**Supplementary Material**

**Supplementary Tables**

**Supplementary Table 1** Description of the information of COVID-19 patients (complete-cases only) according to health states during hospitalisation available from the Belgian COVID-19 hospital surveillance database between March 2020 and June 2021.

| Age (years) | Hospitalisation (N=18,994) | Admission to ICU (N=2,749) | Final health states |
|-------------|----------------------------|-----------------------------|---------------------|
|             | Number                     | Number                      | Hospitalisation     | ICU admission | Recovery | In-hospital death | Lost to follow-up |
| 18-49       | 3,246 (17.1%)              | 441 (16.0%)                 | 3,108 (20.0%)       | 53 (1.8%)     | 85 (16.3%) |
| 50-69       | 6,512 (34.3%)              | 1,295 (47.1%)               | 5,814 (37.4%)       | 481 (16.4%)   | 217 (41.7%) |
| 70-79       | 4,000 (21.1%)              | 735 (26.7%)                 | 3,141 (20.2%)       | 731 (25.0%)   | 128 (24.6%) |
| 80+         | 5,236 (27.6%)              | 278 (10.1%)                 | 3,484 (22.4%)       | 1,661 (56.8%) | 91 (17.5%)  |
| Median [IQR]| 69 [55, 81]                | 65 [55, 73]                 | 66 [53, 78]         | 81 [73, 87]   | 67 [57, 76] |
| Residence in retirement home | 2,165 (11.4%) | 107 (3.9%) | 1,401 (9.0%) | 746 (25.5%) | 18 (3.5%) |
| Sex (males) | 10,509 (55.3%)             | 1,856 (67.5%)               | 8,477 (54.5%)       | 1,727 (59.0%) | 305 (58.5%) |
| Symptoms at admission | | | | | |
| Lower respiratory | 13,667 (72.0%) | 2,324 (84.5%) | 11,076 (71.2%) | 2,205 (75.4%) | 386 (74.1%) |
| Fever       | 9,422 (49.6%)              | 1,597 (58.1%)               | 7,780 (50.0%)       | 1,368 (46.8%) | 274 (52.6%) |
| Typical viral infection | 8,658 (45.6%) | 1,307 (47.5%) | 7,445 (47.9%) | 1,004 (34.3%) | 209 (40.1%) |
| Gastro-intestinal | 5,341 (28.1%) | 678 (24.7%) | 4,658 (30.0%) | 562 (19.2%) | 121 (23.2%) |
| Anosmia     | 1,657 (8.7%)               | 239 (8.7%)                  | 1,496 (9.6%)        | 112 (3.8%)    | 49 (9.4%)   |
| Upper respiratory | 1,505 (7.9%) | 223 (8.1%) | 1,303 (8.4%) | 156 (5.3%) | 46 (8.8%) |
| Loss of appetite | 388 (2.0%) | 173 (6.3%) | 336 (2.2%) | 51 (1.7%) | 1 (0.2%) |
| Pre-existing conditions | | | | | |
| Cardiovascular disease | 6,094 (32.1%) | 890 (32.4%) | 4,380 (28.2%) | 1,562 (53.4%) | 152 (29.2%) |
| Arterial hypertension | 7,944 (41.8%) | 1,247 (45.4%) | 6,073 (39.1%) | 1,631 (55.7%) | 240 (46.1%) |
| Diabetes mellitus | 4,588 (24.2%) | 767 (27.9%) | 3,526 (22.7%) | 913 (31.2%) | 149 (28.6%) |
| Chronic renal disease | 2,577 (13.6%) | 319 (11.6%) | 1,827 (11.8%) | 686 (23.4%) | 64 (12.3%) |
| Chronic liver disease | 503 (2.6%) | 98 (3.6%) | 384 (2.5%) | 107 (3.7%) | 12 (2.3%) |
| Chronic lung disease | 3,128 (16.5%) | 553 (20.1%) | 2,362 (15.2%) | 657 (22.5%) | 109 (20.9%) |
| Neurological disorders | 1,493 (7.9%) | 151 (5.5%) | 1,084 (7.0%) | 382 (13.1%) | 27 (5.2%) |
| Cognitive disorders | 1,818 (9.6%) | 98 (3.6%) | 1,247 (8.0%) | 542 (18.5%) | 29 (5.6%) |
| Immunosuppressive condition | 390 (2.1%) | 105 (3.8%) | 300 (1.9%) | 80 (2.7%) | 10 (1.9%) |
| Cancer      | | | | | |
| Solid       | 1,824 (9.6%)               | 222 (8.1%)                  | 1,344 (8.6%)        | 428 (14.6%)   | 52 (10.0%)  |
| Haematological | 401 (2.1%) | 88 (3.2%) | 263 (1.7%) | 131 (4.5%) | 7 (1.3%) |
| Transplant  | 118 (0.6%)                 | 40 (1.5%)                   | 90 (0.6%)           | 23 (0.8%)     | 5 (1.0%)    |
| Obesity     | 3,020 (15.9%)              | 714 (26.0%)                 | 2,485 (16.0%)       | 417 (14.3%)   | 118 (22.6%) |
| Number of comorbidities | 0 | 4,720 (24.9%) | 583 (21.2%) | 4,413 (28.4%) | 192 (6.6%) | 115 (22.1%) |
|             | 1                        | 4,437 (23.4%)               | 636 (23.1%)         | 3,789 (24.4%) | 514 (17.6%) |
|             | 2                        | 4,179 (22.0%)               | 633 (23.0%)         | 3,310 (21.3%) | 760 (26.0%) |
|             | 3+                       | 5,658 (29.8%)               | 897 (32.6%)         | 4,035 (26.0%) | 1,460 (49.9%) | 163 (31.3%) |
| Risk factors               | n     | (%)   | n     | (%)   | n     | (%)   | n     | (%)   | n     | (%)   |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Pregnancy                 | 129   | (0.7%)| 16    | (0.6%)| 127   | (0.8%)| 0     | (0%)  | 2     | (0.4%)|
| Current smoker            | 1,544 | (8.1%)| 242   | (8.8%)| 1,273 | (8.2%)| 208   | (7.1%)| 63    | (12.1%)|

