Supplementary appendix

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### Supplementary table 1 – Definition of in-hospital complications

| Organ specific complication | Complication within this group | Definition |
|-----------------------------|--------------------------------|------------|
| Respiratory                 | Bacterial pneumonia (highly likely) | Clinically significant organism detected in sputum or deep respiratory culture |
|                             | Bacterial pneumonia (suspected) | Defined clinically in patient healthcare record |
|                             | Likely Acute Respiratory Distress Syndrome (ARDS) | Defined clinically in patient record or defined as one of the following combinations: |
|                             |                                | - receiving extracorporeal membrane oxygenation |
|                             |                                | - being nursed in a prone position and receiving invasive mechanical ventilation |
|                             |                                | - receiving mechanical ventilation and having a PF (PaO2/FiO2) ratio of 300 or less |
|                             | Empyema                        | Defined clinically in patient healthcare record |
|                             | Pneumothorax                   | Defined clinically in patient healthcare record |
|                             | Pleural effusion               | Defined clinically in patient healthcare record |
| Neurological                | Meningitis                     | Defined clinically in patient healthcare record |
|                             | Encephalitis                   | Defined clinically in patient healthcare record |
|                             | Seizure                        | Defined clinically in patient healthcare record |
|                             | Stroke                         | Defined clinically in patient healthcare record |
| Cardiovascular              | Thromboembolism                | Defined clinically in patient healthcare record |
|                             | Heart Failure                  | Defined clinically in patient healthcare record |
|                             | Myocarditis                    | Defined clinically in patient healthcare record |
|                             | Endocarditis                   | Defined clinically in patient healthcare record |
|                             | Arrhythmia                     | Defined clinically in patient healthcare record |
|                             | Cardiomyopathy                 | Defined clinically in patient healthcare record |
|                             | Myocardial Ischaemia           | Defined clinically in patient healthcare record |
|                             | Cardiac Arrest                 | Defined clinically in patient healthcare record |
| Renal                       | Acute Kidney Injury            | Creatinine rise which corresponded to Kidney Disease Improving Global Outcomes (KDIGO) stage 1 or above (creatinine rise ≥1.5x baseline value or by ≥26.5 µmol/L) |
|                             |                                | Urine output not included within this definition |
| Gastrointestinal            | Acute Liver Injury             | Any of the following: |
|                             |                                | - International normalised ratio (INR) rise of 2.5 times or greater than the lowest entered value |
|                             |                                | - INR of over 4.5 (in the absence of warfarin therapy) |
| Condition                        | Definition                                                                 |
|---------------------------------|---------------------------------------------------------------------------|
| Alanine aminotransferase (ALT)  | - ALT rise of greater than 10 times the lowest value                      |
|                                 | - ALT over 150                                                            |
|                                 | - Bilirubin rise of greater than 15                                       |
|                                 | - Bilirubin greater than 55 (in the absence of any pre-existing liver disease) |
| Pancreatitis                    | Defined clinically in patient healthcare record                           |
| Gastrointestinal haemorrhage    | Defined clinically in patient healthcare record                           |
| Systemic                        | Defined clinically in patient healthcare record                           |
| Coagulopathy                    | Defined clinically in patient healthcare record                           |
| Disseminated Intravascular      | Defined clinically in patient healthcare record                           |
| Coagulation                     | Defined clinically in patient healthcare record                           |
| Anaemia                         | Defined clinically in patient healthcare record                           |
| Bloodstream Infection           | Clinically significant sample in blood culture                            |
### Supplementary table 2 – Complication rates by SARS-CoV-2 RT-PCR positivity status

|                  | Total       | Any complication | Systemic | Renal | Gastrointestinal | Cardiovascular | Neurological | Respiratory |
|------------------|-------------|------------------|----------|-------|------------------|----------------|--------------|-------------|
| **Total N (%)**  | 73197       | 36367 (49.7)     | 11895    | 17752 | 7901 (10.8)      | 8973 (12.3)    | 3115 (4.3)  | 13486 (18.4) |
| **PCR Confirmed**| 62894       | 32044 (50.9)     | 10617    | 15829 | 6916 (11.0)      | 7935 (12.6)    | 2753 (4.4)  | 11849 (18.8) |
| **Not confirmed**| 10303       | 4323 (42.0)      | 1278     | 1923  | 985 (9.6)        | 1038 (10.1)    | 362 (3.5)   | 1637 (15.9)  |

Percentage values are row percentages, except for totals which represent column percentages.
| Condition                          | Total N (%) | Total N (%) | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|-----------------------------------|-------------|-------------|-------|-------|-------|-------|-------|-------|-------|-----|
| Female                            | 31977       |             | 882   | 1359  | 1960  | 3488  | 4231  | 6685  | 9178  | 4194|
| Cryptogenic organizing pneumonia  | 42 (0.1)    |             | 0     | 0     | 0     | 4     | 8     | 6     | 10    | 10  |
| Likely ARDS                       | 3251 (10.2) |             | 53    | 145   | 313   | 550   | 703   | 662   | 602   | 223 |
| Pneumothorax                      | 227 (0.7)   |             | 6     | 11    | 8     | 39    | 57    | 52    | 28    | 9   |
| Pleural effusion                  | 1940 (6.1)  |             | 16    | 47    | 35    | 84    | 143   | 269   | 421   | 641 |
| Highly likely Bacterial Pneumonia | 99 (0.3)    |             | 2     | 4     | 0     | 14    | 25    | 21    | 21    | 10  |
| Meningitis / Encephalitis         | 61 (0.2)    |             | 2     | 0     | 4     | 0     | 7     | 19    | 8     | 11  |
| Seizure                           | 331 (1.0)   |             | 6     | 17    | 1     | 46    | 46    | 79    | 87    | 28  |
| Stroke / Cerebrovascular accident | 483 (1.5)   |             | 2     | 0     | 5     | 14    | 32    | 67    | 106   | 175 |
| Other neurological complication   | 537 (1.7)   |             | 7     | 0     | 8     | 22    | 42    | 69    | 105   | 201 |
| Congestive heart failure          | 1133 (3.5)  |             | 0     | 0     | 5     | 16    | 34    | 93    | 243   | 486 |
| Endocarditis / Pericarditis       | 83 (0.3)    |             | 1     | 0     | 5     | 0     | 6     | 11    | 19    | 23  |
| Myocarditis / Pericarditis        | 70 (0.2)    |             | 3     | 0     | 4     | 0     | 5     | 13    | 16    | 13  |
| Cardiomyopathy                    | 79 (0.2)    |             | 0     | 1     | 0     | 6     | 10    | 8     | 16    | 29  |
| Cardiac arrhythm                   | 1907 (6.0)  |             | 15    | 30    | 22    | 87    | 140   | 226   | 429   | 680 |
| Cardiac ischemia                  | 381 (1.2)   |             | 0     | 0     | 3     | 6     | 30    | 29    | 42    | 90  |
| Cardiac arrest                    | 653 (2.0)   |             | 5     | 0     | 13    | 21    | 65    | 93    | 161   | 200 |
| Bloodstream infection             | 404 (1.3)   |             | 6     | 0     | 16    | 34    | 48    | 171   | 76    | 105 |
| Coagulation disorder / DIC        | 724 (2.3)   |             | 14    | 1     | 24    | 46    | 101   | 135   | 146   | 190 |
| Anaemia                           | 4126 (12.9) |             | 81    | 2     | 160   | 250   | 432   | 628   | 856   | 1188|
| Rhabdomyolysis / Myositis         | 99 (0.3)    |             | 3     | 0     | 1     | 1     | 9     | 11    | 15    | 36  |
| Acute Kidney Injury               | 6612 (20.7) |             | 51    | 5     | 124   | 251   | 642   | 933   | 1533  | 2137|
| Gastrointestinal haemorrhage      | 325 (1.0)   |             | 5     | 0     | 8     | 0     | 8     | 25    | 47    | 57  |
| Pancreatitis                      | 108 (0.3)   |             | 5     | 0     | 9     | 0     | 9     | 17    | 24    | 16  |
| Deep Vein Thrombosis              | 167 (0.5)   |             | 2     | 0     | 10    | 9     | 31    | 33    | 30    | 41  |
| Pulmonary Embolism                | 382 (1.2)   |             | 3     | 0     | 15    | 27    | 65    | 83    | 78    | 12  |
| Liver injury                      | 2366 (7.4)  |             | 48    | 5     | 113   | 192   | 409   | 475   | 500   | 55  |
| Male                              | 41025       |             | 612   | 1385  | 3021  | 5591  | 6882  | 9841  | 10662 | 3031|
| Cryptogenic organizing pneumonia  | 50 (0.1)    |             | 0     | 0     | 2     | 4     | 9     | 12    | 10    | 12  |
| Likely ARDS                       | 6417 (15.6) |             | 62    | 247   | 697   | 1376  | 1540  | 1411  | 889   | 195 |
| Pneumothorax                      | 266 (1.1)   |             | 6     | 1     | 20    | 14    | 47    | 113   | 121   | 87  |
| Pleural effusion                  | 2583 (6.3)  |             | 23    | 5     | 53    | 145   | 322   | 456   | 631   | 723 |
| Highly likely Bacterial Pneumonia | 260 (0.6)   |             | 1     | 0     | 10    | 38    | 78    | 60    | 54    | 17  |
| Meningitis / Encephalitis         | 95 (0.2)    |             | 5     | 0     | 5     | 14    | 20    | 23    | 12    | 16  |
| Seizure                           | 497 (1.2)   |             | 13    | 2     | 33    | 45    | 89    | 87    | 105   | 105 |
| Stroke / Cerebrovascular accident | 729 (1.8)   |             | 1     | 0     | 12    | 36    | 75    | 147   | 205   | 209 |
| Other neurological complication   | 696 (1.7)   |             | 7     | 1     | 18    | 31    | 90    | 98    | 175   | 211 |

Supplementary table 3A - Specific complications stratified by age and sex in adults admitted to hospital with severe COVID-19.
| Condition                              | Total | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Congestive heart failure               | 1387  | 0 (0.0)| 11 (0.8)| 27 (0.9)| 84 (1.5)| 184 (2.7)| 363 (3.7)| 539 (5.1)| 179 (5.9) |
| Endocarditis / Myocarditis / Pericarditis | 181 (0.4) | 1 (0.2)| 12 (0.9)| 19 (0.6)| 29 (0.5)| 44 (0.6)| 39 (0.4)| 36 (0.3)| 1 (0.0) |
| Myocarditis / Pericarditis              | 121 (0.3) | 1 (0.2)| 3 (0.2)| 20 (0.7)| 19 (0.3)| 22 (0.3)| 28 (0.3)| 22 (0.2)| 6 (0.2) |
| Cardiomyopathy                         | 94 (0.2) | 0 (0.0)| 3 (0.2)| 9 (0.3)| 13 (0.2)| 20 (0.3)| 24 (0.2)| 21 (0.2)| 4 (0.1) |
| Cardiac arrhythmia                     | 2933 (7.1) | 20 (3.3)| 48 (3.5)| 143 (4.7)| 367 (6.6)| 597 (8.7)| 790 (8.0)| 759 (7.1)| 209 (6.9) |
| Cardiac ischemia                       | 615 (1.5) | 0 (0.0)| 11 (0.8)| 19 (0.6)| 56 (1.0)| 106 (1.5)| 175 (1.8)| 186 (1.7)| 62 (2.0) |
| Cardiac arrest                         | 1249 (3.0) | 4 (0.7)| 19 (1.4)| 68 (2.3)| 175 (3.1)| 238 (3.5)| 327 (3.3)| 315 (3.0)| 103 (3.4) |
| Bloodstream infection                  | 710 (1.7) | 9 (1.5)| 29 (2.1)| 65 (2.2)| 99 (1.6)| 142 (2.1)| 154 (1.6)| 166 (1.6)| 46 (1.5) |
| Coagulation disorder / DIC             | 1343 (3.3) | 13 (2.1)| 56 (4.0)| 131 (4.3)| 258 (4.6)| 272 (4.0)| 292 (3.0)| 253 (2.4)| 68 (2.2) |
| Anaemia                                | 5762 (14.0) | 39 (6.4)| 143 (10.3)| 327 (10.8)| 791 (14.1)| 1043 (15.2)| 1432 (14.6)| 1534 (14.4)| 453 (14.9) |
| Rhabdomyolysis / Myositis              | 165 (0.4) | 5 (0.8)| 6 (0.4)| 12 (0.4)| 24 (0.4)| 18 (0.3)| 42 (0.4)| 41 (0.4)| 17 (0.6) |
| Acute Kidney Injury                    | 11097 (27.0) | 75 (12.3)| 228 (16.5)| 620 (20.5)| 1434 (25.6)| 2116 (30.7)| 2775 (28.2)| 3007 (28.2)| 842 (27.8) |
| Gastrointestinal haemorrhage           | 529 (1.3) | 5 (0.8)| 9 (0.6)| 32 (1.1)| 65 (1.2)| 91 (1.3)| 120 (1.2)| 159 (1.5)| 48 (1.6) |
| Pancreatitis                           | 139 (0.3) | 6 (1.0)| 18 (1.3)| 18 (0.6)| 36 (0.6)| 21 (0.3)| 23 (0.2)| 14 (0.1)| 3 (0.1) |
| Deep Vein Thrombosis                   | 261 (0.6) | 1 (0.2)| 7 (0.5)| 25 (0.8)| 59 (1.1)| 55 (0.8)| 57 (0.6)| 44 (0.4)| 13 (0.4) |
| Pulmonary Embolism                     | 622 (1.5) | 11 (1.8)| 14 (1.0)| 78 (2.6)| 139 (2.5)| 136 (2.0)| 135 (1.4)| 96 (0.9)| 13 (0.4) |
| Liver Injury                           | 4732 (11.5) | 80 (1.5)| 223 (16.1)| 515 (17.0)| 988 (17.7)| 1027 (14.9)| 998 (10.1)| 714 (6.7)| 187 (6.2) |

