

## **Appendix S1: Supporting Information**

### *Excluded procedures*

Both elective and emergency patients undergoing surgery for any indication were eligible. Surgery was defined as any procedure that is routinely performed in an operating theatre by a surgeon. Procedures that are typically performed outside of the operating theatre (e.g. in an endoscopy suite or radiology suite) or by non-surgeons (e.g. by gastroenterologists or cardiologists) were excluded. A full list of excluded procedures is presented in Supplementary Table S15. Free-text procedure information was reviewed for submitted records and records relating to excluded procedures were excluded (Supplementary Figure S1).

### *Calculation of Revised Cardiac Risk Index*

The Revised Cardiac Risk Index (RCRI) is a validated composite score assessing peri-operative cardiac risk [1]. Each of the following items scores one point to create a score ranging from 0 (lowest risk) to 6 (highest risk).:

- Procedural risk with a point scored for patients undergoing intraperitoneal or intrathoracic surgery. In this study all patients undergoing cardiac surgery, gastrointestinal surgery, general surgery, gynaecology, hepatobiliary surgery, thoracic surgery, urology, or vascular surgery scored this point.
- History of ischemic heart disease.
- History of congestive heart failure.
- History of cerebrovascular disease.
- History of diabetes mellitus treated with insulin.
- History of chronic kidney disease (creatinine > 176  $\mu\text{mol.l}^{-1}$ ).

### *Grade of surgery*

Grade of surgery was categorised on the basis of the Bupa schedule of procedures as either minor (minor or intermediate according to the Bupa schedule) or major (major or complex major according to the Bupa schedule).

### *Postoperative pulmonary complications*

The secondary outcome was 30-day postoperative pulmonary complications. This was a composite of postoperative pneumonia, acute respiratory distress syndrome (ARDS) and unexpected ventilation. This outcome has been used in previous peri-operative COVID-19 studies [2,3], having been adapted from the PRISM randomised controlled trial [4].

Unexpected postoperative ventilation was defined as any episode of non-invasive ventilation, invasive ventilation, or extracorporeal membrane oxygenation after initial extubation after surgery; or patient could not be extubated as planned after surgery.

Acute respiratory distress syndrome (ARDS) was defined as an acute diffuse, inflammatory lung injury, leading to increased pulmonary vascular permeability, increased lung weight, and loss of aerated lung tissue with hypoxemia and bilateral radiographic opacities. The Berlin consensus definition was used [5].

Postoperative pneumonia was recorded according to the US Centers for Disease Control (CDC) definition of pneumonia, modified to accommodate limited availability of radiological facilities at some participating centres [6]. Patients were required to have at least one of the following:

- Fever ( $>38^{\circ}\text{C}$ ) with no other recognised cause.
- Leucopenia (white cell count  $<4.10^9$ ) or leucocytosis (white cell count  $>12.10^9$ ).
- For adults  $>70$  years old, altered mental status with no other recognised cause.

AND at least two of the following:

- New onset of purulent sputum or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements.
- New onset or worsening cough, or dyspnoea, or tachypnoea.

- Rales, crackles or bronchial breath sounds.
- Worsening gas exchange (hypoxaemia, increased oxygen requirement).

The following chest radiograph findings were considered to confirm pneumonia: new or progressive and persistent infiltrates; consolidation; or cavitation.

#### *Timing of surgery following SARS-CoV-2 diagnosis*

A total of 140,231 patients were included in the study. Of these, 3127 (2.2%) had a pre-operative SARS-CoV-2 diagnosis. The time from SARS-CoV-2 diagnosis to surgery was 0–2 weeks in 1138 patients (36.4%), 3–4 weeks in 461 patients (14.7%), 5–6 weeks in 326 patients (10.4%) and  $\geq 7$  weeks in 1202 patients (38.4%). All analyses were performed using this categorisation which was defined prior to commencing analysis.

Amongst patients with a time interval from SARS-CoV-2 diagnosis to surgery of  $\geq 7$  weeks, this time interval was 7–8 weeks in 330 patients, 2–4 months in 436 patients, 5–6 months in 246 patients, and  $\geq 7$  months in 190 patients. Overall, 30-day postoperative mortality and 30-day postoperative pulmonary complication rates were largely similar across these groups both overall and in the elective surgery subgroup (Supplementary Table S16).

#### *Diagnosis of SARS-CoV-2*

Of the 3127 patients who had a pre-operative SARS-CoV-2 infection, the diagnosis was confirmed with a RT-PCR swab in 79.5% (2486/3127) of patients. In patients who did not have a positive RT-PCR swab, diagnosis was with a rapid antigen test in 2.8% (87/3127), a CT scan in 3.8% (118/3127), antibody test in 9.0% (280/3127), and a clinical diagnosis in 5.0% (156/3127).

#### *COVID-19 symptoms*

Overall, 55.2% (1726/3127) of pre-operative SARS-CoV-2 infections were recorded as being symptomatic. Of these 1,726 patients, 798 (46.2%) experienced only respiratory symptoms (e.g. cough), 447 (25.9%) experienced only non-respiratory symptoms (e.g. fever, anosmia), 474 (27.5%) experienced both respiratory and non-respiratory symptoms, and data were missing for 7 (0.4%).

Amongst the 1,726 patients who experienced COVID-19 symptoms, 969 (56.1%) did not require hospital admission for treatment of COVID-19, 497 (28.8%) were admitted to hospital for treatment of COVID-19 but did not require respiratory support, 259 (15.0%) were admitted to hospital and required respiratory support (non-invasive or mechanical ventilation), and data were missing for 1 (0.1%) patient.

#### *Repeat swabs following SARS-CoV-2 diagnosis*

Amongst the 1,989 patients who underwent surgery  $\geq 2$  weeks after SARS-CoV-2 diagnosis, 1,450 (72.9%) had at least one interval RT-PCR nasopharyngeal swab test (i.e. swab test at any point following initial diagnosis). Considering the swab tests performed nearest to the time of surgery, 92.4% (1340/1450) were negative and 7.6% (110/1450) were positive.

Amongst patients whose most recent pre-operative swab test result was negative there was a difference in both 30-day postoperative mortality (4.9% at 3–4 weeks versus 3.6% at 5–6 weeks versus 1.6% at  $\geq 7$  weeks,  $p=0.008$ ) and 30-day postoperative pulmonary complications (9.8% at 3–4 weeks versus 7.2% at 5–6 weeks versus 3.0% at  $\geq 7$  weeks,  $p<0.001$ ) depending on timing of surgery after SARS-CoV-2 diagnosis (Supplementary Table S17).