| Laboratory parameters at admission (Median [IQR]) |  |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lymphocytes (n/mm³)             | 830   | [460,1270] | 750   | [410,1150] | 870   | [500,1310] | 640   | [330,1040] | 660   | [139,1052] |
| LDH (IU/L)                      | 332   | [252,451]  | 419   | [313,574]  | 321   | [246,431]  | 396   | [293,558]  | 376   | [276,525]  |
| CRP (mg/dL)                     | 64    | [26,123]  | 109   | [52,179]   | 59    | [23,113]   | 95    | [46,164]   | 89    | [35,152]   |

| Hospital characteristics       |  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Hospital type                  | 12,909| (68.0%)| 1,555 | (56.6%)| 10,525| (67.7%)| 1,995 | (68.2%)| 389   | (74.7%)|
| GH                             | 4,499 | (23.7%)| 680   | (24.7%)| 3,650 | (23.5%)| 735   | (25.1%)| 114   | (21.9%)|
| GHU                            | 1,586 | (8.4%)  | 514   | (18.7%)| 1,372 | (8.8%)  | 196   | (6.7%)  | 18    | (3.5%)  |
| ICU occupancy (%)              | 0.42  | [0.25,0.64] | 0.42  | [0.25,0.63] | 0.44  | 0.44   | 0.50  |       |       |
| Median [IQR]                   | 0.42  | [0.25,0.64] | 0.42  | [0.25,0.63] | 0.44  | 0.44   | 0.50  |       |       |

| Clinical features              |  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Hospital length of stay (days, Median [IQR]) | 9 [5, 14] | 17 [10, 28] | 9 [5, 14] | 10 [6, 16] | 8 [4, 16] |
| Time from hospital admission to ICU admission (days, Median [IQR]) | - | 1 [0, 3] | - | - | - |
| ICU transfer                   | 2,749 | (14.5%)| 2,749 | (100%)| 1,672 | (10.8%)| 870   | (29.7%)| 207   | (39.7%)|
| Final health status            |  |
| Discharged alive               | 15,547| (81.9%)| 1,672 | (60.8%)| 15,547| (100%) | 0     | (0%)  | 0     | (0%)  |
| In-hospital death              | 2,926 | (15.4%)| 870   | (31.6%)| 0     | (0%)   | 2,926 | (100%)| 0     | (0%)  |
| Lost to follow-up              | 521   | (2.7%) | 207   | (7.5%) | 0     | (0%)   | 0     | (0%)  | 521   | (100%) |

Values are numbers and percentage, or median and interquartile values.
Abbreviations: CRP, c-reactive protein; GH, general hospital; GHU, General Hospital with University characteristics; ICU, intensive care units; IQR, interquartile range; LDH, lactate dehydrogenase; UH, university hospital.

*ICU occupancy taken at admission for hospitalised patients without a transfer to ICU, and for ICU patients taken at the time of their ICU transfer instead.
**Supplementary Table 2** Hazard ratios and 95% confidence intervals for transitions of COVID-19 disease progression in a multi-state risk prediction setting in a complete-case analysis.