Percentage values are row percentages, except for totals which represent column percentages. ARDS – Acute Respiratory Distress Syndrome, DIC – Disseminated Intravascular Coagulation.
**Supplementary table 3B – Comparison between suspected and highly likely bacterial pneumonia by age and sex in adults admitted to hospital with severe COVID-19.**

| Age group (years) | Total N (%) | 19-29  | 30-39  | 40-49  | 50-59  | 60-69  | 70-79  | 80-89  | 90+    |
|------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| **Female**       | 31977       | 882 (2.8) | 1359 (4.2) | 1960 (6.1) | 3488 (10.9) | 4231 (13.2) | 6685 (20.9) | 9178 (28.7) | 4194 (13.1) |
| Suspected Bacterial Pneumonia | 3533 (100) | 43 (1.2) | 101 (2.9) | 188 (5.3) | 403 (11.4) | 539 (15.3) | 771 (21.8) | 1028 (29.1) | 460 (13.0) |
| Highly likely Bacterial Pneumonia | 99 (100) | 2 (2.0) | 4 (4.0) | 14 (14.1) | 25 (25.3) | 21 (21.2) | 21 (21.2) | 10 (10.1) | 2 (2.0) |
| **Male**         | 41025       | 612 (1.5) | 1385 (3.4) | 3021 (7.4) | 5591 (13.6) | 6882 (16.8) | 9841 (24.0) | 10662 (26.0) | 3031 (7.4) |
| Suspected Bacterial Pneumonia | 5321 (100) | 52 (1.0) | 148 (2.8) | 407 (7.6) | 765 (14.4) | 927 (17.4) | 1281 (24.1) | 1353 (25.4) | 388 (7.3) |
| Highly likely Bacterial Pneumonia | 260 (100) | 1 (0.4) | 10 (3.8) | 38 (14.6) | 78 (30.0) | 60 (23.1) | 54 (20.8) | 17 (6.5) | 2 (0.8) |

Percentage values are row percentages.
Supplementary table 3C- Comparison between suspected and highly likely bacterial pneumonia by number of existing comorbidities in adults admitted to hospital with severe COVID-19.

| Number of existing comorbidities on admission | Total N | Age group (years) | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|-----------------------------------------------|---------|-------------------|-------|-------|-------|-------|-------|-------|-------|-----|
| 0 Total N (%)                                 | 13908   |                   | 862 (6.2) | 1430 (10.3) | 2140 (15.4) | 2907 (20.9) | 2341 (16.8) | 1925 (13.8) | 1700 (12.2) | 603 (4.3) |
| Suspected Bacterial Pneumonia                 | 1478    |                   | 44 (3.0) | 112 (7.6) | 239 (16.2) | 356 (24.1) | 312 (21.1) | 211 (14.3) | 154 (10.4) | 50 (3.4) |
| Highly likely Bacterial Pneumonia             | 111     |                   | 1 (0.9) | 6 (5.4) | 23 (20.7) | 39 (35.1) | 21 (18.9) | 19 (17.1) | 2 (1.8) | 0 (0.0) |
| 1 Total N (%)                                 | 17635   |                   | 434 (2.5) | 780 (4.4) | 1550 (8.8) | 2850 (16.2) | 3031 (17.2) | 3786 (21.5) | 3768 (21.4) | 1436 (8.1) |
| Suspected Bacterial Pneumonia                 | 2105    |                   | 33 (1.6) | 76 (3.6) | 199 (9.5) | 369 (17.5) | 390 (18.5) | 458 (21.8) | 425 (20.2) | 155 (7.4) |
| Highly likely Bacterial Pneumonia             | 107     |                   | 1 (0.9) | 5 (4.7) | 14 (13.1) | 40 (37.4) | 23 (21.5) | 19 (17.8) | 4 (3.7) | 1 (0.9) |
| 2+ Total N (%)                                | 41654   |                   | 204 (0.5) | 543 (1.3) | 1306 (3.1) | 3344 (8.0) | 5767 (13.8) | 10852 (26.1) | 14432 (34.6) | 5206 (12.5) |
| Suspected Bacterial Pneumonia                 | 5288    |                   | 18 (0.3) | 62 (1.2) | 160 (3.0) | 445 (8.4) | 766 (14.5) | 1389 (26.3) | 1805 (34.1) | 643 (12.2) |
| Highly likely Bacterial Pneumonia             | 141     |                   | 1 (0.7) | 3 (2.1) | 15 (10.6) | 24 (17.0) | 37 (26.2) | 37 (26.2) | 21 (14.9) | 3 (2.1) |

Percentage values are row percentages.
### Supplementary table 4 - Organ specific complications stratified by age and presence of comorbidity in adults admitted to hospital with severe COVID-19 in adults admitted to hospital with severe COVID-19.

| Number of existing comorbidities on admission | Age group (years) | Total | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|-----------------------------------------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| 0                                             |                  |       |       |       |       |       |       |       |       |     |
| Total N (%)                                   | 13908            |       |       |       |       |       |       |       |       |     |
| Systemic                                      | 1614 (11.6)      |       |       |       |       |       |       |       |       |     |
| Renal                                         | 2170 (15.6)      |       |       |       |       |       |       |       |       |     |
| Gastrointestinal                              | 1657 (11.9)      |       |       |       |       |       |       |       |       |     |
| Cardiovascular                                | 1046 (7.5)       |       |       |       |       |       |       |       |       |     |
| Neurological                                  | 409 (2.9)        |       |       |       |       |       |       |       |       |     |
| Respiratory                                   | 2562 (18.4)      |       |       |       |       |       |       |       |       |     |
| Any complication                              | 5328 (38.3)      |       |       |       |       |       |       |       |       |     |
| 1                                             |                  |       |       |       |       |       |       |       |       |     |
| Total N (%)                                   | 17635            |       |       |       |       |       |       |       |       |     |
| Systemic                                      | 2495 (14.1)      |       |       |       |       |       |       |       |       |     |
| Renal                                         | 3747 (21.2)      |       |       |       |       |       |       |       |       |     |
| Gastrointestinal                              | 2021 (11.5)      |       |       |       |       |       |       |       |       |     |
| Cardiovascular                                | 1801 (10.2)      |       |       |       |       |       |       |       |       |     |
| Neurological                                  | 693 (3.9)        |       |       |       |       |       |       |       |       |     |
| Respiratory                                   | 3416 (19.4)      |       |       |       |       |       |       |       |       |     |
| Any complication                              | 8198 (46.5)      |       |       |       |       |       |       |       |       |     |
| 2+                                            |                  |       |       |       |       |       |       |       |       |     |
| Total N (%)                                   | 41654            |       |       |       |       |       |       |       |       |     |
| Systemic                                      | 7786 (18.7)      |       |       |       |       |       |       |       |       |     |
| Renal                                         | 11835 (28.4)     |       |       |       |       |       |       |       |       |     |
| Gastrointestinal                              | 4223 (10.1)      |       |       |       |       |       |       |       |       |     |
| Cardiovascular                                | 6126 (14.7)      |       |       |       |       |       |       |       |       |     |
| Neurological                                  | 2013 (4.8)       |       |       |       |       |       |       |       |       |     |
| Respiratory                                   | 7508 (19.0)      |       |       |       |       |       |       |       |       |     |
| Any complication                              | 22841 (54.8)     |       |       |       |       |       |       |       |       |     |

Percentage values are row percentages, except for totals which represent column percentages.
Supplementary table 5 - Specific complications stratified by age and presence of comorbidity in adults admitted to hospital with severe COVID-19.

| Number of existing comorbidities on admission | Total | Age group (years) |
|-----------------------------------------------|-------|-------------------|
|                                               | Total N (%) | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
| 0                                             | 139098 | 862 (6.2) | 1430 (10.3) | 2140 (15.4) | 2907 (20.9) | 2341 (16.8) | 1925 (13.8) | 1700 (12.2) | 603 (4.3) |
| Empyema                                       | 12 (0.1) | 0 (0.0) | 1 (0.1) | 2 (0.1) | 2 (0.1) | 4 (0.2) | 2 (0.1) | 1 (0.1) | 0 (0.0) |
| Likely ARDS                                   | 2167 (15.6) | 44 (5.1) | 156 (10.9) | 405 (18.9) | 593 (20.4) | 525 (22.4) | 310 (16.1) | 113 (6.6) | 21 (3.5) |
| Pneumothorax                                  | 173 (1.2) | 9 (1.0) | 14 (1.0) | 30 (1.4) | 51 (1.8) | 44 (1.9) | 21 (1.1) | 2 (0.1) | 2 (0.3) |
| Pleural effusion                              | 566 (4.1) | 21 (2.4) | 41 (2.9) | 89 (4.2) | 122 (4.2) | 120 (5.1) | 93 (4.8) | 56 (3.3) | 24 (4.0) |
| Highly likely Bacterial pneumonia             | 111 (0.8) | 1 (0.1) | 6 (0.4) | 23 (1.1) | 39 (1.3) | 21 (0.9) | 19 (1.0) | 2 (0.1) | 0 (0.0) |
| Meningitis / Encephalitis                     | 41 (0.3) | 5 (0.6) | 6 (0.4) | 6 (0.3) | 6 (0.2) | 9 (0.4) | 4 (0.2) | 4 (0.2) | 1 (0.2) |
| Seizure                                       | 106 (0.8) | 6 (0.7) | 18 (1.3) | 18 (0.8) | 24 (0.8) | 14 (0.6) | 12 (0.6) | 13 (0.8) | 1 (0.2) |
| Stroke / Cerebrovascular accident             | 189 (1.4) | 0 (0.0) | 7 (0.5) | 18 (0.8) | 28 (1.0) | 42 (1.8) | 43 (2.2) | 45 (2.6) | 6 (1.0) |
| Other neurological complication               | 117 (0.8) | 2 (0.2) | 7 (0.5) | 17 (0.8) | 25 (0.9) | 26 (1.1) | 13 (0.7) | 21 (1.2) | 6 (1.0) |
| Congestive heart failure                      | 111 (0.8) | 0 (0.0) | 5 (0.3) | 7 (0.3) | 16 (0.6) | 16 (0.7) | 23 (1.2) | 27 (1.6) | 17 (2.8) |
| Endocarditis / Myocarditis                    | 52 (0.4) | 0 (0.0) | 7 (0.5) | 10 (0.5) | 8 (0.3) | 17 (0.7) | 6 (0.3) | 3 (0.2) | 1 (0.2) |
| Pericarditis                                  | 41 (0.3) | 2 (0.2) | 3 (0.2) | 11 (0.5) | 13 (0.4) | 7 (0.3) | 2 (0.1) | 3 (0.2) | 0 (0.0) |
| Myocarditis / Pericarditis                    | 16 (0.1) | 0 (0.0) | 2 (0.1) | 3 (0.1) | 3 (0.1) | 5 (0.2) | 1 (0.1) | 2 (0.1) | 0 (0.0) |
| Cardiomyopathy                                | 672 (4.8) | 15 (1.7) | 28 (2.0) | 90 (4.2) | 138 (4.7) | 157 (6.7) | 130 (6.8) | 86 (5.1) | 28 (4.6) |
| Cardiac arrhythmia                            | 84 (0.6) | 0 (0.0) | 8 (0.6) | 7 (0.3) | 13 (0.4) | 14 (0.6) | 16 (0.8) | 21 (1.2) | 5 (0.8) |
| Cardiac ischaemia                             | 263 (1.9) | 7 (0.8) | 6 (0.4) | 35 (1.6) | 54 (1.9) | 50 (2.1) | 63 (3.3) | 44 (2.6) | 10 (1.7) |
| Cardiac arrest                                | 193 (1.4) | 3 (0.3) | 20 (1.4) | 36 (1.7) | 38 (1.3) | 43 (1.8) | 26 (1.4) | 20 (1.2) | 7 (1.2) |
| Bloodstream Infection                         | 383 (2.8) | 10 (1.2) | 40 (2.8) | 71 (3.3) | 92 (3.2) | 79 (3.4) | 55 (2.9) | 27 (1.6) | 9 (1.5) |
| Coagulation disorder / DIC                    | 1253 (9.0) | 53 (6.1) | 114 (8.0) | 180 (8.4) | 288 (9.9) | 262 (11.2) | 191 (9.9) | 116 (6.8) | 49 (8.1) |
| Anaemia                                       | 45 (0.3) | 2 (0.2) | 3 (0.2) | 8 (0.4) | 9 (0.3) | 4 (0.2) | 8 (0.4) | 6 (0.4) | 5 (0.8) |
| Rhabdomyolysis / Myositis                     | 2170 (15.6) | 45 (5.2) | 122 (8.5) | 273 (12.8) | 497 (17.1) | 497 (21.2) | 365 (19.0) | 281 (16.5) | 90 (14.9) |
| Acute Kidney Injury                           | 87 (0.6) | 6 (0.7) | 5 (0.3) | 7 (0.3) | 21 (0.7) | 21 (0.9) | 8 (0.4) | 14 (0.8) | 5 (0.8) |
| Gastrointestinal haemorrhage                  | 43 (0.3) | 5 (0.6) | 10 (0.7) | 4 (0.2) | 11 (0.4) | 5 (0.2) | 5 (0.3) | 1 (0.1) | 2 (0.3) |
| Pancreatitis                                  | 99 (0.7) | 2 (0.2) | 8 (0.6) | 15 (0.7) | 31 (1.1) | 25 (1.1) | 10 (0.5) | 6 (0.4) | 2 (0.3) |
| Deep Vein Thrombosis                          | 257 (1.8) | 5 (0.6) | 19 (1.3) | 48 (2.2) | 78 (2.7) | 54 (2.3) | 32 (1.7) | 19 (1.1) | 2 (0.3) |
| Pulmonary Embolism                            | 1566 (11.3) | 58 (6.7) | 150 (10.5) | 293 (13.7) | 440 (15.1) | 302 (12.9) | 201 (10.4) | 97 (5.7) | 25 (4.1) |

| I Total N (%) | 17635 | 23 (0.1) | 2683 (15.0) | 49 (11.3) | 132 (16.9) | 293 (18.9) | 627 (22.0) | 677 (22.3) | 526 (13.9) | 275 (7.3) | 74 (5.2) |