#### *References*

1. Lee TH, Marcantonio ER, Mangione CM, et al. Derivation and prospective validation of a simple index for prediction of cardiac risk of major noncardiac surgery. *Circulation* 1999; **100**: 1043–9.
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3. Collaborative CO. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet* 2020; **396**: 27–38.
4. Pearse RM, Abbott TE, Haslop R, et al. The prevention of respiratory insufficiency after surgical management (PRISM) Trial. Report of the protocol for a pragmatic randomized controlled trial of CPAP to prevent respiratory complications and improve survival following major abdominal surgery. *Minerva Anestesiologica* 2017; **83**: 175–82.
5. Force ADT, Ranieri VM, Rubenfeld GD, et al. Acute respiratory distress syndrome: the Berlin Definition. *Journal of the American Medical Association* 2012; **307**: 2526-33.
6. Centres for Disease Control and Prevention. Pneumonia (Ventilator-associated [VAP] and non-ventilator-associated Pneumonia [PNEU]) Event. <https://www.cdc.gov/nhsn/pdfs/pscmanual/6pscvapcurrent.pdf> (Accessed 04/02/2021)

**Supplementary Table S1.** Baseline demographics and outcomes in elective patients. Values are number (proportion).

|   | No pre-operative SARS-CoV-2<br>n=95,680 | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                    |                    |                   | p-value |
|---|---|---|--------------------|--------------------|-------------------|---------|
|   |   | 0–2 weeks<br>n=338  | 3–4 weeks<br>n=300 | 5–6 weeks<br>n=232 | ≥7 weeks<br>n=892 |         |
| <b>Age</b>  |   |   |                    |                    |                   |         |
| 0–29 years  | 17,759 (18.6%)                          | 86 (25.4%)  | 53 (17.7%)         | 37 (15.9%)         | 105 (11.8%)       | p<0.001 |
| 30–49 years   | 25,740 (26.9%)                          | 115 (34%)   | 106 (35.3%)        | 78 (33.6%)         | 271 (30.4%)       |         |
| 50–69 years   | 32,689 (34.2%)                          | 97 (28.7%)  | 102 (34%)          | 85 (36.6%)         | 380 (42.6%)       |         |
| 70–79 years   | 13,862 (14.5%)                          | 28 (8.3%)   | 31 (10.3%)         | 27 (11.6%)         | 92 (10.3%)        |         |
| ≥80 years   | 5,629 (5.9%)                            | 12 (3.6%)   | 8 (2.7%)           | 5 (2.2%)           | 44 (4.9%)         |         |
| Missing   | 1 (0%)                                  | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>Sex</b>  |   |   |                    |                    |                   |         |
| Female  | 50,618 (52.9%)                          | 209 (61.8%)   | 146 (48.7%)        | 126 (54.3%)        | 475 (53.3%)       | 0.010   |
| Male  | 45,059 (47.1%)                          | 129 (38.2%)   | 154 (51.3%)        | 106 (45.7%)        | 417 (46.7%)       |         |
| Missing   | 3 (0%)                                  | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>ASA physical status</b>                          |   |   |                    |                    |                   |         |
| 1–2   | 73,268 (76.6%)                          | 249 (73.7%)   | 217 (72.3%)        | 170 (73.3%)        | 626 (70.2%)       | p<0.001 |
| 3–5   | 22,372 (23.4%)                          | 89 (26.3%)  | 83 (27.7%)         | 62 (26.7%)         | 266 (29.8%)       |         |
| Missing   | 40 (0%)                                 | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>Revised cardiac risk index</b>                   |   |   |                    |                    |                   |         |
| 0   | 44,237 (46.2%)                          | 160 (47.3%)   | 127 (42.3%)        | 89 (38.4%)         | 358 (40.1%)       | p<0.001 |
| 1   | 41,223 (43.1%)                          | 117 (34.6%)   | 131 (43.7%)        | 101 (43.5%)        | 401 (45%)         |         |
| 2   | 7,745 (8.1%)                            | 43 (12.7%)  | 28 (9.3%)          | 28 (12.1%)         | 90 (10.1%)        |         |
| ≥3  | 2,425 (2.5%)                            | 18 (5.3%)   | 14 (4.7%)          | 14 (6%)            | 42 (4.7%)         |         |
| Missing   | 50 (0.1%)                               | 0 (0%)  | 0 (0%)             | 0 (0%)             | 1 (0.1%)          |         |
| <b>Respiratory comorbidities</b>                    |   |   |                    |                    |                   |         |
| No  | 86,695 (90.6%)                          | 294 (87%)   | 271 (90.3%)        | 205 (88.4%)        | 805 (90.2%)       | 0.130   |
| Yes   | 8,908 (9.3%)                            | 44 (13%)  | 29 (9.7%)          | 27 (11.6%)         | 87 (9.8%)         |         |
| Missing   | 77 (0.1%)                               | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>Indication for surgery</b>                       |   |   |                    |                    |                   |         |
| Benign  | 64,762 (67.7%)                          | 161 (47.6%)   | 164 (54.7%)        | 145 (62.5%)        | 613 (68.7%)       | p<0.001 |
| Cancer  | 21,809 (22.8%)                          | 71 (21%)  | 108 (36%)          | 69 (29.7%)         | 223 (25%)         |         |
| Trauma  | 5,352 (5.6%)                            | 37 (10.9%)  | 21 (7%)            | 13 (5.6%)          | 29 (3.3%)         |         |
| Obstetrics  | 3,754 (3.9%)                            | 69 (20.4%)  | 7 (2.3%)           | 5 (2.2%)           | 27 (3%)           |         |
| Missing   | 3 (0%)                                  | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>Grade of surgery</b>                             |   |   |                    |                    |                   |         |
| Minor   | 38,944 (40.7%)                          | 70 (20.7%)  | 79 (26.3%)         | 79 (34.1%)         | 324 (36.3%)       | p<0.001 |
| Major   | 56,718 (59.3%)                          | 268 (79.3%)   | 221 (73.7%)        | 153 (65.9%)        | 567 (63.6%)       |         |
| Missing   | 18 (0%)                                 | 0 (0%)  | 0 (0%)             | 0 (0%)             | 1 (0.1%)          |         |
| <b>COVID-19 symptoms</b>                            |   |   |                    |                    |                   |         |
| Asymptomatic  | –                                       | 221 (65.4%)   | 150 (50%)          | 101 (43.5%)        | 247 (27.7%)       | p<0.001 |
| Symptomatic – resolved                              | –                                       | 69 (20.4%)  | 122 (40.7%)        | 118 (50.9%)        | 608 (68.2%)       |         |
| Symptomatic – ongoing                               | –                                       | 46 (13.6%)  | 28 (9.3%)          | 12 (5.2%)          | 31 (3.5%)         |         |
| Missing   | –                                       | 2 (0.6%)  | 0 (0%)             | 1 (0.4%)           | 6 (0.7%)          |         |
| <b>Country income</b>                               |   |   |                    |                    |                   |         |
| High  | 64,769 (67.7%)                          | 110 (32.5%)   | 83 (27.7%)         | 89 (38.4%)         | 512 (57.4%)       | p<0.001 |
| Low / Middle  | 30,911 (32.3%)                          | 228 (67.5%)   | 217 (72.3%)        | 143 (61.6%)        | 380 (42.6%)       |         |
| <b>30-day postoperative mortality</b>               |   |   |                    |                    |                   |         |
| No  | 95,037 (99.3%)                          | 321 (95%)   | 287 (95.7%)        | 223 (96.1%)        | 884 (99.1%)       | p<0.001 |
| Yes   | 588 (0.6%)                              | 17 (5%)   | 13 (4.3%)          | 9 (3.9%)           | 8 (0.9%)          |         |
| Missing   | 55 (0.1%)                               | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |
| <b>30-day postoperative pulmonary complications</b> |   |   |                    |                    |                   |         |
| No  | 93,896 (98.1%)                          | 307 (90.8%)   | 268 (89.3%)        | 213 (91.8%)        | 870 (97.5%)       | p<0.001 |
| Yes   | 1,720 (1.8%)                            | 31 (9.2%)   | 32 (10.7%)         | 19 (8.2%)          | 22 (2.5%)         |         |
| Missing   | 64 (0.1%)                               | 0 (0%)  | 0 (0%)             | 0 (0%)             | 0 (0%)            |         |

