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

| Characteristics                        | Total (n=32) | Non-survivor (n=11) | Survivor (n=21) | p value |
|----------------------------------------|--------------|---------------------|-----------------|---------|
| **Age, years**                         |              |                     |                 |         |
| <65                                    | 20 (62%)     | 5 (45%)             | 15 (71%)        | 0.149   |
| ≥65                                    | 12 (38%)     | 6 (55%)             | 6 (29%)         |         |
| **Sex**                                |              |                     |                 |         |
| Female                                 | 13 (41%)     | 3 (27%)             | 10 (48%)        | 0.149   |
| Male                                   | 19 (59%)     | 8 (73%)             | 11 (52%)        |         |
| **Any Comorbidity**                   |              |                     |                 |         |
| 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(81.0-111.0) | 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. χ² test, Fisher’s exact test, or Mann-Whitney U test were used to compare the values between survivors and non-survivors as appropriate.
| Test                                | 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   |
| Test                                         | Category | Value 1 | Value 2 | Value 3 | Value 4 | p-value |
|----------------------------------------------|----------|---------|---------|---------|---------|----------|
| International Normalized Ratio, INR         | ≥14.5    | 18 (56%)| 9 (82%) | 9 (43%) |         |          |
| Hypersensitive troponin I, pg/mL            | ≤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) | 37.5(28.2-34.2) | 36.0(32.2-39.9) |         | 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      | 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                          | ≤104     | 27 (84%) | 6 (55%) | 21 (100%) |         | 0.002    |
|                                              | >104     | 5 (16%)  | 5 (45%) | 0 (0%)   |         |          |
| Blood urea nitrogen, mmol/L                 | ≤9.5     | 4.7(3.3-8.4) | 9.2(5.4-13.7) | 4.0(3.3-5.2) |         | 0.008    |
|                                              | >9.5     | 6 (19%)  | 5 (45%) | 1 (5%)   |         |          |
| Potassium, mmol/L                           | ≤3.5     | 7 (22%)  | 2 (18%) | 5 (24%)  |         | 0.042    |
| Sodium, mmol/L | <136 | 136-145 | >145 |
|---------------|------|---------|------|
| Median (IQR)  | 139.0 (136.4-141.9) | 138.7 (137.2-142.6) | 139.1 (135.6-141.7) |
| n (%)         | 7 (22%) | 24 (75%) | 1 (3%) |
| >5.1          | 3 (9%) | 3 (27%) | 0 (0%) |

| Calcium, mmol/L | <2.2 | ≥2.2 |
|-----------------|------|------|
| Median (IQR)    | 2.1 (2.0-2.2) | 2.1 (2.0-2.2) |
| n (%)           | 25 (78%) | 16 (76%) |
| >5.1            | 7 (22%) | 6 (29%) |

| Procalcitonin, ng/mL | <0.05 | ≥0.05 |
|----------------------|-------|-------|
| Median (IQR)         | 0.05 (0.03-0.18) | 0.05 (0.03-0.18) |
| n (%)                | 17 (53%) | 15 (47%) |

| High-sensitivity C-reactive Protein (hs-CRP), mg/L | <1 | ≥1 |
|---------------------------------------------------|---|---|
| Median (IQR)                                      | 52.2 (9.6-114.7) | 28 (87%) |
| n (%)                                             | 4 (13%) | 11 (100%) |

| IL-1β, pg/ml | <5 | ≥5 |
|--------------|---|---|
| Median (IQR) | 4.9 (4.7-4.9) | 4.9 (4.7-4.9) |
| n (%)        | 4 (13%) | 17 (81%) |

| IL-2R, U/ml | 223-710 |
|-------------|---------|
| Median (IQR) | 514.0 (292.5-744.5) |
| n (%)        | 1076.5 (671.8-1699.5) |

| IL-6, pg/ml | <7 | ≥7 |
|-------------|---|---|
| Median (IQR) | 4.5 (1.4-22.6) | 4.5 (1.4-22.6) |
| n (%)        | 65.1 (11.3-154.1) | 65.1 (11.3-154.1) |

| TNF-α, pg/ml | <8.1 | ≥8.1 |
|--------------|------|------|
| Median (IQR) | 7.0 (4.9-9.6) | 21.3 (13.2-28.9) |
| n (%)        | 4.9 (4.0-4.9) | 4.9 (4.0-4.9) |

Data are median (IQR), n (%), or n/N (%), where N is the total number of patients with available data. χ² test, Fisher’s exact test, or Mann-Whitney U test were used to compare the values between survivors and non-survivors as appropriate.
| Demographics and clinical characteristics | Univariable | p value | Multivariable | p value |
|------------------------------------------|-------------|---------|---------------|---------|
| 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   | ..            | ..      |
| Parameter                                      | Reference Range | p-value | OR (95% CI) |
|-----------------------------------------------|-----------------|---------|-------------|
| Albumin, g/L                                  | 0.82(0.71-0.93) | 0.003   | ..          |
| Alanine aminotransferase, U/L                 | 0.97(0.93-1.02) | 0.204   | 0.001       |
| Creatinine, µmol/L                            | 1.00(0.99-1.01) | 0.535   | 0.003       |
| Blood urea nitrogen, mmol/L                   | 1.12(1.02-1.23) | 0.018   | 0.002       |
| Procalcitonin, ng/mL*                         | 1.86(0.82-4.20) | 0.138   | 0.005       |
| High-sensitivity C-reactive Protein (hs-CRP), mg/L* | 1.01(1.00-1.02) | 0.005   | 0.002       |

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

| Demographics | Univariable OR (95% CI) | p value | Multivariable OR (95% CI) | p value |
|--------------|-------------------------|---------|---------------------------|---------|
| Age, years*  | 1.06(1.01-1.13)         | 0.027   | ..                        | ..      |
| Laboratory findings on admission |                   |         |                           |         |
| Lymphocyte count, × 10⁹/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

| Treatments                      | Total (n=102) | Non-survivor (n=15) | Survivor (n=87) | p value |
|---------------------------------|---------------|---------------------|----------------|---------|
| 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 immunoglobulin      | 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  | 6 (6%)        | 2 (13%)             | 4 (5%)         | 0.184   |
| Non-invasive mechanical         | 22 (22%)      | 13 (87%)            | 9 (10%)        | 0.000   |
| ventilation                     |               |                     |                |         |
| 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

| Outcomes                       | Total (n=102) | Non-survivor (n=15) | Survivor (n=87) | p value |
|--------------------------------|---------------|---------------------|----------------|---------|
| 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     | 19(21-34)     | 19(21-34)           | ..             | ..      |
| ICU admission, days            |               |                     |                |         |
| ICU length of stay, days       | 9(3-20)       | 9(3-20)             | ..             | ..      |
| Time from symptom onset to     | 34(25-42)     | 22(17-26)           | 35(28-44)      | 0.000   |
| death or discharge, days       |               |                     |                |         |

Data are median (IQR) or n (%). p values were calculated by χ² 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 immunoglobulin | 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 χ² test, or Fisher’s exact test, as appropriate.