Supplement page - 9
| Comorbidity                                      | Total | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Pneumothorax                                   | 208   | (1.2) |       |       |       |       |       |       |     |
| Pleural effusion                                | 959   | (5.4) |       |       |       |       |       |       |     |
| Highly likely Bacterial Pneumonia               | 107   | (0.6) |       |       |       |       |       |       |     |
| Meningitis / Encephalitis                       | 33    | (0.2) |       |       |       |       |       |       |     |
| Seizure                                         | 178   | (1.0) |       |       |       |       |       |       |     |
| Stroke / Cerebrovascular accident               | 293   | (1.7) |       |       |       |       |       |       |     |
| Other neurological complication                 | 262   | (1.5) |       |       |       |       |       |       |     |
| Congestive heart failure                        | 316   | (1.8) |       |       |       |       |       |       |     |
| Endocarditis / Myocarditis                      | 70    | (0.4) |       |       |       |       |       |       |     |
| Myocarditis / Pericarditis                      | 53    | (0.3) |       |       |       |       |       |       |     |
| Cardiomyopathy                                  | 34    | (0.2) |       |       |       |       |       |       |     |
| Cardiac arrhythmia                              | 1082  | (6.1) |       |       |       |       |       |       |     |
| Cardiac ischaemia                               | 176   | (1.0) |       |       |       |       |       |       |     |
| Cardiac arrest                                  | 461   | (2.6) |       |       |       |       |       |       |     |
| Bloodstream Infection                           | 296   | (1.7) |       |       |       |       |       |       |     |
| Coagulation disorder / DIC                      | 489   | (2.8) |       |       |       |       |       |       |     |
| Anaemia                                         | 2012  | (11.4)|       |       |       |       |       |       |     |
| Rhabdomyolysis / Myositis                       | 54    | (0.3) |       |       |       |       |       |       |     |
| Acute Kidney Injury                             | 3747  |       |       |       |       |       |       |       |     |
| Gastrointestinal haemorrhage                    | 4871  | (21.2)|       |       |       |       |       |       |     |
| Pancreatitis                                    | 187   | (1.1) |       |       |       |       |       |       |     |
| Pancreatitis                                    | 67    | (0.4) |       |       |       |       |       |       |     |
| Deep Vein Thrombosis                            | 102   | (0.6) |       |       |       |       |       |       |     |
| Pulmonary Embolism                              | 261   | (1.5) |       |       |       |       |       |       |     |
| Liver Injury                                    | 1859  | (10.5)|       |       |       |       |       |       |     |
| Total N (%)                                     | 41654 |       |       |       |       |       |       |       |     |
| Empyema                                         | 57    | (0.1) |       |       |       |       |       |       |     |
| Likely ARDS                                     | 4871  | (11.7)|       |       |       |       |       |       |     |
| Pneumothorax                                    | 313   | (0.8) |       |       |       |       |       |       |     |
| Pleural effusion                                | 3006  | (7.2) |       |       |       |       |       |       |     |
| Highly likely Bacterial Pneumonia               | 141   | (0.3) |       |       |       |       |       |       |     |
| Meningitis / Encephalitis                       | 82    | (0.2) |       |       |       |       |       |       |     |
| Seizure                                         | 545   | (1.3) |       |       |       |       |       |       |     |

Note: The numbers in parentheses indicate the percentage of the total number of cases.
| Number of existing comorbidities on admission | Age group (years) | Total | 19-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90+ |
|---------------------------------------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Stroke / Cerebrovascular accident            | 731 (1.8)        | 1 (0.5) | 7 (1.3) | 16 (1.2) | 46 (1.4) | 117 (2.0) | 187 (1.7) | 264 (1.8) | 93 (1.8) |
| Other neurological complication             | 856 (2.1)        | 4 (2.0) | 8 (1.5) | 19 (1.5) | 63 (1.9) | 90 (1.6) | 214 (2.0) | 331 (2.3) | 127 (2.4) |
| Congestive heart failure                    | 2101 (5.0)       | 0 (0.0) | 6 (1.1) | 27 (2.1) | 78 (2.3) | 214 (3.7) | 506 (4.7) | 914 (6.3) | 356 (6.8) |
| Endocarditis / Myocarditis                  | 142 (0.3)        | 2 (1.0) | 2 (0.4) | 9 (0.7) | 18 (0.5) | 27 (0.5) | 43 (0.4) | 39 (0.3) | 2 (0.0) |
| Pericarditis                                | 97 (0.2)         | 1 (0.5) | 2 (0.4) | 6 (0.5) | 11 (0.3) | 19 (0.3) | 26 (0.2) | 22 (0.2) | 10 (0.2) |
| Myocarditis / Pericarditis                  | 124 (0.3)        | 0 (0.0) | 2 (0.4) | 7 (0.5) | 12 (0.4) | 18 (0.3) | 31 (0.3) | 42 (0.3) | 12 (0.2) |
| Cardiomyopathy                              | 3098 (7.4)       | 8 (3.9) | 22 (4.1) | 74 (5.7) | 210 (6.3) | 438 (7.6) | 824 (7.6) | 1129 (7.8) | 393 (7.5) |
| Cardiac arrhythmia                          | 738 (1.8)        | 0 (0.0) | 1 (0.2) | 11 (0.8) | 49 (1.5) | 97 (1.7) | 204 (1.9) | 261 (1.8) | 115 (2.2) |
| Cardiac ischaemia                           | 1173 (2.8)       | 1 (0.5) | 10 (1.8) | 31 (2.4) | 99 (3.0) | 185 (3.2) | 327 (3.0) | 377 (2.6) | 143 (2.7) |
| Cardiac arrest                              | 626 (1.5)        | 3 (1.5) | 12 (2.2) | 30 (2.3) | 51 (1.5) | 109 (1.9) | 151 (1.4) | 203 (1.4) | 67 (1.3) |
| Bloodstream Infection                       | 1199 (2.9)       | 5 (2.5) | 19 (3.5) | 55 (4.2) | 161 (4.8) | 202 (3.5) | 288 (2.7) | 362 (2.5) | 107 (2.1) |
| Coagulation disorder / DIC                  | 6641 (15.9)      | 33 (16.2) | 97 (17.9) | 226 (17.3) | 586 (17.5) | 991 (17.2) | 1693 (15.6) | 2232 (15.5) | 783 (15.0) |
| Anaemia                                     | 167 (0.4)        | 2 (1.0) | 3 (0.6) | 2 (0.2) | 15 (0.4) | 18 (0.3) | 35 (0.3) | 59 (0.4) | 33 (0.6) |
| Rhabdomyolysis / Myositis                   | 11835 (28.4)     | 39 (19.1) | 126 (23.2) | 340 (26.0) | 978 (29.2) | 1762 (30.6) | 3086 (28.4) | 4085 (28.3) | 1419 (27.3) |
| Acute Kidney Injury                         | 581 (1.4)        | 2 (1.0) | 8 (1.5) | 12 (0.9) | 40 (1.2) | 80 (1.4) | 141 (1.3) | 224 (1.6) | 74 (1.4) |
| Gastrointestinal haemorrhage                | 138 (0.3)        | 3 (1.5) | 10 (1.8) | 13 (1.0) | 25 (0.7) | 26 (0.5) | 26 (0.2) | 29 (0.2) | 6 (0.1) |
| Pancreatitis                                | 228 (0.5)        | 1 (0.5) | 7 (1.3) | 5 (0.4) | 40 (1.2) | 37 (0.6) | 52 (0.5) | 66 (0.5) | 20 (0.4) |
| Deep Vein Thrombosis                        | 486 (1.2)        | 3 (1.5) | 4 (0.7) | 26 (2.0) | 76 (2.3) | 101 (1.8) | 130 (1.2) | 120 (0.8) | 26 (0.5) |
| Pulmonary Embolism                          | 3883 (8.8)       | 22 (10.8) | 81 (14.9) | 194 (14.9) | 530 (15.8) | 733 (12.7) | 922 (8.5) | 915 (6.3) | 286 (5.5) |

Percentage values are row percentages, except for totals which represent column percentages. ARDS – Acute Respiratory Distress Syndrome, DIC – Disseminated Intravascular Coagulation.
Supplementary table 6 - Outcomes by organ specific complications in adults admitted to hospital with severe COVID-19 who survived.

| Total number of patients experiencing complications | Organ-specific level complications¹ |
|-----------------------------------------------------|-----------------------------------|
|                                                     | Any complication                  | Systemic | Renal | Gastrointestinal | Cardiovascular | Neurological | Respiratory |
| Total N (%)                                         | 50105                             | 21784 (43.5) | 7423 (14.8) | 10059 (20.1) | 4837 (9.7) | 4035 (8.1) | 1880 (3.8) | 7028 (14.0) |
| Critical Care Admission No                          | 43153 (86.1)                      | 16853 (77.4) | 5557 (74.9) | 7467 (74.2) | 3233 (66.8) | 3020 (74.8) | 1461 (77.7) | 3616 (51.5) |
| Critical Care Admission Yes                         | 6242 (12.5)                       | 4926 (22.6)  | 1866 (25.1) | 2589 (25.7) | 1602 (33.1) | 1015 (25.2) | 419 (22.3)  | 3410 (48.5) |
| Critical Care Admission (Missing)                   | 710 (1.4)                         | 5 (0.0)      | 0 (0.0)     | 3 (0.0)     | 2 (0.0)     | 0 (0.0)     | 0 (0.0)     | 2 (0.0)     |
| Any invasive ventilation No                         | 45825 (91.5)                      | 18630 (85.5) | 6067 (81.7) | 8271 (82.2) | 3728 (77.1) | 3275 (81.2) | 1533 (81.5) | 4498 (64.0) |
| Any invasive ventilation Yes                        | 3472 (6.9)                        | 3130 (14.4)  | 1352 (18.2) | 1773 (17.6) | 1104 (22.8) | 758 (18.8)  | 347 (18.5)  | 2529 (36.0) |
| Any invasive ventilation (Missing)                  | 808 (1.6)                         | 24 (0.1)     | 4 (0.1)     | 15 (0.1)    | 5 (0.1)     | 2 (0.0)     | 0 (0.0)     | 1 (0.0)     |
| Any non-invasive ventilation No                     | 42350 (87.2)                      | 17255 (80.1) | 5917 (80.3) | 7738 (77.8) | 3568 (74.6) | 3184 (79.6) | 1566 (84.3) | 4232 (60.6) |
| Any non-invasive ventilation Yes                    | 15607 (31.8)                      | 4892 (22.6)  | 1454 (19.7) | 2207 (22.2) | 1218 (25.4) | 817 (20.4)  | 291 (15.7)  | 2748 (39.4) |
| Any non-invasive ventilation (Missing)              | 33310 (68.2)                      | 16760 (77.4) | 5642 (76.3) | 8061 (80.6) | 3873 (80.5) | 3120 (77.8) | 1285 (68.9) | 6379 (91.1) |

Percentage values are row percentages, except for totals which represent column percentages. § = Denominator is number of non-missing observations for each organ system.
## Supplementary table 7 - Outcomes by organ specific complications in adults admitted to hospital with severe COVID-19 who died.

| Total number of patients experiencing complications | Organ-specific level complications* | Systemic | Renal | Gastrointestinal | Cardiovascular | Neurological | Respiratory |
|-----------------------------------------------------|-----------------------------------|----------|-------|------------------|----------------|--------------|-------------|
| Total N (%):                                        |                                   | 4472 (19.4) | 7693 (33.3) | 3064 (13.3) | 4938 (21.4) | 1235 (5.3)  | 6458 (28.0) |
| Critical Care Admission:                            |                                   |           |       |                  |                |              |             |
| No: 18972 (82.2)                                    |                                   | 3247 (72.6) | 5525 (71.8) | 1906 (62.2) | 3620 (73.3) | 985 (79.8)  | 3856 (59.7)  |
| Yes: 3792 (16.4)                                    |                                   | 1224 (27.4) | 2166 (28.2) | 1158 (37.8) | 1318 (26.7) | 249 (20.2)  | 2602 (40.3)  |
| (Missing): 328 (1.4)                                |                                   | 1 (0.0)    | 2 (0.0)  | 0 (0.0)         | 0 (0.0)       | 1 (0.1)     | 0 (0.0)     |
| Any invasive ventilation:                           |                                   | 3489 (78.0) | 5991 (77.9) | 2087 (68.1) | 3911 (79.2) | 1040 (84.2) | 4311 (66.8)  |
| No: 20063 (86.9)                                    |                                   | 978 (21.9)  | 1698 (22.1) | 973 (31.8)  | 1026 (20.8) | 195 (15.8)  | 2141 (33.2)  |
| Yes: 2650 (11.5)                                    |                                   | 379 (1.6)   | 14 (0.1)   | 5 (0.1)      | 4 (0.1)      | 1 (0.0)     | 0 (0.0)     |
| (Missing): 379 (1.6)                                |                                   |            |           |                |              |             |             |
| Any non-invasive ventilation:                       |                                   | 3311 (74.8) | 5623 (73.9) | 2117 (70.0) | 3678 (75.1) | 1000 (81.8) | 4100 (64.2)  |
| No: 17685 (79.3)                                    |                                   | 1113 (25.2) | 1987 (26.1) | 906 (30.0)  | 1217 (24.9) | 222 (18.2) | 2290 (35.8) |
| Yes: 4621 (20.7)                                    |                                   | 3445 (23.9) |            |                |              |             |             |
| (Missing): 3445 (23.9)                              |                                   |            |           |                |              |             |             |
| Any oxygen:                                         |                                   | 4120 (92.6) | 7128 (93.1) | 2832 (93.0) | 4624 (93.9) | 1073 (87.2) | 6219 (96.7) |
| No: 2145 (9.5)                                      |                                   |            |           |                |              |             |             |
| Yes: 20385 (90.5)                                   |                                   | 331 (7.4)   | 528 (6.9)  | 213 (7.0)    | 302 (6.1)    | 157 (12.8)  | 211 (3.3)   |
| (Missing): 331 (7.4)                                |                                   |            |           |                |              |             |             |