ASA: American Society of Anesthesiologists physical status grade

p-values from chi squares tests for trend, comparing all 5 groups

**Supplementary Table S2.** Unadjusted and adjusted 30-day postoperative mortality (95% CI) in key subgroups from main analysis.

|                            |            | No pre-operative SARS-CoV-2 | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                  |                  |                 |
|----------------------------|------------|-----------------------------|---|------------------|------------------|-----------------|
|                            |            |                             | 0–2 weeks   | 3–4 weeks        | 5–6 weeks        | ≥7 weeks        |
| <b>Overall</b>             |            |                             |   |                  |                  |                 |
| All patients               | Unadjusted | 1.4% (1973/137104)          | 9.1% (104/1138)   | 6.9% (32/461)    | 5.5% (18/326)    | 2.0% (24/1202)  |
|                            | Adjusted   | 1.5% (1.4-1.5%)             | 4.1% (3.3-4.8%)   | 3.9% (2.6-5.1%)  | 3.6% (2.0-5.2%)  | 1.5% (0.9-2.1%) |
| <b>Age</b>                 |            |                             |   |                  |                  |                 |
| <70 years                  | Unadjusted | 1.0% (1148/110778)          | 6.1% (58/951)   | 5.1% (20/395)    | 4.0% (11/272)    | 1.3% (13/1004)  |
|                            | Adjusted   | 1.2% (1.2-1.3%)             | 3.5% (2.8-4.2%)   | 3.3% (2.2-4.4%)  | 3.1% (1.7-4.5%)  | 1.2% (0.8-1.7%) |
| ≥70 years                  | Unadjusted | 3.1% (825/26324)            | 24.6% (46/187)  | 18.2% (12/66)    | 13.0% (7/54)     | 5.6% (11/198)   |
|                            | Adjusted   | 2.0% (1.9-2.2%)             | 5.5% (4.4-6.5%)   | 5.2% (3.5-6.9%)  | 4.8% (2.8-6.9%)  | 2.0% (1.3-2.8%) |
| <b>ASA physical status</b> |            |                             |   |                  |                  |                 |
| 1–2                        | Unadjusted | 0.5% (524/103503)           | 3.2% (25/779)   | 1.9% (6/316)     | 1.3% (3/227)     | 0.7% (6/805)    |
|                            | Adjusted   | 0.6% (0.6-0.7%)             | 1.9% (1.5-2.3%)   | 1.8% (1.1-2.5%)  | 1.6% (0.8-2.5%)  | 0.6% (0.4-0.9%) |
| 3–5                        | Unadjusted | 4.3% (1448/33553)           | 22.0% (79/359)  | 17.9% (26/145)   | 15.2% (15/99)    | 4.5% (18/397)   |
|                            | Adjusted   | 3.0% (2.8-3.2%)             | 8.3% (6.7-9.9%)   | 7.9% (5.3-10.5%) | 7.3% (4.1-10.5%) | 3.1% (1.9-4.2%) |
| <b>Grade of surgery</b>    |            |                             |   |                  |                  |                 |
| Minor                      | Unadjusted | 0.6% (334/55301)            | 5.6% (22/395)   | 6.1% (8/132)     | 6.0% (7/117)     | 0.6% (3/473)    |
|                            | Adjusted   | 0.8% (0.7-0.9%)             | 2.4% (1.8-2.9%)   | 2.2% (1.4-3%)    | 2.1% (1.1-3.1%)  | 0.8% (0.5-1.1%) |
| Major                      | Unadjusted | 2.0% (1639/81771)           | 11.0% (82/743)  | 7.3% (24/329)    | 5.3% (11/209)    | 2.9% (21/728)   |
|                            | Adjusted   | 1.8% (1.7-1.9%)             | 4.9% (4-5.8%)   | 4.7% (3.2-6.2%)  | 4.3% (2.5-6.2%)  | 1.8% (1.1-2.5%) |
| <b>Urgency of surgery</b>  |            |                             |   |                  |                  |                 |
| Elective                   | Unadjusted | 0.6% (588/95680)            | 5.0% (17/338)   | 4.3% (13/300)    | 3.9% (9/232)     | 0.9% (8/892)    |
|                            | Adjusted   | 0.6% (0.6-0.7%)             | 1.9% (1.5-2.3%)   | 1.8% (1.1-2.5%)  | 1.6% (0.8-2.5%)  | 0.6% (0.4-0.9%) |
| Emergency                  | Unadjusted | 3.3% (1385/41413)           | 10.9% (87/800)  | 11.8% (19/161)   | 9.6% (9/94)      | 5.2% (16/310)   |
|                            | Adjusted   | 3.6% (3.4-3.8%)             | 9.3% (7.7-11%)  | 8.9% (6.2-11.7%) | 8.3% (4.9-11.8%) | 3.6% (2.3-5%)   |

ASA, American Society of Anesthesiologists physical status

Rates adjusted for age, sex, ASA, Revised Cardiac Risk Index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis. Full model presented in Table 2

**Supplementary Table S3.** Sensitivity analysis for elective patients with unadjusted and adjusted models for 30-day postoperative mortality. Values are OR (95%CI).

| Factor  | Unadjusted          |         | Adjusted         |         |
|---|---------------------|---------|------------------|---------|
|   | OR (95% CI)         | p-value | OR (95% CI)      | p-value |
| <b>Age</b>  |                     |         |                  |         |
| 0–69 years  | Reference           | –       | Reference        | –       |
| ≥70 years   | 2.59 (2.21-3.04)    | <0.001  | 1.53 (1.28-1.82) | <0.001  |
| <b>Sex</b>  |                     |         |                  |         |
| Female  | Reference           | –       | Reference        | –       |
| Male  | 1.56 (1.34-1.83)    | <0.001  | 1.25 (1.06-1.47) | 0.008   |
| <b>ASA physical status</b>                              |                     |         |                  |         |
| 1–2   | Reference           | –       | Reference        | –       |
| 3–5   | 6.89 (5.83-8.15)    | <0.001  | 4.62 (3.80-5.62) | <0.001  |
| <b>Revised cardiac risk index</b>                       |                     |         |                  |         |
| 0   | Reference           | –       | Reference        | –       |
| 1   | 2.69 (2.17-3.35)    | <0.001  | 1.79 (1.42-2.25) | <0.001  |
| 2   | 7.55 (5.90-9.65)    | <0.001  | 2.40 (1.82-3.16) | <0.001  |
| ≥3  | 14.92 (11.29-19.72) | <0.001  | 3.98 (2.90-5.46) | <0.001  |
| <b>Respiratory comorbidities</b>                        |                     |         |                  |         |
| No  | Reference           | –       | Reference        | –       |
| Yes   | 1.83 (1.47-2.26)    | <0.001  | 1.06 (0.85-1.33) | 0.583   |
| <b>Indication for surgery</b>                           |                     |         |                  |         |
| Benign  | Reference           | –       | Reference        | –       |
| Cancer  | 3.16 (2.69-3.71)    | <0.001  | 2.25 (1.90-2.66) | <0.001  |
| Trauma  | 1.50 (1.06-2.13)    | 0.022   | 2.06 (1.43-2.97) | <0.001  |
| Obstetrics  | 0.12 (0.03-0.47)    | 0.003   | 0.21 (0.05-0.85) | 0.029   |
| <b>Grade of surgery</b>                                 |                     |         |                  |         |
| Minor   | Reference           | –       | Reference        | –       |
| Major   | 2.80 (2.30-3.41)    | <0.001  | 1.75 (1.43-2.14) | <0.001  |
| <b>Country income</b>                                   |                     |         |                  |         |
| High  | Reference           | –       | Reference        | –       |
| Low / Middle  | 2.09 (1.79-2.44)    | <0.001  | 3.16 (2.67-3.74) | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                     |         |                  |         |
| No diagnosis  | Reference           | –       | Reference        | –       |
| 0–2 weeks   | 8.56 (5.22-14.04)   | <0.001  | 5.50 (3.24-9.34) | <0.001  |
| 3–4 weeks   | 7.32 (4.17-12.84)   | <0.001  | 3.95 (2.18-7.15) | <0.001  |
| 5–6 weeks   | 6.52 (3.33-12.76)   | <0.001  | 4.14 (2.05-8.33) | <0.001  |
| ≥7 weeks  | 1.46 (0.73-2.95)    | 0.288   | 1.03 (0.50-2.09) | 0.945   |

ASA, American Society of Anesthesiologists physical status.

