
≤0·5		8 (25%)	1 (9%)	7 (33%)	0.000
>0·5 to ≤1		11 (34%)	0 (0%)	11 (52%)	
>1		13 (41%)	10 (91%)	3 (15%)	
Prothrombin time, s	11.5-14.5	14.8(13.8-15.4)	15.5(14.8-17.7)	14.3(13.4-15.0)	0.005
<14.5		14 (44%)	2 (18%)	12 (57%)	0.035

≥14.5		18 (56%)	9 (82%)	9 (43%)	
International Normalized Ratio, INR	0.80-1.20	1.15(1.05-1.20)	1.21(1.14-1.45)	1.09(1.01-1.17)	0.005
Hypersensitive troponin I, pg/mL	≤34.2	11.0(4.2-27.0)	23.1(13.0-204.7)	6.0(2.3-13.2)	0.005
≤34.2		24/31 (77%)	6 (55%)	18/20 (90%)	0.024
>34.2		7/31 (23%)	5 (45%)	2/20 (10%)	
NT-proB-type Natriuretic Peptide (BNP), pg/mL	<241	192.0(71.0-702.5)	777.0(348.5-2847.0)	90.5(58.8-194.5)	0.000
<241		17/30 (57%)	0 (0%)	17/20 (85%)	0.000
≥241		13/30 (43%)	10 (100%)	3/20 (15%)	
Albumin, g/L	35-52	33.4(30.1-39.5)	31.5(28.2-34.2)	36.0(32.2-39.9)	0.034
<35		18 (56%)	9 (82%)	9 (43%)	0.035
≥35		14 (44%)	2 (18%)	12 (57%)	
Alanine aminotransferase, U/L	≤41	19.5(13.0-28.5)	17.0(14.0-29.0)	20.0(12.0-27.5)	0.725
≤41		28 (87%)	10 (91%)	18 (86%)	0.673
>41		4 (13%)	1 (9%)	3 (14%)	
Aspartate aminotransferase, U/L	≤40	30.0(19.3-43.0)	34.0(24.0-54.0)	24.0(19.0-36.0)	0.271
≤40		24 (75%)	7 (64%)	17 (81%)	0.283
>40		8 (25%)	4 (36%)	4 (19%)	
Total bilirubin, μmol/L	≤26	7.9(6.2-10.3)	7.5(6.6-9.8)	8.1(6.0-10.9)	1.000
Creatinine, μmol/L	59-104	68.0(61.3-87.8)	100.0(62.0-164.0)	67.0(59.5-76.0)	0.088
≤104		27 (84%)	6 (55%)	21 (100%)	0.002
>104		5 (16%)	5 (45%)	0 (0%)	
Blood urea nitrogen, mmol/L	3.6-9.5	4.7(3.3-8.4)	9.2(5.4-13.7)	4.0(3.3-5.2)	0.008
≤9.5		26 (81%)	6 (55%)	20 (95%)	0.005
>9.5		6 (19%)	5 (45%)	1 (5%)	
Potassium, mmol/L	3.50-5.10	4.1(3.5-4.5)	4.4(3.6-5.3)	4.0(3.5-4.3)	0.208
<3.5		7 (22%)	2 (18%)	5 (24%)	0.042

3.5-5.1		22 (69%)	6 (55%)	16 (76%)	
>5.1		3 (9%)	3 (27%)	0 (0%)	
Sodium, mmol/L	136-145	139.0(136.4-141.9)	138.7(137.2-142.6)	139.1(135.6-141.7)	0.938
<136		7 (22%)	2 (18%)	5 (24%)	0.363
136-145		24 (75%)	8 (73%)	16 (76%)	
>145		1 (3%)	1 (9%)	0 (0%)	
Calcium, mmol/L	2.20-2.55	2.1(2.0-2.2)	2.0(1.9-2.2)	2.1(2.0-2.2)	0.081
<2.2		25 (78%)	10 (91%)	15 (71%)	0.205
≥2.2		7 (22%)	1 (9%)	6 (29%)	
Procalcitonin, ng/mL	<0.05	0.05(0.03-0.18)	0.32(0.11-0.60)	0.04(0.02-0.06)	0.000
<0·05		17 (53%)	1 (9%)	16 (76%)	0.000
≥0·05		15 (47%)	10 (91%)	5 (24%)	
High-sensitivity C-reactive Protein (hs-CRP), mg/L	<1	52.2(9.6-114.7)	102.1(51.3-194.8)	27.0(5.5-71.1)	0.009
<3		4 (13%)	0 (0%)	4 (19%)	0.272
≥3		28 (87%)	11 (100%)	17 (81%)	
IL-1β, pg/ml	<5	4.9(4.7-4.9)	4.9(4.2-4.9)	4.9(4.7-4.9)	0.652
IL-2R, U/ml	223-710	514.0(292.5-744.5)	1076.5(671.8-1699.5)	454.5(270.3-563.0)	0.005
IL-6, pg/ml	<7	4.5(1.4-22.6)	65.1(11.3-154.1)	3.3(1.4-16.7)	0.019
IL-8, pg/ml	<62	10.2(6.1-18.9)	27.6(14.1-64.9)	9.4(5.7-15.9)	0.010
IL-10, pg/ml	<9.1	4.9(4.0-4.9)	8.3(4.9-17.0)	4.9(4.0-4.9)	0.081
TNF-α, pg/ml	<8.1	7.0(4.9-9.6)	21.3(13.2-28.9)	5.7(3.8-7.9)	0.000

Data are median (IQR), n (%), or n/N (%), where N is the total number of patients with available data. χ^2 test, Fisher's exact test, or Mann-Whitney U test were used to compare the values between survivors and non-survivors as appropriate.