Percentage values are row percentages, except for totals which represent column percentages. § = Denominator is number of non-missing observations for each organ system.
### Supplementary table 8 - Effect of complications on survival (adjusted Cox proportional hazards models) for figure 2C

### Supplementary table 8A - Any complication

| Dependent: Survival (mortality) | HR (univariable) | HR (multivariable) |
|--------------------------------|------------------|--------------------|
| Any complication               |                  |                    |
| Yes                            | 1.91 (1.86-1.97, p<0.001) | 1.74 (1.64-1.84, p<0.001) |
| No                             | -                | -                  |

| Age on admission               |                  |                    |
| 19-29                          | -                | -                  |
| 30-39                          | 1.82 (1.25-2.64, p=0.002) | 1.68 (1.22-2.31, p=0.002) |
| 40-49                          | 3.22 (2.29-4.53, p<0.001) | 2.78 (1.97-3.94, p<0.001) |
| 50-59                          | 6.24 (4.48-8.68, p<0.001) | 5.26 (3.79-7.29, p<0.001) |
| 60-69                          | 11.72 (8.43-16.27, p<0.001) | 9.68 (6.99-13.40, p<0.001) |
| 70-79                          | 18.38 (13.25-25.51, p<0.001) | 15.44 (11.07-21.54, p<0.001) |
| 80-89                          | 23.49 (16.93-32.59, p<0.001) | 20.15 (14.56-27.89, p<0.001) |
| 90+                            | 27.63 (19.89-38.36, p<0.001) | 24.73 (17.77-34.40, p<0.001) |

| Sex at Birth                   |                  |                    |
| Female                         | -                | -                  |
| Male                           | 1.23 (1.20-1.27, p<0.001) | 1.30 (1.26-1.33, p<0.001) |

| Deprivation                   |                  |                    |
| 1 (least deprived)            |                  |                    |
| 2                              | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.97-1.08, p=0.348) |
| 3                              | 0.99 (0.95-1.04, p=0.743) | 1.06 (0.99-1.12, p=0.074) |
| 4                              | 0.95 (0.91-1.00, p=0.039) | 1.07 (1.01-1.13, p=0.033) |
| 5 (most deprived)             | 0.93 (0.89-0.97, p=0.001) | 1.09 (1.03-1.15, p=0.002) |
| Systemic Complication | No | 62531 (100.0) |  |  |
|------------------------|----|---------------|---|---|
|                        | Yes | 11970 (100.0) | 1.27 (1.23-1.31, p<0.001) | 1.20 (1.15-1.26, p<0.001) |
| **Age on admission**   | 19-29 | 1477 (100.0) | - | - |
|                        | 30-39 | 2707 (100.0) | 1.82 (1.25-2.64, p=0.002) | 1.75 (1.27-2.42, p=0.001) |
|                        | 40-49 | 4930 (100.0) | 3.22 (2.29-4.53, p<0.001) | 3.00 (2.12-4.26, p<0.001) |
|                        | 50-59 | 9003 (100.0) | 6.24 (4.48-8.68, p<0.001) | 5.79 (4.17-8.04, p<0.001) |
|                        | 60-69 | 11035 (100.0) | 11.72 (8.43-16.27, p<0.001) | 10.87 (7.84-15.07, p<0.001) |
|                        | 70-79 | 16445 (100.0) | 18.38 (13.25-25.51, p<0.001) | 17.25 (12.36-24.09, p<0.001) |
|                        | 80-89 | 19771 (100.0) | 23.49 (16.93-32.59, p<0.001) | 22.50 (16.24-31.18, p<0.001) |
|                        | 90+   | 7204 (100.0) | 27.63 (19.89-38.36, p<0.001) | 27.61 (19.83-38.43, p<0.001) |
| **Sex at Birth**       | Female | 31733 (100.0) | - | - |
|                        | Male | 40648 (100.0) | 1.23 (1.20-1.27, p<0.001) | 1.34 (1.30-1.38, p<0.001) |
| **Deprivation**        | 1 (least deprived) | 10347 (100.0) | - | - |
|                        | 2 | 12775 (100.0) | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.98-1.08, p=0.281) |
|                        | 3 | 15712 (100.0) | 0.99 (0.95-1.04, p=0.743) | 1.06 (1.00-1.12, p=0.059) |
|                        | 4 | 15880 (100.0) | 0.95 (0.91-1.00, p=0.039) | 1.07 (1.02-1.13, p=0.012) |
|                        | 5 (most deprived) | 17845 (100.0) | 0.93 (0.89-0.97, p=0.001) | 1.09 (1.04-1.15, p=0.001) |
### Supplementary table 8C - Renal complications/ acute kidney injury

| Dependent: Survival (mortality) | HR (univariable) | HR (multivariable) |
|---------------------------------|------------------|-------------------|
| **Renal complication**          |                  |                   |
| No                              | 56691 (100.0)    | -                 |
| Yes                             | 17810 (100.0)    | 1.68 (1.64-1.73, p<0.001) |
|                                 |                  | 1.49 (1.42-1.55, p<0.001) |
| **Age on admission**            |                  |                   |
| 19-29                           | 1477 (100.0)     | -                 |
| 30-39                           | 2707 (100.0)     | 1.82 (1.25-2.64, p=0.002) |
|                                 |                  | 1.74 (1.26-2.39, p=0.001) |
| 40-49                           | 4930 (100.0)     | 3.22 (2.29-4.53, p<0.001) |
|                                 |                  | 2.92 (2.06-4.14, p<0.001) |
| 50-59                           | 9003 (100.0)     | 6.24 (4.48-8.68, p<0.001) |
|                                 |                  | 5.53 (3.99-7.68, p<0.001) |
| 60-69                           | 11035 (100.0)    | 11.72 (8.43-16.27, p<0.001) |
|                                 |                  | 10.22 (7.37-14.17, p<0.001) |
| 70-79                           | 16445 (100.0)    | 18.38 (13.25-25.51, p<0.001) |
|                                 |                  | 16.24 (11.63-22.67, p<0.001) |
| 80-89                           | 19771 (100.0)    | 23.49 (16.93-32.59, p<0.001) |
|                                 |                  | 21.16 (15.27-29.32, p<0.001) |
| 90+                             | 7204 (100.0)     | 27.63 (19.89-38.36, p<0.001) |
|                                 |                  | 26.05 (18.70-36.27, p<0.001) |
| **Sex at Birth**                |                  |                   |
| Female                          | 31733 (100.0)    | -                 |
| Male                            | 40648 (100.0)    | 1.23 (1.20-1.27, p<0.001) |
|                                 |                  | 1.31 (1.27-1.35, p<0.001) |
| **Deprivation**                 |                  |                   |
| 1 (least deprived)              | 10347 (100.0)    | -                 |
| 2                               | 12775 (100.0)    | 1.00 (0.96-1.05, p=0.965) |
|                                 |                  | 1.03 (0.98-1.08, p=0.317) |
| 3                               | 15712 (100.0)    | 0.99 (0.95-1.04, p=0.743) |
|                                 |                  | 1.05 (0.99-1.11, p=0.089) |
| 4                               | 15880 (100.0)    | 0.95 (0.91-1.00, p=0.039) |
|                                 |                  | 1.06 (1.00-1.12, p=0.046) |
| 5 (most deprived)               | 17845 (100.0)    | 0.93 (0.89-0.97, p=0.001) |
|                                 |                  | 1.08 (1.02-1.13, p=0.006) |
### Supplementary table 8D - Gastrointestinal and liver complications

| Dependent: Survival (mortality) | No       | Yes       | HR (univariable) | HR (multivariable) |
|---------------------------------|----------|-----------|------------------|--------------------|
| Gastrointestinal or liver complication | 66464 (100.0) | 8037 (100.0) | 1.28 (1.23-1.33, p<0.001) | 1.50 (1.44-1.57, p<0.001) |
| Age on admission                 |          |           |                  |                    |
| 19-29                            | 1477 (100.0) | -         | -                | -                  |
| 30-39                            | 2707 (100.0) | 1.82 (1.25-2.64, p=0.002) | 1.74 (1.26-2.39, p=0.001) |
| 40-49                            | 4930 (100.0) | 3.22 (2.29-4.53, p<0.001) | 2.97 (2.10-4.20, p<0.001) |
| 50-59                            | 9003 (100.0) | 6.24 (4.48-8.68, p<0.001) | 5.71 (4.12-7.92, p<0.001) |
| 60-69                            | 11035 (100.0) | 11.72 (8.43-16.27, p<0.001) | 10.85 (7.84-15.02, p<0.001) |
| 70-79                            | 16445 (100.0) | 18.38 (13.25-25.51, p<0.001) | 17.54 (12.58-24.45, p<0.001) |
| 80-89                            | 19771 (100.0) | 23.49 (16.93-32.59, p<0.001) | 23.15 (16.73-32.03, p<0.001) |
| 90+                              | 7204 (100.0) | 27.63 (19.89-38.36, p<0.001) | 28.46 (20.46-39.59, p<0.001) |
| Sex at Birth                     |          |           |                  |                    |
| Female                           | 31733 (100.0) | -         | -                | -                  |
| Male                             | 40648 (100.0) | 1.23 (1.20-1.27, p<0.001) | 1.33 (1.29-1.37, p<0.001) |
| Deprivation                      |          |           |                  |                    |
| 1 (least deprived)               | 10347 (100.0) | -         | -                | -                  |
| 2                                | 12775 (100.0) | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.98-1.08, p=0.292) |
| 3                                | 15712 (100.0) | 0.99 (0.95-1.04, p=0.743) | 1.06 (1.00-1.12, p=0.052) |
| 4                                | 15880 (100.0) | 0.95 (0.91-1.00, p=0.039) | 1.08 (1.02-1.14, p=0.011) |
| 5 (most deprived)                | 17845 (100.0) | 0.93 (0.89-0.97, p=0.001) | 1.09 (1.04-1.15, p=0.001) |
## Supplementary table 8E - Cardiovascular complications