**Supplementary Table S4.** Sensitivity analysis for elective patients with unadjusted and adjusted 30-day postoperative mortality (95%CI) in key subgroups.

|                            |            | No pre-operative SARS-CoV-2 | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                 |                 |                 |
|----------------------------|------------|-----------------------------|---|-----------------|-----------------|-----------------|
|                            |            |                             | 0–2 weeks   | 3–4 weeks       | 5–6 weeks       | ≥7 weeks        |
| <b>Overall</b>             |            |                             |   |                 |                 |                 |
| All patients               | Unadjusted | 0.6% (588/95680)            | 5.0% (17/338)   | 4.3% (13/300)   | 3.9% (9/232)    | 0.9% (8/892)    |
|                            | Adjusted   | 0.6% (0.6-0.7%)             | 3.1% (1.6-4.5%)   | 2.3% (1.1-3.5%) | 2.4% (0.9-3.9%) | 0.6% (0.2-1.1%) |
| <b>Age</b>                 |            |                             |   |                 |                 |                 |
| <70 years                  | Unadjusted | 0.5% (353/76188)            | 4.0% (12/298)   | 2.7% (7/261)    | 3.0% (6/200)    | 0.8% (6/756)    |
|                            | Adjusted   | 0.5% (0.5-0.6%)             | 2.7% (1.4-4%)   | 2.0% (0.9-3.1%) | 2.1% (0.7-3.4%) | 0.6% (0.2-0.9%) |
| ≥70 years                  | Unadjusted | 1.2% (235/19491)            | 12.5% (5/40)  | 15.4% (6/39)    | 9.4% (3/32)     | 1.5% (2/136)    |
|                            | Adjusted   | 0.8% (0.7-0.9%)             | 4.0% (2.1-5.9%)   | 3.0% (1.3-4.6%) | 3.1% (1.1-5%)   | 0.8% (0.3-1.4%) |
| <b>ASA physical status</b> |            |                             |   |                 |                 |                 |
| 1–2                        | Unadjusted | 0.3% (191/73268)            | 2.8% (7/249)  | 0.9% (2/217)    | 1.2% (2/170)    | 0.6% (4/626)    |
|                            | Adjusted   | 0.3% (0.3-0.3%)             | 1.6% (0.8-2.4%)   | 1.1% (0.5-1.8%) | 1.2% (0.4-2%)   | 0.3% (0.1-0.5%) |
| 3–5                        | Unadjusted | 1.8% (397/22372)            | 11.2% (10/89)   | 13.3% (11/83)   | 11.3% (7/62)    | 1.5% (4/266)    |
|                            | Adjusted   | 1.3% (1.2-1.5%)             | 6.6% (3.5-9.6%)   | 4.9% (2.3-7.5%) | 5.1% (1.9-8.3%) | 1.4% (0.4-2.3%) |
| <b>Grade of surgery</b>    |            |                             |   |                 |                 |                 |
| Minor                      | Unadjusted | 0.3% (111/38944)            | 4.1% (3/73)   | 8.4% (7/83)     | 3.8% (3/79)     | 0.3% (1/338)    |
|                            | Adjusted   | 0.4% (0.3-0.5%)             | 2.1% (1-3.2%)   | 1.6% (0.7-2.5%) | 1.6% (0.5-2.7%) | 0.4% (0.1-0.7%) |
| Major                      | Unadjusted | 0.8% (477/56718)            | 5.3% (14/265)   | 2.8% (6/217)    | 3.9% (6/153)    | 1.3% (7/553)    |
|                            | Adjusted   | 0.7% (0.6-0.8%)             | 3.5% (1.9-5.2%)   | 2.6% (1.2-4%)   | 2.7% (1-4.5%)   | 0.7% (0.2-1.2%) |

ASA, American Society of Anesthesiologists physical status.

Rates adjusted for age, sex, ASA, Revised Cardiac Risk Index, respiratory comorbidity, grade of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis. Full model presented in Supplementary Table S3



**Supplementary Table S5.** Sensitivity analysis for RT-PCR nasopharyngeal swab proven SARS-CoV-2 infection, with unadjusted and adjusted models for 30-day postoperative mortality. Values are OR (95%CI).

| Factor  | Unadjusted          |         | Adjusted         |         |
|---|---------------------|---------|------------------|---------|
|   | OR (95% CI)         | p-value | OR (95% CI)      | p-value |
| <b>Age</b>  |                     |         |                  |         |
| 0–69 years  | Reference           | –       | Reference        | –       |
| ≥70 years   | 3.14 (2.88-3.43)    | <0.001  | 1.75 (1.58-1.93) | <0.001  |
| <b>Sex</b>  |                     |         |                  |         |
| Female  | Reference           | –       | Reference        | –       |
| Male  | 1.40 (1.29-1.53)    | <0.001  | 1.09 (0.99-1.19) | 0.077   |
| <b>ASA physical status</b>                              |                     |         |                  |         |
| 1–2   | Reference           | –       | Reference        | –       |
| 3–5   | 8.95 (8.12-9.87)    | <0.001  | 5.29 (4.72-5.93) | <0.001  |
| <b>Revised cardiac risk index</b>                       |                     |         |                  |         |
| 0   | Reference           | –       | Reference        | –       |
| 1   | 2.32 (2.06-2.60)    | <0.001  | 1.42 (1.25-1.62) | <0.001  |
| 2   | 6.49 (5.67-7.42)    | <0.001  | 1.82 (1.56-2.13) | <0.001  |
| ≥3  | 12.69 (10.90-14.76) | <0.001  | 2.73 (2.28-3.26) | <0.001  |
| <b>Respiratory comorbidities</b>                        |                     |         |                  |         |
| No  | Reference           | –       | Reference        | –       |
| Yes   | 1.72 (1.52-1.94)    | <0.001  | 1.02 (0.89-1.17) | 0.763   |
| <b>Indication for surgery</b>                           |                     |         |                  |         |
| Benign  | Reference           | –       | Reference        | –       |
| Cancer  | 1.64 (1.48-1.82)    | <0.001  | 1.98 (1.76-2.23) | <0.001  |
| Trauma  | 1.60 (1.42-1.80)    | <0.001  | 0.90 (0.78-1.03) | 0.122   |
| Obstetrics  | 0.27 (0.19-0.37)    | <0.001  | 0.23 (0.16-0.32) | <0.001  |
| <b>Grade of surgery</b>                                 |                     |         |                  |         |
| Minor   | Reference           | –       | Reference        | –       |
| Major   | 3.29 (2.94-3.68)    | <0.001  | 2.39 (2.12-2.69) | <0.001  |
| <b>Urgency of surgery</b>                               |                     |         |                  |         |
| Elective  | Reference           | –       | Reference        | –       |
| Emergency   | 5.57 (5.07-6.12)    | <0.001  | 6.53 (5.87-7.27) | <0.001  |
| <b>Country income</b>                                   |                     |         |                  |         |
| High  | Reference           | –       | Reference        | –       |
| Low / Middle  | 1.73 (1.59-1.88)    | <0.001  | 2.96 (2.69-3.26) | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                     |         |                  |         |
| No diagnosis  | Reference           | –       | Reference        | –       |
| 0–2 weeks   | 7.03 (5.57-8.87)    | <0.001  | 3.35 (2.58-4.36) | <0.001  |
| 3–4 weeks   | 5.55 (3.82-8.07)    | <0.001  | 3.28 (2.17-4.98) | <0.001  |
| 5–6 weeks   | 3.59 (2.09-6.15)    | <0.001  | 2.36 (1.30-4.27) | 0.005   |
| ≥7 weeks  | 1.73 (1.14-2.62)    | 0.010   | 1.19 (0.76-1.84) | 0.445   |