Table S3. Risk factors associated with fatality

	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
Demographics and clinical characteristics				
Age, years*	1.07(1.02-1.11)	0.006	1.062(1.005-1.123)	0.033
<65	1 (ref)	..	..	..
≥65	4.17(1.34-13.02)	0.014	..	..
Female sex (vs male)	0.45(0.13-1.52)	0.196	..	..
Comorbidity present (vs not present)				
Diabetes	0.88(0.18-4.34)	0.871	..	..
Hypertension	2.30(0.75-7.03)	0.120	..	..
Coronary heart disease	6.54(0.85-50.54)	0.072	..	..
Other	1.39(0.43-4.50)	0.582	..	..
Current smoker	0.96(0.11-8.63)	0.974		
Laboratory findings				
White blood cell count, × 10⁹/L	1.29(1.07-1.56)	0.008	..	..
<4	0.84(0.09-7.43)	0.873	..	..
4–10	1 (ref)	..	..	..
>10	5.03(1.44-17.54)	0.011	..	..
Neutrophil count, × 10⁹/L*	1.33(1.11-1.59)	0.002	..	..
Lymphocyte count, × 10⁹/L*	0.17(0.04-0.79)	0.024	..	..
Platelet count, × 10⁹/L	0.98(0.97-0.99)	0.001	..	..
<125	16.93(4.66-61.51)	0.000	..	..
≥125	1 (ref)	..	..	..
Lactate dehydrogenase, U/L*	1.01(1.00-1.02)	0.000	1.010(1.005-1.015)	0.000
≤225	1 (ref)	..	..	..
>225	5.97(0.75-47.77)	0.092	..	..
D-dimer, μg/mL	1.14(1.04-1.25)	0.007	..	..
≤0·5	1 (ref)	..	..	..
>0·5 to ≤1	0.96(0.06-16.21)	0.980	..	..
>1	10.97(1.35-89.34)	0.025	..	..
Prothrombin time, s	1.08(0.96-1.21)	0.210	..	..
<14.5	1 (ref)	..	..	..
≥14.5	6.45(1.88-22.14)	0.003	..	..
Hypersensitive troponin I, pg/mL	1.00(0.99-1.01)	0.313	..	..
≤34.2	1 (ref)	..	..	..
>34.2	11.67(3.15-43.26)	0.000	..	..
NT-proB-type natriuretic peptide (BNP), pg/mL	1.00(1.00-1.00)	0.706	..	..

<241	1 (ref)	..	..	..
≥241	35.61(4.41-287.68)	0.001	..	..
Albumin, g/L	0.82(0.71-0.93)	0.003	..	..
<35	8.00(1.70-37.60)	0.008	..	..
≥35	1 (ref)	..	..	..
Alanine aminotransferase, U/L	0.97(0.93-1.02)	0.204	..	..
≤41	1 (ref)	..	..	..
>41	0.34(0.04-2.81)	0.319	..	..
Creatinine, μmol/L	1.00(0.99-1.01)	0.535	..	..
≤104	1 (ref)	..	..	..
>104	7.62(2.10-27.68)	0.002	..	..
Blood urea nitrogen, mmol/L	1.12(1.02-1.23)	0.018	..	..
≤9.5	1 (ref)	..	..	..
>9.5	18.16(4.36-75.62)	0.000	..	..
Procalcitonin, ng/mL*	1.86(0.82-4.20)	0.138	..	..
High-sensitivity C-reactive Protein (hs-CRP), mg/L*	1.01(1.00-1.02)	0.005	..	..
IL-2R, U/ml*	1.003(1.001-1.004)	0.001	..	..
IL-6, pg/ml*	1.02(1.01-1.04)	0.002	..	..
TNF-α, pg/ml*	1.19(1.06-1.34)	0.005	..	..

OR=odds ratio. *Per 1 unit increase.