| Dependent: Survival (mortality) | Cardiovascular complication | HR (univariable) | HR (multivariable) |
|---------------------------------|-------------------------------|-----------------|--------------------|
|                                 | No                            | 65498 (100.0)   | -                  |
|                                 | Yes                           | 9003 (100.0)    | 2.32 (2.25-2.39, p<0.001) | 1.98 (1.85-2.11, p<0.001) |
| Age on admission                 | 19-29                         | 1477 (100.0)    | -                  |
|                                 | 30-39                         | 2707 (100.0)    | 1.82 (1.25-2.64, p=0.002) | 1.74 (1.26-2.39, p=0.001) |
|                                 | 40-49                         | 4930 (100.0)    | 3.22 (2.29-4.53, p<0.001) | 2.93 (2.07-4.15, p<0.001) |
|                                 | 50-59                         | 9003 (100.0)    | 6.24 (4.48-8.68, p<0.001) | 5.57 (4.02-7.73, p<0.001) |
|                                 | 60-69                         | 11035 (100.0)   | 11.72 (8.43-16.27, p<0.001) | 10.23 (7.38-14.17, p<0.001) |
|                                 | 70-79                         | 16445 (100.0)   | 18.38 (13.25-25.51, p<0.001) | 16.11 (11.55-22.48, p<0.001) |
|                                 | 80-89                         | 19771 (100.0)   | 23.49 (16.93-32.59, p<0.001) | 20.85 (15.05-28.88, p<0.001) |
|                                 | 90+                           | 7204 (100.0)    | 27.63 (19.89-38.36, p<0.001) | 25.50 (18.34-35.45, p<0.001) |
| Sex at Birth                    | Female                        | 31733 (100.0)   | -                  |
|                                 | Male                          | 40648 (100.0)   | 1.23 (1.20-1.27, p<0.001) | 1.32 (1.28-1.36, p<0.001) |
| Deprivation                     | 1 (least deprived)           | 10347 (100.0)   | -                  |
|                                 | 2                             | 12775 (100.0)   | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.98-1.09, p=0.219) |
|                                 | 3                             | 15712 (100.0)   | 0.99 (0.95-1.04, p=0.743) | 1.06 (1.00-1.12, p=0.053) |
|                                 | 4                             | 15880 (100.0)   | 0.95 (0.91-1.00, p=0.039) | 1.07 (1.02-1.14, p=0.012) |
|                                 | 5 (most deprived)             | 17845 (100.0)   | 0.93 (0.89-0.97, p=0.001) | 1.10 (1.05-1.16, p<0.001) |
| Neurological complication | No | 71340 (100.0) | 1.29 (1.22-1.37, p<0.001) | 1.21 (1.13-1.29, p<0.001) |
|--------------------------|----|---------------|---------------------------|---------------------------|
| Yes | 3161 (100.0) | 1.29 (1.22-1.37, p<0.001) | 1.21 (1.13-1.29, p<0.001) |
| Age on admission          | 19-29 | 1477 (100.0) | 1.82 (1.25-2.64, p=0.002) | 1.76 (1.28-2.34, p=0.001) |
| 30-39 | 2707 (100.0) | 1.82 (1.25-2.64, p=0.002) | 1.76 (1.28-2.34, p=0.001) |
| 40-49 | 4930 (100.0) | 3.22 (2.29-4.53, p<0.001) | 3.03 (2.13-4.29, p<0.001) |
| 50-59 | 9003 (100.0) | 6.24 (4.48-8.68, p<0.001) | 5.84 (4.21-8.11, p<0.001) |
| 60-69 | 11035 (100.0) | 11.72 (8.43-16.27, p<0.001) | 10.99 (7.93-15.24, p<0.001) |
| 70-79 | 16445 (100.0) | 18.38 (13.25-25.51, p<0.001) | 17.42 (12.48-24.31, p<0.001) |
| 80-89 | 19771 (100.0) | 23.49 (16.93-32.59, p<0.001) | 22.70 (16.38-31.44, p<0.001) |
| 90+ | 7204 (100.0) | 27.63 (19.89-38.36, p<0.001) | 27.85 (20.00-38.77, p<0.001) |
| Sex at Birth               | Female | 31733 (100.0) | 1.23 (1.20-1.27, p<0.001) | 1.34 (1.31-1.38, p<0.001) |
| Male | 40648 (100.0) | 1.23 (1.20-1.27, p<0.001) | 1.34 (1.31-1.38, p<0.001) |
| Deprivation                | 1 (least deprived) | 10347 (100.0) | - | - |
| 2 | 12775 (100.0) | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.98-1.08, p=0.287) |
| 3 | 15712 (100.0) | 0.99 (0.95-1.04, p=0.743) | 1.06 (1.00-1.12, p=0.060) |
| 4 | 15880 (100.0) | 0.95 (0.91-1.00, p=0.039) | 1.07 (1.01-1.13, p=0.014) |
| 5 (most deprived) | 17845 (100.0) | 0.93 (0.89-0.97, p=0.001) | 1.09 (1.03-1.14, p=0.001) |
Supplementary table 8G - Respiratory complications

| Dependent: Survival (mortality) | HR (univariable) | HR (multivariable) |
|---------------------------------|------------------|--------------------|
| Respiratory complication        |                  |                    |
| No                              | 60982 (100.0)    | -                  |
| Yes                             | 13519 (100.0)    | 1.89 (1.83-1.94, p<0.001) | 2.15 (2.04-2.27, p<0.001) |
| Age on admission                |                  |                    |
| 19-29                           | 1477 (100.0)     | -                  |
| 30-39                           | 2707 (100.0)     | 1.82 (1.25-2.64, p=0.002) | 1.65 (1.20-2.27, p=0.002) |
| 40-49                           | 4930 (100.0)     | 3.22 (2.29-4.53, p<0.001) | 2.67 (1.89-3.78, p<0.001) |
| 50-59                           | 9003 (100.0)     | 6.24 (4.48-8.68, p<0.001) | 5.12 (3.70-7.10, p<0.001) |
| 60-69                           | 11035 (100.0)    | 11.72 (8.43-16.27, p<0.001) | 9.71 (7.01-13.45, p<0.001) |
| 70-79                           | 16445 (100.0)    | 18.38 (13.25-25.51, p<0.001) | 16.45 (11.80-22.92, p<0.001) |
| 80-89                           | 19771 (100.0)    | 23.49 (16.93-32.59, p<0.001) | 22.33 (16.15-30.89, p<0.001) |
| 90+                             | 7204 (100.0)     | 27.63 (19.89-38.36, p<0.001) | 27.49 (19.78-38.21, p<0.001) |
| Sex at Birth                    |                  |                    |
| Female                          | 31733 (100.0)    | -                  |
| Male                            | 40648 (100.0)    | 1.23 (1.20-1.27, p<0.001) | 1.31 (1.27-1.35, p<0.001) |
| Deprivation                     |                  |                    |
| 1 (least deprived)             | 10347 (100.0)    | -                  |
| 2                               | 12775 (100.0)    | 1.00 (0.96-1.05, p=0.965) | 1.03 (0.98-1.08, p=0.209) |
| 3                               | 15712 (100.0)    | 0.99 (0.95-1.04, p=0.743) | 1.05 (0.99-1.11, p=0.135) |
| 4                               | 15880 (100.0)    | 0.95 (0.91-1.00, p=0.039) | 1.07 (1.01-1.13, p=0.022) |
| 5 (most deprived)              | 17845 (100.0)    | 0.93 (0.89-0.97, p=0.001) | 1.10 (1.04-1.16, p<0.001) |
Supplementary table 9 - Effect of complications on odds of critical care admission
(adjusted logistic regression models) for figure 2D

Supplementary table 9A - Any complication

| Dependent: Critical Care Admission | No               | Yes              | OR (univariable) | OR (multilevel) |
|-----------------------------------|------------------|------------------|------------------|-----------------|
| Any complication                  |                  |                  |                  |                 |
| No                                | 33809 (95.1)     | 1760 (4.9)       |                  |                 |
| Yes                               | 27937 (77.4)     | 8155 (22.6)      | 5.61 (5.31-5.92, p<0.001) | 7.25 (6.83-7.69, p<0.001) |
| Age on admission                  |                  |                  |                  |                 |
| 19-29                             | 1241 (85.8)      | 205 (14.2)       |                  |                 |
| 30-39                             | 2101 (79.1)      | 555 (20.9)       | 1.60 (1.34-1.91, p<0.001) | 1.33 (1.10-1.61, p=0.004) |
| 40-49                             | 3596 (74.0)      | 1264 (26.0)      | 2.13 (1.82-2.51, p<0.001) | 1.57 (1.32-1.88, p<0.001) |
| 50-59                             | 6389 (71.7)      | 2521 (28.3)      | 2.39 (2.05-2.80, p<0.001) | 1.63 (1.38-1.94, p<0.001) |
| 60-69                             | 8166 (74.9)      | 2740 (25.1)      | 2.03 (1.75-2.38, p<0.001) | 1.24 (1.04-1.47, p=0.014) |
| 70-79                             | 14285 (87.9)     | 1960 (12.1)      | 0.83 (0.71-0.97, p=0.019) | 0.47 (0.39-0.56, p=0.001) |
| 80-89                             | 18964 (97.1)     | 567 (2.9)        | 0.18 (0.15-0.21, p<0.001) | 0.10 (0.08-0.12, p<0.001) |
| 90+                               | 7004 (98.6)      | 103 (1.4)        | 0.09 (0.07-0.11, p<0.001) | 0.05 (0.04-0.07, p<0.001) |
| Sex at Birth                      |                  |                  |                  |                 |
| Female                            | 28230 (90.1)     | 3100 (9.9)       |                  |                 |
| Male                              | 33348 (83.1)     | 6792 (16.9)      | 1.85 (1.77-1.94, p<0.001) | 1.49 (1.42-1.57, p<0.001) |
| Deprivation                       |                  |                  |                  |                 |
| 1 (least deprived)               | 8747 (86.2)      | 1401 (13.8)      |                  |                 |
| 2                                 | 10923 (86.9)     | 1653 (13.1)      | 0.94 (0.88-1.02, p=0.146) | 0.86 (0.79-0.94, p=0.001) |
| 3                                 | 13352 (86.3)     | 2115 (13.7)      | 0.99 (0.92-1.06, p=0.765) | 0.89 (0.82-0.98, p=0.012) |
| 4                                 | 13360 (85.1)     | 2340 (14.9)      | 1.09 (1.02-1.17, p=0.014) | 0.89 (0.82-0.97, p=0.011) |
| 5 (most deprived)                | 15352 (86.5)     | 2405 (13.5)      | 0.98 (0.91-1.05, p=0.540) | 0.78 (0.72-0.85, p<0.001) |
### Supplementary table 9B - Systemic complications

| Dependent: Critical Care Admission | Systemic complication | Age on admission | Sex at Birth | Deprivation |
|-----------------------------------|-----------------------|------------------|--------------|-------------|
| No                                | 53004 (88.5)          | 6875 (11.5)      | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 8742 (74.2)           | 3040 (25.8)      | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 19-29 1241 (85.8)     | 205 (14.2)       | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 2101 (79.1)           | 555 (20.9)       | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 30-39 2101 (79.1)     | 555 (20.9)       | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 3596 (74.0)           | 1264 (26.0)      | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 40-49 3596 (74.0)     | 1264 (26.0)      | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 6389 (71.7)           | 2521 (28.3)      | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 50-59 6389 (71.7)     | 2521 (28.3)      | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 8166 (74.9)           | 2740 (25.1)      | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 60-69 8166 (74.9)     | 2740 (25.1)      | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 14285 (87.9)          | 1960 (12.1)      | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 70-79 14285 (87.9)    | 1960 (12.1)      | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 18964 (97.1)          | 567 (2.9)        | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 80-89 18964 (97.1)    | 567 (2.9)        | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 2101 (79.1)           | 555 (20.9)       | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
| No                                | 90+ 7004 (98.6)       | 103 (1.4)        | Female       | 1 (least deprived) 8747 (86.2) 1401 (13.8) |
| Yes                               | 28230 (90.1)          | 3100 (9.9)       | Male         | 2 10923 (86.9) 1653 (13.1) |
|                                   |                       |                  |              | 3 13352 (86.3) 2115 (13.7) |
|                                   |                       |                  |              | 4 13360 (85.1) 2340 (14.9) |
|                                   |                       |                  |              | 5 (most deprived) 15352 (86.5) 2405 (13.5) |
### Supplementary table 9C - Renal complications/ acute kidney injury

| Dependent: Critical Care Admission | No       | Yes       | OR (univariable) | OR (multilevel) |
|-----------------------------------|----------|-----------|------------------|-----------------|
| Renal complication                |          |           |                  |                 |
| No                                | 48812 (90.3) | 5238 (9.7) |                  |                 |
| Yes                               | 12934 (73.4) | 4677 (26.6) | 3.37 (3.22-3.52, p<0.001) | 4.36 (4.14-4.58, p<0.001) |
| Age on admission                  |          |           |                  |                 |
| 19-29                             | 1241 (85.8) | 205 (14.2) |                  |                 |
| 30-39                             | 2101 (79.1) | 555 (20.9) | 1.60 (1.34-1.91, p<0.001) | 1.45 (1.21-1.74, p<0.001) |
| 40-49                             | 3596 (74.0) | 1264 (26.0) | 2.13 (1.82-2.51, p<0.001) | 1.74 (1.47-2.06, p<0.001) |
| 50-59                             | 6389 (71.7) | 2521 (28.3) | 2.39 (2.05-2.80, p<0.001) | 1.82 (1.54-2.14, p<0.001) |
| 60-69                             | 8166 (74.9) | 2740 (25.1) | 2.03 (1.75-2.38, p<0.001) | 1.40 (1.19-1.65, p<0.001) |
| 70-79                             | 14285 (87.9) | 1960 (12.1) | 0.83 (0.71-0.97, p=0.019) | 0.54 (0.46-0.64, p<0.001) |
| 80-89                             | 18964 (97.1) | 567 (2.9) | 0.18 (0.15-0.21, p<0.001) | 0.11 (0.10-0.14, p<0.001) |
| 90+                               | 7004 (98.6) | 103 (1.4) | 0.09 (0.07-0.11, p<0.001) | 0.06 (0.05-0.07, p<0.001) |
| Sex at Birth                      |          |           |                  |                 |
| Female                            | 28230 (90.1) | 3100 (9.9) |                  |                 |
| Male                              | 33348 (83.1) | 6792 (16.9) | 1.85 (1.77-1.94, p<0.001) | 1.51 (1.44-1.59, p<0.001) |
| Deprivation                       |          |           |                  |                 |
| 1 (least deprived)                | 8747 (86.2) | 1401 (13.8) |                  |                 |
| 2                                 | 10923 (86.9) | 1653 (13.1) | 0.94 (0.88-1.02, p=0.146) | 0.89 (0.81-0.97, p=0.009) |
| 3                                 | 13352 (86.3) | 2115 (13.7) | 0.99 (0.92-1.06, p=0.765) | 0.89 (0.82-0.97, p=0.011) |
| 4                                 | 13360 (85.1) | 2340 (14.9) | 1.09 (1.02-1.17, p=0.014) | 0.89 (0.81-0.97, p=0.006) |
| 5 (most deprived)                 | 15352 (86.5) | 2405 (13.5) | 0.98 (0.91-1.05, p=0.540) | 0.79 (0.73-0.86, p<0.001) |
Supplementary table 9D - Gastrointestinal and liver complications