ASA, American Society of Anesthesiologists physical status; RT-PCR, reverse transcription-polymerase chain reaction

Sensitivity analysis for RT-PCR swab proven SARS-CoV-2 includes patients who either had RT-PCR nasopharyngeal swab proven SARS-CoV-2 or did not have a SARS-CoV-2 diagnosis; patients with a SARS-CoV-2 diagnosis which was not supported by a RT-PCR swab were excluded

**Supplementary Table S6.** Sensitivity analysis for RT-PCR nasopharyngeal swab proven SARS-CoV-2 infection with unadjusted and adjusted 30-day postoperative mortality in key subgroups. Values are proportion (rate) or proportion (95%CI).

|                            |            | No pre-operative SARS-CoV-2 | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                  |                  |                 |
|----------------------------|------------|-----------------------------|---|------------------|------------------|-----------------|
|                            |            |                             | 0–2 weeks   | 3–4 weeks        | 5–6 weeks        | ≥7 weeks        |
| <b>Overall</b>             |            |                             |   |                  |                  |                 |
| All patients               | Unadjusted | 1.4% (1973/137104)          | 9.3% (81/870)   | 7.5% (30/400)    | 5.0% (14/281)    | 2.5% (23/935)   |
|                            | Adjusted   | 1.5% (1.4-1.5%)             | 4.2% (3.3-5.1%)   | 4.1% (2.7-5.5%)  | 3.1% (1.6-4.7%)  | 1.7% (1-2.4%)   |
| <b>Age</b>                 |            |                             |   |                  |                  |                 |
| <70 years                  | Unadjusted | 1.0% (1148/110778)          | 5.8% (42/726)   | 5.2% (18/344)    | 3.1% (7/229)     | 1.7% (13/769)   |
|                            | Adjusted   | 1.2% (1.1-1.3%)             | 3.6% (2.8-4.4%)   | 3.5% (2.3-4.8%)  | 2.6% (1.3-4%)    | 1.4% (0.9-2%)   |
| ≥70 years                  | Unadjusted | 3.1% (825/26324)            | 27.1% (39/144)  | 21.4% (12/56)    | 13.5% (7/52)     | 6.0% (10/166)   |
|                            | Adjusted   | 2.0% (1.9-2.2%)             | 5.7% (4.5-6.8%)   | 5.6% (3.7-7.4%)  | 4.3% (2.2-6.3%)  | 2.4% (1.4-3.3%) |
| <b>ASA physical status</b> |            |                             |   |                  |                  |                 |
| 1–2                        | Unadjusted | 0.5% (524/103503)           | 3.2% (19/585)   | 1.9% (5/263)     | 1.0% (2/192)     | 1.0% (6/584)    |
|                            | Adjusted   | 0.6% (0.6-0.7%)             | 2.0% (1.5-2.5%)   | 1.9% (1.2-2.7%)  | 1.4% (0.6-2.2%)  | 0.7% (0.4-1%)   |
| 3–5                        | Unadjusted | 4.3% (1448/33553)           | 21.8% (62/285)  | 18.2% (25/137)   | 13.5% (12/89)    | 4.8% (17/351)   |
|                            | Adjusted   | 3.0% (2.8-3.2%)             | 8.5% (6.7-10.3%)  | 8.4% (5.6-11.2%) | 6.4% (3.2-9.5%)  | 3.5% (2.1-4.9%) |
| <b>Grade of surgery</b>    |            |                             |   |                  |                  |                 |
| Minor                      | Unadjusted | 0.6% (334/55301)            | 5.4% (16/294)   | 6.1% (7/115)     | 5.0% (5/101)     | 0.8% (3/361)    |
|                            | Adjusted   | 0.8% (0.7-0.9%)             | 2.4% (1.8-3%)   | 2.4% (1.5-3.3%)  | 1.8% (0.8-2.7%)  | 0.9% (0.5-1.3%) |
| Major                      | Unadjusted | 2% (1639/81771)             | 11.3% (65/576)  | 8.1% (23/285)    | 5.0% (9/180)     | 3.5% (20/574)   |
|                            | Adjusted   | 1.8% (1.7-1.9%)             | 5.1% (4-6.1%)   | 5.0% (3.3-6.7%)  | 3.8% (1.9-5.7%)  | 2.1% (1.3-2.9%) |
| <b>Urgency of surgery</b>  |            |                             |   |                  |                  |                 |
| Elective                   | Unadjusted | 0.6% (588/95680)            | 6.0% (15/248)   | 4.5% (12/265)    | 3.5% (7/202)     | 1.2% (8/687)    |
|                            | Adjusted   | 0.6% (0.6-0.7%)             | 2.0% (1.5-2.4%)   | 1.9% (1.2-2.7%)  | 1.4% (0.6-2.2%)  | 0.7% (0.4-1%)   |
| Emergency                  | Unadjusted | 3.3% (1385/41413)           | 10.6% (66/622)  | 13.3% (18/135)   | 8.9% (7/79)      | 6.0% (15/248)   |
|                            | Adjusted   | 3.6% (3.4-3.8%)             | 9.7% (7.8-11.5%)  | 9.5% (6.5-12.5%) | 7.3% (3.9-10.8%) | 4.1% (2.6-5.7%) |

ASA, American Society of Anesthesiologists physical status; RT-PCR, reverse transcription-polymerase chain reaction

Sensitivity analysis for RT-PCR swab proven SARS-CoV-2 includes patients who either had RT-PCR nasopharyngeal swab proven SARS-CoV-2 or did not have a SARS-CoV-2 diagnosis; patients with a SARS-CoV-2 diagnosis which was not supported by a RT-PCR swab were excluded

Rates adjusted for age, sex, ASA, revised cardiac risk index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis. Full model presented in Supplementary Table S5

**Supplementary Table S7.** Unadjusted and adjusted models for 30-day postoperative mortality in patients with pre-operative SARS-CoV-2 infection. Values are OR (95%CI).