| Predictors                          | Transition 1 Hospitalisation --> ICU | Transition 2 Hospitalisation --> Recovery | Transition 3 Hospitalisation --> in-hospital death | Transition 4 ICU --> Recovery | Transition 5 ICU --> In-hospital death |
|-------------------------------------|--------------------------------------|------------------------------------------|-----------------------------------------------------|-----------------------------|---------------------------------------|
| Age (years)                         |                                      |                                          |                                                     |                             |                                       |
| Q2 vs Q1                            | 1.23 (1.12; 1.35)                     | 0.83 (0.78; 0.88)                        | 1.80 (1.49; 2.17)                                   | 0.75 (0.66; 0.85)           | 1.12 (0.94; 1.33)                     |
| Q3 vs Q1                            | 0.42 (0.36; 0.50)                     | 0.53 (0.50; 0.57)                        | 4.05 (3.38; 4.85)                                   |                             | 1.65 (1.22; 2.24)                     |
| Q4 vs Q1                            | 1.28 (1.16; 1.41)                     | 0.37 (0.34; 0.39)                        | 1.22 (1.10; 1.36)                                   |                             |                                       |
| Sex (males)                         | 0.75 (0.60; 0.92)                     | 1.62 (1.43; 1.83)                        |                                                     |                             | 1.02 (0.66; 1.56)                     |
| Residence in retirement home        | 1.33 (1.18; 1.51)                     | 1.40 (1.24; 1.57)                        |                                                     |                             |                                       |
| Symptoms at admission               |                                      |                                          |                                                     |                             |                                       |
| Lower respiratory                   | 1.03 (0.94; 1.13)                     | 1.07 (1.03; 1.12)                        |                                                     |                             | 1.19 (0.93; 1.53)                     |
| Typical viral infection             | 0.86 (0.78; 0.96)                     | 1.05 (1.00; 1.09)                        |                                                     |                             | 0.82 (0.62; 1.09)                     |
| Gastro-intestinal                   | 1.08 (1.00; 1.16)                     |                                          |                                                     |                             |                                       |
| Anosmia                             | 1.74 (1.38; 2.19)                     | 1.40 (1.24; 1.57)                        |                                                     |                             |                                       |
| Pre-existing conditions              |                                      |                                          |                                                     |                             |                                       |
| Cardiovascular disease              | 1.01 (0.92; 1.11)                     | 0.97 (0.91; 1.02)                        | 1.20 (1.05; 1.36)                                   |                             | 1.23 (1.01; 1.50)                     |
| Arterial hypertension               | 0.95 (0.89; 1.00)                     | 1.03 (0.90; 1.17)                        |                                                     |                             | 0.95 (0.82; 1.10)                     |
| Diabetes mellitus                   | 0.91 (0.85; 0.97)                     | 1.15 (0.84; 1.58)                        |                                                     |                             |                                       |
| Chronic renal disease               | 1.07 (0.96; 1.21)                     | 0.92 (0.87; 0.98)                        |                                                     |                             | 0.94 (0.81; 1.10)                     |
| Chronic lung disease                | 0.98 (0.82; 1.17)                     | 0.82 (0.76; 0.89)                        |                                                     |                             | 1.28 (1.10; 1.50)                     |
| Neurological disorders              | 0.87 (0.70; 1.07)                     | 0.87 (0.81; 0.94)                        |                                                     |                             | 1.05 (0.92; 1.21)                     |
| Cognitive disorders                 | 0.96 (0.83; 1.11)                     | 0.96 (0.89; 1.03)                        |                                                     |                             | 1.25 (1.07; 1.46)                     |
| Immunosuppressive conditions        | 0.96 (0.89; 1.03)                     | 1.25 (1.07; 1.46)                        |                                                     |                             |                                       |
| Cancer                              | 0.96 (0.89; 1.03)                     | 1.25 (1.07; 1.46)                        |                                                     |                             |                                       |
|                     | Mean (95% CI)          |
|---------------------|------------------------|
| **Haematological**  |                        |
| Transplant          | 1.08 (0.70; 1.67)      |
| Pregnancy           | 1.17 (0.89; 1.53)      |
| Obesity             | 1.39 (1.25; 1.55)      |
| **Number of comorbidities** |
| 1 vs 0              | 0.88 (0.77; 1.02)      |
| 2 vs 0              | 1.19 (0.88; 1.62)      |
| 3+ vs 0             | 0.94 (0.78; 1.12)      |
| **Risk factors**    |                        |
| Current smoker      |                        |
| **Laboratory parameters at admission** |
| Lymphocytes (n/mm³) |                        |
| Q2 vs Q1            | 1.03 (0.98; 1.08)      |
| Q3 vs Q1            | 0.87 (0.76; 0.99)      |
| Q4 vs Q1            | 1.14 (1.09; 1.20)      |
| LDH (IU/L)          |                        |
| Q2 vs Q1            | 1.16 (1.03; 1.31)      |
| Q3 vs Q1            | 0.96 (0.91; 1.00)      |
| Q4 vs Q1            | 1.93 (1.73; 2.15)      |
| CRP (mg/dL)         |                        |
| Q2 vs Q1            | 1.91 (1.73; 2.13)      |
| Q3 vs Q1            | 0.89 (0.84; 0.94)      |
| Q4 vs Q1            | 1.48 (1.26; 1.73)      |
| **Hospital characteristics** |
| Hospital type at admission |
| GHU vs GH           | 2.04 (1.77; 2.36)      |
| UH vs GH            | 1.02 (0.94; 1.11)      |
| ICU occupancy a     |                        |
| Q2 vs Q1            | 1.02 (0.97; 1.07)      |
| Q3 vs Q1            | 1.08 (0.95; 1.24)      |
| Q4 vs Q1            | 0.89 (0.80; 0.99)      |

Abbreviations: CRP, C-reactive protein; GH, general hospital; GHU, General Hospital with University characteristics; ICU, intensive care units; LDH, lactate dehydrogenase; UH, university hospital; Q, quartile; a ICU occupancy taken at admission for hospitalised patients without a transfer to ICU, and for ICU patients taken at the time of their ICU transfer instead.