| Dependent: | No | Yes | OR (univariable) | OR (multilevel) |
|------------|----|-----|------------------|----------------|
| Critical Care Admission | | | | |
| No | 56625 (88.8) | 7173 (11.2) | - | - |
| Yes | 5121 (65.1) | 2742 (34.9) | 4.23 (4.01-4.45, p<0.001) | 3.52 (3.32-3.74, p<0.001) |
| Age on admission | | | | |
| 19-29 | 1241 (85.8) | 205 (14.2) | - | - |
| 30-39 | 2101 (79.1) | 555 (20.9) | 1.60 (1.34-1.91, p<0.001) | 1.45 (1.21-1.75, p<0.001) |
| 40-49 | 3596 (74.0) | 1264 (26.0) | 2.13 (1.82-2.51, p<0.001) | 1.84 (1.56-2.19, p<0.001) |
| 50-59 | 6389 (71.7) | 2521 (28.3) | 2.39 (2.05-2.80, p<0.001) | 2.08 (1.77-2.45, p<0.001) |
| 60-69 | 8166 (74.9) | 2740 (25.1) | 2.03 (1.75-2.38, p<0.001) | 1.82 (1.55-2.14, p<0.001) |
| 70-79 | 14285 (87.9) | 1960 (12.1) | 0.83 (0.71-0.97, p=0.019) | 0.77 (0.65-0.90, p=0.001) |
| 80-89 | 18964 (97.1) | 567 (2.9) | 0.18 (0.15-0.21, p<0.001) | 0.18 (0.15-0.21, p<0.001) |
| 90+ | 7004 (98.6) | 103 (1.4) | 0.09 (0.07-0.11, p<0.001) | 0.09 (0.07-0.12, p<0.001) |
| Sex at Birth | | | | |
| Female | 28230 (90.1) | 3100 (9.9) | - | - |
| Male | 33348 (83.1) | 6792 (16.9) | 1.85 (1.77-1.94, p<0.001) | 1.56 (1.48-1.63, p<0.001) |
| Deprivation | | | | |
| 1 (least deprived) | 8747 (86.2) | 1401 (13.8) | - | - |
| 2 | 10923 (86.9) | 1653 (13.1) | 0.94 (0.88-1.02, p=0.146) | 0.89 (0.82-0.97, p=0.009) |
| 3 | 13352 (86.3) | 2115 (13.7) | 0.99 (0.92-1.06, p=0.765) | 0.93 (0.86-1.01, p=0.096) |
| 4 | 13360 (85.1) | 2340 (14.9) | 1.09 (1.02-1.17, p=0.014) | 0.94 (0.87-1.03, p=0.170) |
| 5 (most deprived) | 15352 (86.5) | 2405 (13.5) | 0.98 (0.91-1.05, p=0.540) | 0.85 (0.78-0.92, p<0.001) |
## Supplementary table 9E - Cardiovascular complications

| Dependent: Critical Care Admission | No       | Yes      | OR (univariable) | OR (multilevel) |
|-----------------------------------|----------|----------|------------------|-----------------|
| Cardiovascular complication       |          |          |                  |                 |
| No                                | 55139 (87.9) | 7619 (12.1) | -                | -               |
| Yes                               | 6607 (74.2)  | 2296 (25.8)  | 2.51 (2.38-2.65, p<0.001) | 3.64 (3.42-3.88, p<0.001) |
| Age on admission                  |          |          |                  |                 |
| 19-29                             | 1241 (85.8)  | 205 (14.2)   | -                | -               |
| 30-39                             | 2101 (79.1)  | 555 (20.9)   | 1.60 (1.34-1.91, p<0.001) | 1.48 (1.24-1.78, p<0.001) |
| 40-49                             | 3596 (74.0)  | 1264 (26.0)  | 2.13 (1.82-2.51, p<0.001) | 1.83 (1.54-2.16, p<0.001) |
| 50-59                             | 6389 (71.7)  | 2521 (28.3)  | 2.39 (2.05-2.80, p<0.001) | 2.02 (1.72-2.37, p<0.001) |
| 60-69                             | 8166 (74.9)  | 2740 (25.1)  | 2.03 (1.75-2.38, p<0.001) | 1.63 (1.39-1.91, p<0.001) |
| 70-79                             | 14285 (87.9) | 1960 (12.1)  | 0.83 (0.71-0.97, p=0.019) | 0.63 (0.53-0.74, p<0.001) |
| 80-89                             | 18964 (97.1) | 567 (2.9)    | 0.18 (0.15-0.21, p<0.001) | 0.13 (0.11-0.16, p<0.001) |
| 90+                               | 7004 (98.6)  | 103 (1.4)    | 0.09 (0.07-0.11, p<0.001) | 0.07 (0.05-0.09, p<0.001) |
| Sex at Birth                      |          |          |                  |                 |
| Female                            | 28230 (90.1) | 3100 (9.9)   | -                | -               |
| Male                              | 33348 (83.1) | 6792 (16.9)  | 1.85 (1.77-1.94, p<0.001) | 1.61 (1.53-1.69, p<0.001) |
| Deprivation                       |          |          |                  |                 |
| 1 (least deprived)               | 8747 (86.2)  | 1401 (13.8)  | -                | -               |
| 2                                 | 10923 (86.9) | 1653 (13.1)  | 0.94 (0.88-1.02, p=0.146) | 0.89 (0.81-0.97, p=0.006) |
| 3                                 | 13352 (86.3) | 2115 (13.7)  | 0.99 (0.92-1.06, p=0.765) | 0.92 (0.84-1.00, p=0.046) |
| 4                                 | 13360 (85.1) | 2340 (14.9)  | 1.09 (1.02-1.17, p=0.014) | 0.92 (0.85-1.00, p=0.050) |
| 5 (most deprived)                | 15352 (86.5) | 2405 (13.5)  | 0.98 (0.91-1.05, p=0.540) | 0.83 (0.76-0.90, p<0.001) |
| Dependent: Critical Care Admission | No | Yes | OR (univariable) | OR (multilevel) |
|-----------------------------------|----|-----|------------------|----------------|
| Neurological complication          |    |     |                  |                |
| No                                | 59321 (86.5) | 9264 (13.5) | -                | -              |
| Yes                               | 2425 (78.8)  | 651 (21.2)  | 1.72 (1.57-1.88, p<0.001) | 1.88 (1.70-2.08, p<0.001) |
| Age on admission                   |    |     |                  |                |
| 19-29                             | 1241 (85.8)  | 205 (14.2)  | -                | -              |
| 30-39                             | 2101 (79.1)  | 555 (20.9)  | 1.60 (1.34-1.91, p<0.001) | 1.51 (1.26-1.81, p<0.001) |
| 40-49                             | 3596 (74.0)  | 1264 (26.0) | 2.13 (1.82-2.51, p<0.001) | 1.91 (1.62-2.26, p<0.001) |
| 50-59                             | 6389 (71.7)  | 2521 (28.3) | 2.39 (2.05-2.80, p<0.001) | 2.17 (1.85-2.55, p<0.001) |
| 60-69                             | 8166 (74.9)  | 2740 (25.1) | 2.03 (1.75-2.38, p<0.001) | 1.85 (1.58-2.17, p<0.001) |
| 70-79                             | 14285 (87.9)| 1960 (12.1)| 0.83 (0.71-0.97, p=0.019) | 0.75 (0.64-0.88, p<0.001) |
| 80-89                             | 18964 (97.1)| 567 (2.9)   | 0.18 (0.15-0.21, p<0.001) | 0.17 (0.14-0.20, p<0.001) |
| 90+                               | 7004 (98.6)  | 103 (1.4)   | 0.09 (0.07-0.11, p<0.001) | 0.09 (0.07-0.11, p<0.001) |
| Sex at Birth                      |    |     |                  |                |
| Female                            | 28230 (90.1)| 3100 (9.9)  | -                | -              |
| Male                              | 33348 (83.1)| 6792 (16.9) | 1.85 (1.77-1.94, p<0.001) | 1.65 (1.57-1.73, p<0.001) |
| Deprivation                       |    |     |                  |                |
| 1 (least deprived)                | 8747 (86.2) | 1401 (13.8) | -                | -              |
| 2                                 | 10923 (86.9)| 1653 (13.1) | 0.94 (0.88-1.02, p=0.146) | 0.90 (0.82-0.97, p=0.010) |
| 3                                 | 13352 (86.3)| 2115 (13.7) | 0.99 (0.92-1.06, p=0.765) | 0.92 (0.85-1.00, p=0.065) |
| 4                                 | 13360 (85.1)| 2340 (14.9) | 1.09 (1.02-1.17, p=0.014) | 0.94 (0.86-1.02, p=0.114) |
| 5 (most deprived)                 | 15352 (86.5)| 2405 (13.5) | 0.98 (0.91-1.05, p=0.540) | 0.83 (0.77-0.91, p<0.001) |
### Supplementary table 9G - Respiratory complications

| Dependent: Critical Care Admission | No | Yes | OR (univariable) | OR (multilevel) |
|------------------------------------|----|-----|------------------|-----------------|
| Respiratory complication            |    |     |                  |                 |
| No                                 | 54321 (93.2) | 3986 (6.8) | -                | -               |
| Yes                                | 7425 (55.6)  | 5929 (44.4) | 10.88 (10.38-11.41, p<0.001) | 12.48 (11.81-13.18, p<0.001) |
| Age on admission                    |    |     |                  |                 |
| 19-29                              | 1241 (85.8)  | 205 (14.2)  | -                | -               |
| 30-39                              | 2101 (79.1)  | 555 (20.9)  | 1.60 (1.34-1.91, p<0.001) | 1.28 (1.05-1.56, p=0.015) |
| 40-49                              | 3596 (74.0)  | 1264 (26.0) | 2.13 (1.82-2.51, p<0.001) | 1.40 (1.17-1.68, p<0.001) |
| 50-59                              | 6389 (71.7)  | 2521 (28.3) | 2.39 (2.05-2.80, p<0.001) | 1.56 (1.31-1.86, p<0.001) |
| 60-69                              | 8166 (74.9)  | 2740 (25.1) | 2.03 (1.75-2.38, p<0.001) | 1.27 (1.06-1.51, p=0.008) |
| 70-79                              | 14285 (87.9)| 1960 (12.1) | 0.83 (0.71-0.97, p=0.019) | 0.52 (0.44-0.62, p<0.001) |
| 80-89                              | 18964 (97.1)| 567 (2.9)   | 0.18 (0.15-0.21, p<0.001) | 0.11 (0.09-0.14, p=0.001) |
| 90+                                | 7004 (98.6)  | 103 (1.4)   | 0.09 (0.07-0.11, p<0.001) | 0.06 (0.04-0.08, p<0.001) |
| Sex at Birth                        |    |     |                  |                 |
| Female                             | 28230 (90.1)| 3100 (9.9)  | -                | -               |
| Male                               | 33348 (83.1)| 6792 (16.9) | 1.85 (1.77-1.94, p<0.001) | 1.53 (1.44-1.61, p<0.001) |
| Deprivation                        |    |     |                  |                 |
| 1 (least deprived)                 | 8747 (86.2) | 1401 (13.8) | -                | -               |
| 2                                  | 10923 (86.9)| 1653 (13.1) | 0.94 (0.88-1.02, p=0.146) | 0.86 (0.79-0.95, p=0.003) |
| 3                                  | 13352 (86.3)| 2115 (13.7) | 0.99 (0.92-1.06, p=0.765) | 0.90 (0.82-0.99, p=0.029) |
| 4                                  | 13360 (85.1)| 2340 (14.9) | 1.09 (1.02-1.17, p=0.014) | 0.88 (0.81-0.97, p=0.009) |
| 5 (most deprived)                  | 15352 (86.5)| 2405 (13.5) | 0.98 (0.91-1.05, p=0.540) | 0.80 (0.73-0.88, p<0.001) |
Supplementary table 10 - Effect of complications on odds of worse ability to self-care at discharge (adjusted logistic regression models) for figure 4C

Supplementary table 10A - Any complication

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|------------------------------|-----------------------------|-------|------------------|----------------|
| Any complication             |                             |       |                  |                |
| No                           | 19692 (77.4)                | 5759 (22.6) | 2.12 (2.04-2.21, p<0.001) | 2.41 (2.30-2.52, p<0.001) |
| Yes                          | 12174 (61.7)                | 7550 (38.3) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| Age (years)                  |                             |       |                  |                |
| 19-29                        | 1121 (86.7)                 | 172 (13.3) | 2.12 (2.04-2.21, p<0.001) | 2.41 (2.30-2.52, p<0.001) |
| 30-39                        | 1962 (83.7)                 | 383 (16.3) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 40-49                        | 3331 (79.9)                 | 838 (20.1) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 50-59                        | 5508 (78.8)                 | 1486 (21.2) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 60-69                        | 5451 (73.3)                 | 1990 (26.7) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 70-79                        | 6237 (66.5)                 | 3139 (33.5) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 80-89                        | 6069 (61.4)                 | 3810 (38.6) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| 90+                          | 1940 (58.5)                 | 1377 (41.5) | 1.27 (1.05-1.55, p=0.015) | 1.54 (1.24-1.92, p<0.001) |
| Sex at Birth                 |                             |       |                  |                |
| Female                       | 14550 (70.9)                | 5968 (29.1) | 1.03 (0.99-1.08, p=0.107) | 1.05 (1.01-1.10, p=0.021) |
| Male                         | 17230 (70.2)                | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.05 (1.01-1.10, p=0.021) |
| Deprivation                  |                             |       |                  |                |
| 1 (least deprived)           | 4468 (69.7)                 | 1946 (30.3) | 0.98 (0.92-1.06, p=0.655) | 0.97 (0.90-1.05, p=0.442) |
| 2                             | 5473 (70.0)                 | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.97 (0.90-1.05, p=0.442) |
| 3                             | 6751 (69.4)                 | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.03 (0.95-1.12, p=0.438) |
| 4                             | 7008 (70.2)                 | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.07 (0.99-1.16, p=0.095) |
| 5 (most deprived)            | 8156 (72.8)                 | 3052 (27.2) | 0.86 (0.80-0.92, p=0.001) | 1.03 (0.95-1.11, p=0.545) |
### Supplementary table 10B - Systemic complications