| Factor  | Unadjusted         |         | Adjusted         |         |
|---|--------------------|---------|------------------|---------|
|   | OR (95% CI)        | p-value | OR (95% CI)      | p-value |
| <b>Age</b>  |                    |         |                  |         |
| 0–69 years  | Reference          | –       | Reference        | –       |
| ≥70 years   | 4.37 (3.19-5.99)   | <0.001  | 2.03 (1.37-3.01) | <0.001  |
| <b>Sex</b>  |                    |         |                  |         |
| Female  | Reference          | –       | Reference        | –       |
| Male  | 1.56 (1.14-2.11)   | 0.005   | 1.10 (0.77-1.58) | 0.599   |
| <b>ASA physical status</b>                              |                    |         |                  |         |
| 1–2   | Reference          | –       | Reference        | –       |
| 3–5   | 8.34 (5.82-11.97)  | <0.001  | 4.26 (2.76-6.57) | <0.001  |
| <b>Revised cardiac risk index</b>                       |                    |         |                  |         |
| 0   | Reference          | –       | Reference        | –       |
| 1   | 2.20 (1.40-3.45)   | 0.001   | 1.46 (0.87-2.46) | 0.155   |
| 2   | 5.90 (3.59-9.70)   | <0.001  | 1.72 (0.94-3.15) | 0.079   |
| ≥3  | 12.97 (7.66-21.96) | <0.001  | 3.37 (1.72-6.61) | <0.001  |
| <b>Respiratory comorbidities</b>                        |                    |         |                  |         |
| No  | Reference          | –       | Reference        | –       |
| Yes   | 1.91 (1.26-2.88)   | 0.002   | 0.88 (0.54-1.43) | 0.608   |
| <b>Indication for surgery</b>                           |                    |         |                  |         |
| Benign  | Reference          | –       | Reference        | –       |
| Cancer  | 1.00 (0.67-1.51)   | 0.992   | 1.88 (1.13-3.13) | 0.015   |
| Trauma  | 1.38 (0.91-2.11)   | 0.133   | 1.64 (0.95-2.86) | 0.078   |
| Obstetrics  | 0.21 (0.08-0.57)   | 0.002   | 0.46 (0.15-1.43) | 0.180   |
| <b>Grade of surgery</b>                                 |                    |         |                  |         |
| Minor   | Reference          | –       | Reference        | –       |
| Major   | 1.99 (1.39-2.84)   | <0.001  | 1.55 (1.03-2.34) | 0.038   |
| <b>Urgency of surgery</b>                               |                    |         |                  |         |
| Elective  | Reference          | –       | Reference        | –       |
| Emergency   | 3.88 (2.76-5.46)   | <0.001  | 2.54 (1.64-3.93) | <0.001  |
| <b>Country income</b>                                   |                    |         |                  |         |
| High  | Reference          | –       | Reference        | –       |
| Low / Middle  | 1.43 (1.05-1.95)   | 0.025   | 2.25 (1.54-3.29) | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                    |         |                  |         |
| 0–2 weeks   | Reference          | –       | Reference        | –       |
| 3–4 weeks   | 0.74 (0.49-1.12)   | 0.155   | 0.89 (0.55-1.46) | 0.654   |
| 5–6 weeks   | 0.58 (0.35-0.97)   | 0.039   | 0.81 (0.44-1.49) | 0.496   |
| ≥7 weeks  | 0.20 (0.13-0.32)   | <0.001  | 0.30 (0.17-0.52) | <0.001  |
| <b>COVID-19 symptoms</b>                                |                    |         |                  |         |
| Asymptomatic  | Reference          | –       | Reference        | –       |
| Symptomatic – resolved                                  | 1.15 (0.74-1.77)   | 0.533   | 1.95 (1.17-3.24) | 0.010   |
| Symptomatic – ongoing                                   | 9.14 (6.21-13.45)  | <0.001  | 5.42 (3.53-8.34) | <0.001  |

ASA, American Society of Anesthesiologists physical status.

**Supplementary Table S8.** Unadjusted and adjusted 30-day postoperative mortality in patients with pre-operative SARS-CoV-2 infection in key subgroups. Values are proportion (rate) or proportion (95%CI).

|                            |            | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                   |                   |                 |
|----------------------------|------------|---|-------------------|-------------------|-----------------|
|                            |            | 0–2 weeks   | 3–4 weeks         | 5–6 weeks         | ≥7 weeks        |
| <b>Overall</b>             |            |   |                   |                   |                 |
| All patients               | Unadjusted | 9.1% (104/1138)   | 6.9% (32/461)     | 5.5% (18/326)     | 2.0% (24/1202)  |
|                            | Adjusted   | 7.3% (5.8-8.8%)   | 6.7% (4.7-8.8%)   | 6.3% (3.7-8.8%)   | 2.8% (1.7-3.9%) |
| <b>Age</b>                 |            |   |                   |                   |                 |
| <70 years                  | Unadjusted | 6.1% (58/951)   | 5.1% (20/395)     | 4.0% (11/272)     | 1.3% (13/1004)  |
|                            | Adjusted   | 6.2% (4.7-7.6%)   | 5.6% (3.8-7.5%)   | 5.2% (2.9-7.5%)   | 2.2% (1.3-3.2%) |
| ≥70 years                  | Unadjusted | 24.6% (46/187)  | 18.2% (12/66)     | 13% (7/54)        | 5.6% (11/198)   |
|                            | Adjusted   | 10.5% (7.6-13.4%)   | 9.7% (6.3-13.1%)  | 9.0% (5.2-12.8%)  | 4.1% (2.4-5.9%) |
| <b>ASA physical status</b> |            |   |                   |                   |                 |
| 1–2                        | Unadjusted | 3.2% (25/779)   | 1.9% (6/316)      | 1.3% (3/227)      | 0.7% (6/805)    |
|                            | Adjusted   | 3.5% (2.3-4.7%)   | 3.2% (1.7-4.6%)   | 2.9% (1.3-4.6%)   | 1.2% (0.5-1.8%) |
| 3–5                        | Unadjusted | 22.0% (79/359)  | 17.9% (26/145)    | 15.2% (15/99)     | 4.5% (18/397)   |
|                            | Adjusted   | 11.7% (8.7-14.7%)   | 10.8% (7.2-14.3%) | 10.0% (5.7-14.2%) | 4.4% (2.6-6.2%) |
| <b>Grade of surgery</b>    |            |   |                   |                   |                 |
| Minor                      | Unadjusted | 5.6% (22/395)   | 6.1% (8/132)      | 6.0% (7/117)      | 0.6% (3/473)    |
|                            | Adjusted   | 5.8% (3.9-7.6%)   | 5.3% (3.1-7.5%)   | 4.9% (2.5-7.3%)   | 2.1% (1.1-3.1%) |
| Major                      | Unadjusted | 11.0% (82/743)  | 7.3% (24/329)     | 5.3% (11/209)     | 2.9% (21/728)   |
|                            | Adjusted   | 8.0% (6.3-9.8%)   | 7.4% (5.2-9.6%)   | 6.9% (4.1-9.7%)   | 3.1% (1.9-4.3%) |
| <b>Urgency of surgery</b>  |            |   |                   |                   |                 |
| Elective                   | Unadjusted | 5.0% (17/338)   | 4.3% (13/300)     | 3.9% (9/232)      | 0.9% (8/892)    |
|                            | Adjusted   | 4.9% (3.2-6.5%)   | 4.4% (2.7-6.1%)   | 4.1% (2.1-6%)     | 1.7% (0.9-2.5%) |
| Emergency                  | Unadjusted | 10.9% (87/800)  | 11.8% (19/161)    | 9.6% (9/94)       | 5.2% (16/310)   |
|                            | Adjusted   | 10% (7.7-12.2%)   | 9.2% (6.2-12.2%)  | 8.5% (4.9-12.2%)  | 3.9% (2.3-5.4%) |
| <b>COVID-19 symptoms</b>   |            |   |                   |                   |                 |
| Asymptomatic               | Unadjusted | 3.8% (28/731)   | 2.0% (4/203)      | 4.5% (6/133)      | 0.9% (3/317)    |
|                            | Adjusted   | 3.9% (2.7-5.2%)   | 3.6% (2-5.2%)     | 3.3% (1.4-5.1%)   | 1.3% (0.6-2.0%) |
| Symptomatic – resolved     | Unadjusted | 9.7% (12/124)   | 5.7% (11/193)     | 3.7% (6/163)      | 1.8% (15/820)   |
|                            | Adjusted   | 6.9% (4.3-9.5%)   | 6.3% (3.8-8.8%)   | 5.8% (3.0-8.6%)   | 2.4% (1.4-3.4%) |
| Symptomatic – ongoing      | Unadjusted | 23.1% (64/277)  | 26.2% (17/65)     | 21.4% (6/28)      | 10.7% (6/56)    |
|                            | Adjusted   | 14.9% (11.5-18.2%)  | 13.8% (9.3-18.3%) | 12.8% (7.3-18.3%) | 6.0% (3.2-8.7%) |