Table S4. Risk factors associated with fatality of the subset of patients with CT severity scores within the first week after symptom onset

	Univariable OR (95% CI)	p value	Multivariable OR (95% CI)	p value
Demographics				
Age, years*	1.06(1.01-1.13)	0.027	..	..
Laboratory findings on admission				
Lymphocyte count, × 10^9/L*	0.53(0.09-3.03)	0.474	..	..
Lactate dehydrogenase, U/L	1.01(1.00-1.02)	0.003	..	..
≤225	1 (ref)	..	..	..
>225	6.15(0.66-57.60)	0.111	..	..
D-dimer, μg/mL	9.30(1.85-46.74)	0.007	..	..
≤0·5	1 (ref)	..	..	..
>0·5 to ≤1	..	..	..	..
>1	23.33(1.99-273.29)	0.012	..	..
Hypersensitive troponin I, pg/mL	1.00(0.99-1.01)	0.411	..	..
≤34.2	1 (ref)	..	..	..
>34.2	7.50(1.14-49.26)	0.036	..	..
CT findings within the first week after symptom onset				
Total severity score*	1.39(1.12-1.72)	0.003	1.544(1.004-2.374)	0.048
<15	1 (ref)	..	..	..
≥15	35.00(3.32-368.57)	0.003	..	..
Number of involved lung lobes	1.366(1.003-1.860)	0.048	..	..
<5	1 (ref)	..	..	..
=5	9.00(1.52-53.40)	0.016	..	..

OR=odds ratio. *Per 1 unit increase.

Table S5. Treatments and outcomes

	Total (n=102)	Non-survivor (n=15)	Survivor (n=87)	p value
Treatments				
Antibiotics	81 (79%)	15 (100%)	66 (76%)	0.036
Antiviral treatment	75 (74%)	7 (47%)	68 (78%)	0.011
Traditional Chinese medicine	79 (77%)	3 (20%)	76 (87%)	0.000
Corticosteroids	52 (51%)	13 (87%)	39 (45%)	0.003
Intravenous immunoglobin	19 (19%)	5 (33%)	14 (16%)	0.113
Nasal cannula oxygen therapy	76 (75%)	5 (33%)	71 (82%)	0.000
High-flow nasal cannula oxygen therapy	6 (6%)	2 (13%)	4 (5%)	0.184
Non-invasive mechanical ventilation	22 (22%)	13 (87%)	9 (10%)	0.000
Invasive mechanical ventilation	3 (3%)	3 (20%)	0 (0%)	0.003
ECMO	1 (1%)	1 (7%)	0 (0%)	..
Renal replacement therapy	2 (2%)	2 (13%)	0 (0%)	0.020
Outcomes				
Respiratory failure	35 (34%)	15 (100%)	20 (23%)	0.000
Heart failure	7 (7%)	4 (27%)	3 (3%)	0.001
Acute kidney failure	5 (5%)	5 (33%)	0 (0%)	0.000
ICU admission	3 (3%)	3 (20%)	0 (0%)	0.003
Hospital length of stay, days	21(13-29)	11(7-13)	22(16-30)	0.000
Time from symptom onset to ICU admission, days	19(21-34)	19(21-34)	..	..
ICU length of stay, days	9(3-20)	9(3-20)	..	..
Time from symptom onset to death or discharge, days	34(25-42)	22(17-26)	35(28-44)	0.000

Data are median (IQR) or n (%). p values were calculated by χ^2 test, or Fisher's exact test, as appropriate. ECMO=extracorporeal membrane oxygenation. ICU=intensive care unit.

Table S6. Treatments and outcomes of the subset of patients included in the analysis of CT within the first week after symptom onset

	Total (n=32)	Non-survivor (n=11)	Survivor (n=21)	p value
Treatments				
Antibiotics	29 (91%)	11 (100%)	18 (86%)	0.188
Antiviral treatment	25 (78%)	5 (45%)	20 (95%)	0.001
Traditional Chinese medicine	21 (66%)	1 (9%)	20 (95%)	0.000
Corticosteroids	19 (59%)	9 (82%)	10 (48%)	0.061
Intravenous immunoglobin	7 (22%)	3 (27%)	4 (19%)	0.593
Nasal cannula oxygen therapy	19 (59%)	2 (18%)	17 (81%)	0.001
High-flow nasal cannula oxygen therapy	0 (0%)	0 (0%)	0 (0%)	..
Non-invasive mechanical ventilation	13 (41%)	10 (91%)	3 (14%)	0.000
Invasive mechanical ventilation	0 (0%)	0 (0%)	0 (0%)	..
ECMO	0 (0%)	0 (0%)	0 (0%)	..
Renal replacement therapy	0 (0%)	0 (0%)	0 (0%)	..
Outcomes				
Respiratory failure	18 (56%)	11 (100%)	7 (33%)	0.000
Heart failure	3 (9%)	2 (18%)	1 (5%)	0.216
Acute kidney failure	4 (13%)	4 (36%)	0 (0%)	0.009
ICU admission	0 (0%)	0 (0%)	0 (0%)	..
Hospital length of stay, days	17(11-26)	10(7-12)	23(16-30)	0.000
Time from symptom onset to ICU admission, days	0 (0%)	0 (0%)	0 (0%)	..
ICU length of stay, days	0 (0%)	0 (0%)	0 (0%)	..
Time from symptom onset to death or discharge, days	28(22-35)	20(16-25)	34(27-38)	0.000

The counting data were presented as count (percentage of the total). p values were calculated by χ^2 test, or Fisher's exact test, as appropriate.