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|------------------------------|-----------------------------|-------|------------------|-----------------|
| Systemic complication        |                             |       |                  |                 |
| No                           | 26339 (73.7)                | 9378 (26.3) | -                | -               |
| Yes                          | 3812 (56.1)                 | 2987 (43.9) | 2.20 (2.09-2.32, p<0.001) | 2.39 (2.25-2.53, p<0.001) |
| Age (years)                  |                             |       |                  |                 |
| 19-29                        | 1121 (86.7)                 | 172 (13.3) | -                | -               |
| 30-39                        | 1962 (83.7)                 | 383 (16.3) | 1.27 (1.05-1.55, p=0.015) | 1.66 (1.33-2.09, p<0.001) |
| 40-49                        | 3331 (79.9)                 | 838 (20.1) | 1.64 (1.38-1.96, p=0.001) | 2.28 (1.85-2.82, p<0.001) |
| 50-59                        | 5508 (78.8)                 | 1486 (21.2) | 1.76 (1.49-2.09, p=0.001) | 2.46 (2.01-3.02, p<0.001) |
| 60-69                        | 5451 (73.3)                 | 1990 (26.7) | 2.38 (2.02-2.82, p<0.001) | 3.36 (2.74-4.11, p<0.001) |
| 70-79                        | 6237 (66.5)                 | 3139 (33.5) | 3.28 (2.79-3.88, p<0.001) | 4.66 (3.82-5.69, p<0.001) |
| 80-89                        | 6069 (61.4)                 | 3810 (38.6) | 4.09 (3.48-4.84, p<0.001) | 6.03 (4.94-7.36, p<0.001) |
| 90+                          | 1940 (58.5)                 | 1377 (41.5) | 4.63 (3.89-5.52, p<0.001) | 6.99 (5.68-8.62, p<0.001) |
| Sex at Birth                 |                             |       |                  |                 |
| Female                       | 14550 (70.9)                | 5968 (29.1) | -                | -               |
| Male                         | 17230 (70.2)                | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.10 (1.05-1.15, p<0.001) |
| Deprivation                  |                             |       |                  |                 |
| 1 (least deprived)           | 4468 (69.7)                 | 1946 (30.3) | -                | -               |
| 2                            | 5473 (70.0)                 | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.98 (0.91-1.07, p=0.687) |
| 3                            | 6751 (69.4)                 | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.03 (0.95-1.12, p=0.412) |
| 4                            | 7008 (70.2)                 | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.09 (1.01-1.19, p=0.031) |
| 5 (most deprived)            | 8156 (72.8)                 | 3052 (27.2) | 0.86 (0.80-0.92, p<0.001) | 1.03 (0.95-1.12, p=0.429) |
### Supplementary Table 10C - Renal Complications/ Acute Kidney Injury

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariate) | OR (multilevel) |
|-------------------------------|------------------------------|-------|----------------|----------------|
| **Renal complication**       |                              |       |                |                |
| No                            | 25847 (74.1)                 | 9039 (25.9) |                |                |
| Yes                           | 5287 (58.2)                  | 3791 (41.8) | 2.05 (1.95-2.15, p<0.001) | 2.12 (2.01-2.23, p<0.001) |
| **Age (years)**               |                              |       |                |                |
| 19-29                         | 1121 (86.7)                  | 172 (13.3) |                |                |
| 30-39                         | 1962 (83.7)                  | 383 (16.3) | 1.27 (1.05-1.55, p=0.015) | 1.67 (1.34-2.10, p<0.001) |
| 40-49                         | 3331 (79.9)                  | 838 (20.1) | 1.64 (1.38-1.96, p<0.001) | 2.25 (1.83-2.77, p<0.001) |
| 50-59                         | 5508 (78.8)                  | 1486 (21.2) | 1.76 (1.49-2.09, p<0.001) | 2.38 (1.95-2.91, p<0.001) |
| 60-69                         | 5451 (73.3)                  | 1990 (26.7) | 2.38 (2.02-2.82, p<0.001) | 3.27 (2.68-3.99, p<0.001) |
| 70-79                         | 6237 (66.5)                  | 3139 (33.5) | 3.28 (2.79-3.88, p<0.001) | 4.45 (3.66-5.43, p<0.001) |
| 80-89                         | 6069 (61.4)                  | 3810 (38.6) | 4.09 (3.48-4.84, p<0.001) | 5.72 (4.70-6.97, p<0.001) |
| 90+                           | 1940 (58.5)                  | 1377 (41.5) | 4.63 (3.89-5.52, p<0.001) | 6.61 (5.38-8.13, p<0.001) |
| **Sex at Birth**              |                              |       |                |                |
| Female                        | 14550 (70.9)                 | 5968 (29.1) |                |                |
| Male                          | 17230 (70.2)                 | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.06 (1.01-1.11, p=0.017) |
| **Deprivation**               |                              |       |                |                |
| 1 (least deprived)            | 4468 (69.7)                  | 1946 (30.3) |                |                |
| 2                             | 5473 (70.0)                  | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.97 (0.89-1.05, p=0.443) |
| 3                             | 6751 (69.4)                  | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.02 (0.94-1.11, p=0.590) |
| 4                             | 7008 (70.2)                  | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.06 (0.98-1.15, p=0.139) |
| 5 (most deprived)             | 8156 (72.8)                  | 3052 (27.2) | 0.86 (0.80-0.92, p<0.001) | 1.01 (0.94-1.10, p=0.724) |
## Supplementary table 10D - Gastrointestinal and liver complications

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|------------------------------|-----------------------------|-------|-----------------|----------------|
| **Gastrointestinal complication** |                             |       |                 |                |
| No                           | 29144 (71.4)                | 11650 (28.6) | -               | -              |
| Yes                          | 2722 (62.1)                 | 1659 (37.9)  | 1.52 (1.43-1.63, p<0.001) | 1.95 (1.82-2.10, p<0.001) |
| **Age (years)**              |                             |       |                 |                |
| 19-29                        | 1121 (86.7)                 | 172 (13.3)    | -               | -              |
|                               | 1962 (83.7)                 | 383 (16.3)     | 1.27 (1.05-1.55, p=0.015) | 1.57 (1.27-1.95, p<0.001) |
| 30-39                        | 3331 (79.9)                 | 838 (20.1)     | 1.64 (1.38-1.96, p<0.001) | 2.14 (1.76-2.61, p<0.001) |
| 40-49                        | 5508 (78.8)                 | 1486 (21.2)    | 1.76 (1.49-2.09, p<0.001) | 2.39 (1.97-2.89, p<0.001) |
| 50-59                        | 5451 (73.3)                 | 1990 (26.7)    | 2.38 (2.02-2.82, p<0.001) | 3.37 (2.79-4.08, p<0.001) |
| 60-69                        | 6237 (66.5)                 | 3139 (33.5)    | 3.28 (2.79-3.88, p<0.001) | 4.75 (3.94-5.73, p<0.001) |
| 70-79                        | 6069 (61.4)                 | 3810 (38.6)    | 4.09 (3.48-4.84, p<0.001) | 6.14 (5.09-7.41, p<0.001) |
| 80-89                        | 1940 (58.5)                 | 1377 (41.5)    | 4.63 (3.89-5.52, p<0.001) | 7.12 (5.85-8.67, p<0.001) |
| 90+                          | 14550 (70.9)                | 5968 (29.1)     | 1.03 (0.99-1.08, p=0.107) | 1.09 (1.04-1.14, p<0.001) |
| **Sex at Birth**             |                             |       |                 |                |
| Female                       | 4468 (69.7)                 | 1946 (30.3)    | -               | -              |
| Male                         | 17230 (70.2)                | 7308 (29.8)    | 1.03 (0.99-1.08, p=0.107) | 1.09 (1.04-1.14, p<0.001) |
| **Deprivation**             |                             |       |                 |                |
| 1 (least deprived)           | 5473 (70.0)                 | 2345 (30.0)    | 0.98 (0.92-1.06, p=0.655) | 0.97 (0.90-1.05, p=0.470) |
| 2                             | 6751 (69.4)                 | 2983 (30.6)    | 1.01 (0.95-1.09, p=0.680) | 1.05 (0.97-1.13, p=0.262) |
| 3                             | 7008 (70.2)                 | 2982 (29.8)    | 0.98 (0.91-1.05, p=0.504) | 1.09 (1.01-1.18, p=0.023) |
| 4 (most deprived)            | 8156 (72.8)                 | 3052 (27.2)    | 0.86 (0.80-0.92, p<0.001) | 1.05 (0.97-1.13, p=0.272) |
### Supplementary table 10E - Cardiovascular complications

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|------------------------------|-----------------------------|-------|------------------|----------------|
| Cardiovascular complication  |                             |       |                  |                |
| No                           | 28222 (72.7)                | 10600 (27.3) | -                | -              |
| Yes                          | 1957 (53.3)                 | 1716 (46.7) | 2.33 (2.18-2.50, p<0.001) | 2.18 (2.02-2.35, p<0.001) |
| Age (years)                  |                             |       |                  |                |
| 19-29                        | 1121 (86.7)                 | 172 (13.3) | 1.27 (1.05-1.55, p=0.015) | 1.69 (1.34-2.12, p<0.001) |
| 30-39                        | 1962 (83.7)                 | 383 (16.3) | 1.64 (1.38-1.96, p<0.001) | 2.26 (1.83-2.79, p<0.001) |
| 40-49                        | 3331 (79.9)                 | 838 (20.1) | 1.76 (1.49-2.09, p<0.001) | 2.46 (2.00-3.01, p<0.001) |
| 50-59                        | 5508 (78.8)                 | 1486 (21.2) |                |                |
| 60-69                        | 5451 (73.3)                 | 1990 (26.7) | 2.38 (2.02-2.82, p<0.001) | 3.34 (2.73-4.08, p<0.001) |
| 70-79                        | 6237 (66.5)                 | 3139 (33.5) | 3.28 (2.79-3.88, p<0.001) | 4.60 (3.77-5.62, p<0.001) |
| 80-89                        | 6069 (61.4)                 | 3810 (38.6) | 4.09 (3.48-4.84, p<0.001) | 5.91 (4.84-7.21, p<0.001) |
| 90+                          | 1940 (58.5)                 | 1377 (41.5) | 4.63 (3.89-5.52, p<0.001) | 6.74 (5.47-8.30, p<0.001) |
| Sex at Birth                 |                             |       |                  |                |
| Female                       | 14550 (70.9)                | 5968 (29.1) | -                | -              |
| Male                         | 17230 (70.2)                | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.10 (1.05-1.15, p<0.001) |
| Deprivation                  |                             |       |                  |                |
| 1 (least deprived)           | 4468 (69.7)                 | 1946 (30.3) | -                | -              |
| 2                            | 5473 (70.0)                 | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.98 (0.90-1.06, p=0.554) |
| 3                            | 6751 (69.4)                 | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.03 (0.95-1.12, p=0.447) |
| 4                            | 7008 (70.2)                 | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.08 (1.00-1.18, p=0.051) |
| 5 (most deprived)            | 8156 (72.8)                 | 3052 (27.2) | 0.86 (0.80-0.92, p<0.001) | 1.03 (0.95-1.12, p=0.507) |
| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|----------------------------|-------------------------------|-------|-----------------|----------------|
| **Neurological complication** | No | 29467 (72.4) | 11216 (27.6) | - | - |
| Yes | 645 (37.5) | 1074 (62.5) | 4.37 (3.96-4.84, p<0.001) | 4.35 (3.90-4.84, p<0.001) |
| **Age (years)** | 19-29 | 1121 (86.7) | 172 (13.3) | - | - |
| | 30-39 | 1962 (83.7) | 383 (16.3) | 1.27 (1.05-1.55, p=0.015) | 1.68 (1.33-2.10, p<0.001) |
| | 40-49 | 3331 (79.9) | 838 (20.1) | 1.64 (1.38-1.96, p<0.001) | 2.27 (1.84-2.81, p<0.001) |
| | 50-59 | 5508 (78.8) | 1486 (21.2) | 1.76 (1.49-2.09, p<0.001) | 2.47 (2.02-3.03, p<0.001) |
| | 60-69 | 5451 (73.3) | 1990 (26.7) | 2.38 (2.02-2.82, p<0.001) | 3.41 (2.78-4.17, p<0.001) |
| | 70-79 | 6237 (66.5) | 3139 (33.5) | 3.28 (2.79-3.88, p<0.001) | 4.73 (3.87-5.78, p<0.001) |
| | 80-89 | 6069 (61.4) | 3810 (38.6) | 4.09 (3.48-4.84, p<0.001) | 6.08 (4.98-7.43, p<0.001) |
| | 90+ | 1940 (58.5) | 1377 (41.5) | 4.63 (3.89-5.52, p<0.001) | 6.97 (5.66-8.60, p<0.001) |
| **Sex at Birth** | Female | 14550 (70.9) | 5968 (29.1) | - | - |
| | Male | 17230 (70.2) | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.10 (1.05-1.15, p<0.001) |
| **Deprivation** | 1 (least deprived) | 4468 (69.7) | 1946 (30.3) | - | - |
| | 2 | 5473 (70.0) | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.98 (0.91-1.07, p=0.681) |
| | 3 | 6751 (69.4) | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.04 (0.96-1.13, p=0.327) |
| | 4 | 7008 (70.2) | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.11 (1.02-1.20, p=0.015) |
| | 5 (most deprived) | 8156 (72.8) | 3052 (27.2) | 0.86 (0.80-0.92, p<0.001) | 1.03 (0.95-1.12, p=0.465) |
### Supplementary table 10G - Respiratory complications