ASA, American Society of Anesthesiologists physical status.

Rates adjusted for age, sex, ASA, Revised Cardiac Risk Index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis, COVID-19 symptoms. Full model presented in Supplementary Table S7

**Supplementary Table S9.** Unadjusted and adjusted model for 30-day postoperative pulmonary complications in all patients. Values are OR (95% CI).

| Factor  | Unadjusted        |         | Adjusted         |         |
|---|-------------------|---------|------------------|---------|
|   | OR (95% CI)       | p-value | OR (95% CI)      | p-value |
| <b>Age</b>  |                   |         |                  |         |
| 0–69 years  | Reference         | –       | Reference        | –       |
| ≥70 years   | 2.19 (2.05-2.34)  | <0.001  | 1.20 (1.11-1.30) | <0.001  |
| <b>Sex</b>  |                   |         |                  |         |
| Female  | Reference         | –       | Reference        | –       |
| Male  | 1.60 (1.50-1.71)  | <0.001  | 1.38 (1.29-1.48) | <0.001  |
| <b>ASA physical status</b>                              |                   |         |                  |         |
| 1–2   | Reference         | –       | Reference        | –       |
| 3–5   | 5.26 (4.93-5.62)  | <0.001  | 3.05 (2.82-3.30) | <0.001  |
| <b>Revised cardiac risk index</b>                       |                   |         |                  |         |
| 0   | Reference         | –       | Reference        | –       |
| 1   | 2.03 (1.87-2.20)  | <0.001  | 1.49 (1.36-1.63) | <0.001  |
| 2   | 5.50 (4.99-6.06)  | <0.001  | 2.13 (1.90-2.38) | <0.001  |
| ≥3  | 9.08 (8.07-10.22) | <0.001  | 2.76 (2.40-3.17) | <0.001  |
| <b>Respiratory comorbidities</b>                        |                   |         |                  |         |
| No  | Reference         | –       | Reference        | –       |
| Yes   | 2.36 (2.17-2.56)  | <0.001  | 1.58 (1.44-1.73) | <0.001  |
| <b>Indication for surgery</b>                           |                   |         |                  |         |
| Benign  | Reference         | –       | Reference        | –       |
| Cancer  | 1.52 (1.40-1.64)  | <0.001  | 1.49 (1.37-1.62) | <0.001  |
| Trauma  | 1.40 (1.28-1.53)  | <0.001  | 1.00 (0.90-1.11) | 0.978   |
| Obstetrics  | 0.50 (0.42-0.60)  | <0.001  | 0.55 (0.45-0.67) | <0.001  |
| <b>Grade of surgery</b>                                 |                   |         |                  |         |
| Minor   | Reference         | –       | Reference        | –       |
| Major   | 3.22 (2.96-3.49)  | <0.001  | 2.61 (2.39-2.85) | <0.001  |
| <b>Urgency of surgery</b>                               |                   |         |                  |         |
| Elective  | Reference         | –       | Reference        | –       |
| Emergency   | 2.73 (2.56-2.91)  | <0.001  | 2.85 (2.65-3.07) | <0.001  |
| <b>Country income</b>                                   |                   |         |                  |         |
| High  | Reference         | –       | Reference        | –       |
| Low / Middle  | 1.25 (1.17-1.34)  | <0.001  | 1.72 (1.60-1.84) | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                   |         |                  |         |
| No diagnosis  | Reference         | –       | Reference        | –       |
| 0–2 weeks   | 5.50 (4.61-6.55)  | <0.001  | 3.40 (2.80-4.11) | <0.001  |
| 3–4 weeks   | 5.46 (4.15-7.18)  | <0.001  | 3.89 (2.89-5.23) | <0.001  |
| 5–6 weeks   | 4.11 (2.86-5.90)  | <0.001  | 3.39 (2.30-4.99) | <0.001  |
| ≥7 weeks  | 1.32 (0.97-1.81)  | 0.075   | 1.06 (0.77-1.46) | 0.738   |

ASA, American Society of Anesthesiologists physical status.

**Supplementary Table S10.** Unadjusted and adjusted 30-day postoperative pulmonary complications in key subgroups from main analysis. Values are proportion (rate) or proportion (95% CI).