| Dependent: Self-care ability | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|------------------------------|-------------------------------|-------|------------------|-----------------|
| No                           | 26878 (74.2)                 | 9360 (25.8) | -                | -               |
| Yes                          | 3380 (52.4)                  | 3069 (47.6) | 2.61 (2.47-2.75, p<0.001) | 3.61 (3.39-3.84, p<0.001) |

| Age (years) | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|-------------|-------------------------------|-------|------------------|-----------------|
| 19-29       | 1121 (86.7)                  | 172 (13.3) | -                | -               |
|             | 1962 (83.7)                  | 383 (16.3) | 1.27 (1.05-1.55, p=0.015) | 1.58 (1.25-1.99, p<0.001) |
| 30-39       | 3331 (79.9)                  | 838 (20.1) | 1.64 (1.38-1.96, p<0.001) | 2.02 (1.63-2.50, p<0.001) |
| 40-49       | 5508 (78.8)                  | 1486 (21.2) | 1.76 (1.49-2.09, p<0.001) | 2.22 (1.80-2.72, p<0.001) |
| 50-59       | 5451 (73.3)                  | 1990 (26.7) | 2.38 (2.02-2.82, p<0.001) | 3.24 (2.64-3.98, p<0.001) |
| 60-69       | 6237 (66.5)                  | 3139 (33.5) | 3.28 (2.79-3.88, p<0.001) | 4.90 (4.00-6.00, p<0.001) |
| 70-79       | 6069 (61.4)                  | 3810 (38.6) | 4.09 (3.48-4.84, p<0.001) | 6.63 (5.42-8.12, p<0.001) |
| 80-89       | 1940 (58.5)                  | 1377 (41.5) | 4.63 (3.89-5.52, p<0.001) | 7.59 (6.14-9.38, p<0.001) |

| Sex at Birth | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|--------------|-------------------------------|-------|------------------|-----------------|
| Female       | 14550 (70.9)                 | 5968 (29.1) | -                | -               |
| Male         | 17230 (70.2)                 | 7308 (29.8) | 1.03 (0.99-1.08, p=0.107) | 1.06 (1.02-1.11, p=0.009) |

| Deprivation  | Equivalent to before illness | Worse | OR (univariable) | OR (multilevel) |
|--------------|-------------------------------|-------|------------------|-----------------|
| 1 (least deprived) | 4468 (69.7) | 1946 (30.3) | -                | -               |
| 2             | 5473 (70.0)                  | 2345 (30.0) | 0.98 (0.92-1.06, p=0.655) | 0.98 (0.90-1.06, p=0.614) |
| 3             | 6751 (69.4)                  | 2983 (30.6) | 1.01 (0.95-1.09, p=0.680) | 1.03 (0.95-1.12, p=0.419) |
| 4             | 7008 (70.2)                  | 2982 (29.8) | 0.98 (0.91-1.05, p=0.504) | 1.08 (1.00-1.17, p=0.062) |
| 5 (most deprived) | 8156 (72.8) | 3052 (27.2) | 0.86 (0.80-0.92, p<0.001) | 1.04 (0.96-1.13, p=0.366) |
Supplementary figure 1 – Heatmap of co-occurrence of complications. Measured using the Jaccard similarity index, where 1 is perfect co-occurrence and 0 is no co-occurrence.
Supplementary figure 2 - Adjusted effect of age and sex on organ specific complications in adults with severe COVID-19 (also adjusted for centre as a random effect).

### Cardiovascular: OR (95% CI, p-value)

| Complication | Age on admission | Sex at Birth | Deprivation | Chronic Cardiac Disease | Dementia | Malignant neoplasms |
|--------------|-----------------|-------------|-------------|------------------------|----------|-------------------|
| Any complication | 30-39 | Female | 1.39 (1.31-1.48, p<0.001) | Yes | No | Yes |
| | 40-49 | Male | 1.03 (0.96-1.10, p=0.046) | No | Yes | Yes |
| | 50-59 | Male | 1.03 (0.94-1.14, p=0.010) | No | Yes | Yes |
| | 60-69 | Male | 1.04 (0.98-1.11, p=0.025) | No | Yes | Yes |
| | 70-79 | Male | 1.03 (0.97-1.10, p=0.032) | No | Yes | Yes |
| | 80+ | Male | 2.49 (2.03-3.05, p<0.001) | No | Yes | Yes |
| Respiratory: OR (95% CI, p-value)

| Complication | Age on admission | Sex at Birth | Deprivation | Chronic Cardiac Disease | Chronic pulmonary disease | Dementia | Malignant neoplasms |
|--------------|-----------------|-------------|-------------|------------------------|------------------------|----------|-------------------|
| Any complication | 30-39 | Female | 1.39 (1.26-1.57, p<0.001) | Yes | No | Yes |
| | 40-49 | Male | 0.98 (0.94-1.03, p<0.001) | No | No | Yes |
| | 50-59 | Male | 1.48 (1.40-1.56, p<0.001) | No | No | Yes |
| | 60-69 | Male | 0.91 (0.86-0.97, p<0.001) | No | No | Yes |
| | 70-79 | Male | 1.22 (1.15-1.30, p<0.001) | No | No | Yes |
| | 80+ | Male | 2.10 (1.94-2.28, p<0.001) | No | No | Yes |

### Gastrointestinal: OR (95% CI, p-value)

| Complication | Age on admission | Sex at Birth | Deprivation | Chronic Cardiac Disease | Chronic pulmonary disease | Dementia | Malignant neoplasms |
|--------------|-----------------|-------------|-------------|------------------------|------------------------|----------|-------------------|
| Any complication | 30-39 | Female | 1.95 (1.86-2.05, p<0.001) | Yes | No | Yes |
| | 40-49 | Male | 2.31 (2.23-2.39, p<0.001) | No | Yes | Yes |
| | 50-59 | Male | 3.09 (2.92-3.27, p<0.001) | No | Yes | Yes |
| | 60-69 | Male | 3.85 (3.70-4.01, p<0.001) | No | Yes | Yes |
| | 70-79 | Male | 4.01 (3.85-4.19, p<0.001) | No | Yes | Yes |
| | 80+ | Male | 4.18 (4.04-5.77, p<0.001) | No | Yes | Yes |
| | 90+ | Male | 4.28 (4.05-5.54, p<0.001) | No | Yes | Yes |

### Neurological: OR (95% CI, p-value)

| Complication | Age on admission | Sex at Birth | Deprivation | Chronic Cardiac Disease | Chronic pulmonary disease | Dementia | Malignant neoplasms |
|--------------|-----------------|-------------|-------------|------------------------|------------------------|----------|-------------------|
| Any complication | 30-39 | Female | 1.33 (1.25-1.42, p<0.001) | Yes | No | Yes |
| | 40-49 | Male | 1.71 (1.60-1.82, p<0.001) | No | Yes | Yes |
| | 50-59 | Male | 2.10 (2.02-2.19, p<0.001) | No | Yes | Yes |
| | 60-69 | Male | 2.54 (2.42-2.66, p<0.001) | No | Yes | Yes |
| | 70-79 | Male | 2.62 (2.52-2.73, p<0.001) | No | Yes | Yes |
| | 80+ | Male | 2.49 (2.02-3.05, p<0.001) | No | Yes | Yes |

### Systemic: OR (95% CI, p-value)

| Complication | Age on admission | Sex at Birth | Deprivation | Chronic Cardiac Disease | Chronic pulmonary disease | Dementia | Malignant neoplasms |
|--------------|-----------------|-------------|-------------|------------------------|------------------------|----------|-------------------|
| Any complication | 30-39 | Female | 1.43 (1.40-1.47, p<0.001) | Yes | No | Yes |
| | 40-49 | Male | 1.81 (1.72-1.91, p<0.001) | No | Yes | Yes |
| | 50-59 | Male | 2.80 (2.73-2.88, p<0.001) | No | Yes | Yes |
| | 60-69 | Male | 3.11 (3.05-3.17, p<0.001) | No | Yes | Yes |
| | 70-79 | Male | 3.85 (3.78-3.93, p<0.001) | No | Yes | Yes |
| | 80+ | Male | 2.01 (1.84-2.19, p<0.001) | No | Yes | Yes |

### Odds ratio (95% CI, log scale)

- Cardiovascular
- Respiratory
- Gastrointestinal
- Neurological
- Systemic
Supplementary figure 3 - Effect of age, sex and deprivation on specific complications in adults with COVID-19 (also adjusted for centre as a random effect).

Any complication: OR (95% CI, p-value)
- Age on admission
  - Male: 1.10 (0.70-1.72, p=0.65)
  - Female: 1.08 (0.72-1.60, p=0.70)
- Sex at Birth
  - Female: 1.10 (0.70-1.72, p=0.65)
  - Male: 1.08 (0.72-1.60, p=0.70)
- Depreciation
  - Male: 1.10 (0.70-1.72, p=0.65)
  - Female: 1.08 (0.72-1.60, p=0.70)

Suspected Bacterial Pneumonia: OR (95% CI, p-value)
- Age on admission
  - Male: 1.03 (0.79-1.33, p=0.80)
  - Female: 1.02 (0.78-1.31, p=0.83)
- Sex at Birth
  - Female: 1.41 (1.03-1.92, p=0.03)
  - Male: 1.26 (0.96-1.66, p=0.12)
- Depreciation
  - Male: 1.41 (1.03-1.92, p=0.03)
  - Female: 1.26 (0.96-1.66, p=0.12)

ARDS: OR (95% CI, p-value)
- Age on admission
  - Male: 1.20 (0.89-1.61, p=0.22)
  - Female: 1.06 (0.81-1.40, p=0.62)
- Sex at Birth
  - Female: 1.20 (0.89-1.61, p=0.22)
  - Male: 1.06 (0.81-1.40, p=0.62)
- Depreciation
  - Male: 1.20 (0.89-1.61, p=0.22)
  - Female: 1.06 (0.81-1.40, p=0.62)

Pneumothorax: OR (95% CI, p-value)
- Age on admission
  - Male: 2.41 (1.35-4.34, p=0.002)
  - Female: 2.30 (1.35-4.00, p=0.001)
- Sex at Birth
  - Female: 2.41 (1.35-4.34, p=0.002)
  - Male: 2.30 (1.35-4.00, p=0.001)
- Depreciation
  - Male: 2.41 (1.35-4.34, p=0.002)
  - Female: 2.30 (1.35-4.00, p=0.001)

Physiological failure: OR (95% CI, p-value)
- Age on admission
  - Male: 1.10 (0.70-1.72, p=0.65)
  - Female: 1.08 (0.72-1.60, p=0.70)
- Sex at Birth
  - Female: 1.10 (0.70-1.72, p=0.65)
  - Male: 1.08 (0.72-1.60, p=0.70)
- Depreciation
  - Male: 1.10 (0.70-1.72, p=0.65)
  - Female: 1.08 (0.72-1.60, p=0.70)

Highly Likely Bacterial Pneumonia: OR (95% CI, p-value)
- Age on admission
  - Male: 2.41 (1.35-4.34, p=0.002)
  - Female: 2.30 (1.35-4.00, p=0.001)
- Sex at Birth
  - Female: 2.41 (1.35-4.34, p=0.002)
  - Male: 2.30 (1.35-4.00, p=0.001)
- Depreciation
  - Male: 2.41 (1.35-4.34, p=0.002)
  - Female: 2.30 (1.35-4.00, p=0.001)
Supplementary figure 3 (continued) - Effect of age, sex and deprivation on specific complications in adults with COVID-19 (also adjusted for centre as a random effect).

DIC - Disseminated intravascular coagulation.
Supplementary figure 4 - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of systemic complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of systemic complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
Supplementary figure 5 - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of renal complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of renal complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
Supplementary figure 6 - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of gastrointestinal or liver complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of gastrointestinal or liver complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
**Supplementary figure 7** - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of cardiovascular complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of cardiovascular complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
**Supplementary figure 8** - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of neurological complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of neurological complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
Supplementary figure 9 - Relationship between age, sex, comorbidities and adjusted outcomes using generalised additive models. (A) Shows relationships for the outcome of adjusted risk of respiratory complications. (B) Shows relationships for the outcome of adjusted mortality risk, stratified by presence of respiratory complications. Each line represents one bootstrap replicate (i.e. one simulated patient).
Supplementary figure 11 - Associations between specific comorbidities and organ specific complications in adults with severe COVID-19.

A positive Z-score represents stronger associations between variables in positive direction, whereas negative z-score represents effect in opposite direction.
Supplementary figure 12 - Effect of specific comorbidities on specific complications in adults with COVID-19.

A positive Z-score represents stronger associations between variables in positive direction, whereas negative z-score represents effect in opposite direction.
Supplementary figure 13 – Probability of complication by admission severity score and symptoms in those who survived. (A) ISARIC 4C mortality score against proportion of patients experiencing any complication. (B) National Early Warning Score 2 against proportion of patients experiencing any complication. (C) Quick Sequential Organ Failure Assessment score against proportion of patients experiencing any complication. (D) Total number of symptoms on admission against proportion of patients experiencing any complication. For continuous outcomes (4C score, NEWS2 and number of symptoms), red line shows smoothed conditional mean line using generalised additive model. Higher scores indicate critical illness.