|                            |            | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                    |                    |                   |                 |
|----------------------------|------------|---|--------------------|--------------------|-------------------|-----------------|
|                            |            | No pre-operative SARS-CoV-2                                       | 0–2 weeks          | 3–4 weeks          | 5–6 weeks         | ≥7 weeks        |
| <b>Overall</b>             |            |   |                    |                    |                   |                 |
| All patients               | Unadjusted | 2.7% (3654/137104)  | 13.1% (149/1138)   | 13.0% (60/461)     | 10.1% (33/326)    | 3.5% (42/1202)  |
|                            | Adjusted   | 2.7% (2.6-2.8%)   | 7.9% (6.6-9.1%)    | 8.8% (6.7-10.8%)   | 7.8% (5.4-10.3%)  | 2.8% (2.0-3.7%) |
| <b>Age</b>                 |            |   |                    |                    |                   |                 |
| <70 years                  | Unadjusted | 2.2% (2437/110778)  | 9.5% (90/951)      | 11.1% (44/395)     | 7.4% (20/272)     | 2.6% (26/1004)  |
|                            | Adjusted   | 2.6% (2.5-2.7%)   | 7.5% (6.3-8.7%)    | 8.4% (6.4-10.4%)   | 7.5% (5.1-9.9%)   | 2.7% (1.9-3.5%) |
| ≥70 years                  | Unadjusted | 4.6% (1217/26324)   | 31.6% (59/187)     | 24.2% (16/66)      | 24.1% (13/54)     | 8.1% (16/198)   |
|                            | Adjusted   | 3.0% (2.9-3.2%)   | 8.8% (7.4-10.1%)   | 9.8% (7.4-12.1%)   | 8.7% (6.0-11.5%)  | 3.2% (2.2-4.1%) |
| <b>ASA physical status</b> |            |   |                    |                    |                   |                 |
| 1–2                        | Unadjusted | 1.4% (1401/103503)  | 6.7% (52/779)      | 6% (19/316)        | 5.7% (13/227)     | 1.9% (15/805)   |
|                            | Adjusted   | 1.6% (1.5-1.7%)   | 5.1% (4.2-6%)      | 5.8% (4.3-7.4%)    | 5.1% (3.3-6.9%)   | 1.7% (1.2-2.2%) |
| 3–5                        | Unadjusted | 6.7% (2252/33553)   | 27% (97/359)       | 28.3% (41/145)     | 20.2% (20/99)     | 6.8% (27/397)   |
|                            | Adjusted   | 4.7% (4.4-4.9%)   | 13.4% (11.3-15.4%) | 14.9% (11.5-18.3%) | 13.4% (9.2-17.5%) | 4.9% (3.5-6.3%) |
| <b>Grade of surgery</b>    |            |   |                    |                    |                   |                 |
| Minor                      | Unadjusted | 1.1% (620/55301)  | 9.1% (36/395)      | 15.9% (21/132)     | 10.3% (12/117)    | 1.5% (7/473)    |
|                            | Adjusted   | 1.4% (1.3-1.5%)   | 4.3% (3.5-5.1%)    | 4.9% (3.6-6.2%)    | 4.3% (2.8-5.8%)   | 1.4% (1-1.9%)   |
| Major                      | Unadjusted | 3.7% (3030/81771)   | 15.2% (113/743)    | 11.9% (39/329)     | 10% (21/209)      | 4.8% (35/728)   |
|                            | Adjusted   | 3.4% (3.3-3.5%)   | 9.9% (8.3-11.4%)   | 11.0% (8.4-13.6%)  | 9.8% (6.8-12.9%)  | 3.6% (2.5-4.6%) |
| <b>Urgency of surgery</b>  |            |   |                    |                    |                   |                 |
| Elective                   | Unadjusted | 1.8% (1720/95680)   | 9.2% (31/338)      | 10.7% (32/300)     | 8.2% (19/232)     | 2.5% (22/892)   |
|                            | Adjusted   | 1.8% (1.7-1.9%)   | 5.6% (4.6-6.5%)    | 6.3% (4.7-7.9%)    | 5.5% (3.7-7.4%)   | 1.9% (1.3-2.5%) |
| Emergency                  | Unadjusted | 4.7% (1934/41413)   | 14.8% (118/800)    | 17.4% (28/161)     | 14.9% (14/94)     | 6.5% (20/310)   |
|                            | Adjusted   | 4.8% (4.5-5%)   | 13.2% (11.3-15.1%) | 14.6% (11.4-17.8%) | 13.1% (9.3-17%)   | 5.0% (3.6-6.4%) |

ASA, American Society of Anesthesiologists physical status.

Rates adjusted for age, sex, ASA, Revised cardiac risk index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis. Full model presented in Supplementary Table S9

**Supplementary Table S11.** Sensitivity analysis for elective patients with unadjusted and adjusted model for 30-day postoperative pulmonary complications. Values are or (95%CI).

| Factor  | Unadjusted        |         | Adjusted         |         |
|---|-------------------|---------|------------------|---------|
|   | OR (95% CI)       | p-value | OR (95% CI)      | p-value |
| <b>Age</b>  |                   |         |                  |         |
| 0–69 years  | Reference         | -       | Reference        | -       |
| ≥70 years   | 1.78 (1.61-1.97)  | <0.001  | 1.08 (0.96-1.20) | 0.200   |
| <b>Sex</b>  |                   |         |                  |         |
| Female  | Reference         | -       | Reference        | -       |
| Male  | 1.73 (1.57-1.90)  | <0.001  | 1.61 (1.45-1.78) | <0.001  |
| <b>ASA physical status</b>                              |                   |         |                  |         |
| 1–2   | Reference         | -       | Reference        | -       |
| 3–5   | 4.19 (3.82-4.60)  | <0.001  | 2.48 (2.22-2.78) | <0.001  |
| <b>Revised cardiac risk index</b>                       |                   |         |                  |         |
| 0   | Reference         | -       | Reference        | -       |
| 1   | 2.20 (1.95-2.48)  | <0.001  | 1.59 (1.40-1.82) | <0.001  |
| 2   | 5.90 (5.13-6.79)  | <0.001  | 2.43 (2.06-2.85) | <0.001  |
| ≥3  | 9.98 (8.39-11.86) | <0.001  | 3.54 (2.90-4.32) | <0.001  |
| <b>Respiratory comorbidities</b>                        |                   |         |                  |         |
| No  | Reference         | -       | Reference        | -       |
| Yes   | 2.66 (2.37-2.99)  | <0.001  | 1.83 (1.62-2.07) | <0.001  |
| <b>Indication for surgery</b>                           |                   |         |                  |         |
| Benign  | Reference         | -       | Reference        | -       |
| Cancer  | 2.17 (1.97-2.39)  | <0.001  | 1.62 (1.47-1.80) | <0.001  |
| Trauma  | 1.07 (0.86-1.34)  | 0.538   | 1.40 (1.11-1.76) | 0.005   |
| Obstetrics  | 0.83 (0.62-1.11)  | 0.215   | 1.33 (0.97-1.81) | 0.073   |
| <b>Grade of surgery</b>                                 |                   |         |                  |         |
| Minor   | Reference         | -       | Reference        | -       |
| Major   | 3.66 (3.22-4.15)  | <0.001  | 2.70 (2.37-3.07) | <0.001  |
| <b>Country income</b>                                   |                   |         |                  |         |
| High  | Reference         | -       | Reference        | -       |
| Low / Middle  | 1.35 (1.23-1.49)  | <0.001  | 1.70 (1.53-1.88) | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                   |         |                  |         |
| No diagnosis  | Reference         | -       | Reference        | -       |
| 0–2 weeks   | 5.51 (3.80-8.00)  | <0.001  | 3.77 (2.53-5.62) | <0.001  |
| 3–4 weeks   | 6.52 (4.50-9.43)  | <0.001  | 4.58 (3.09-6.78) | <0.001  |
| 5–6 weeks   | 4.87 (3.04-7.80)  | <0.001  | 3.57 (2.17-5.88) | <0.001  |
| ≥7 weeks  | 1.38 (0.90-2.11)  | 0.138   | 1.09 (0.71-1.69) | 0.683   |

ASA: American Society of Anesthesiologists physical status.

**Supplementary Table S12.** Sensitivity analysis for elective patients with unadjusted and adjusted 30-day postoperative pulmonary complications in key subgroups. Values are proportion (rate) or proportion (95% CI).

|                            |            | No pre-operative SARS-CoV-2 | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                   |                  |                 |
|----------------------------|------------|-----------------------------|---|-------------------|------------------|-----------------|
|                            |            |                             | 0–2 weeks   | 3–4 weeks         | 5–6 weeks        | ≥7 weeks        |
| <b>Overall</b>             |            |                             |   |                   |                  |                 |
| All patients               | Unadjusted | 1.8% (1720/95680)           | 9.2% (31/338)   | 10.7% (32/300)    | 8.2% (19/232)    | 2.5% (22/892)   |
|                            | Adjusted   | 1.8% (1.7-1.9%)             | 6.1% (4.0-8.2%)   | 7.2% (4.8-9.6%)   | 5.8% (3.3-8.4%)  | 2.0% (1.2-2.8%) |
| <b>Age</b>                 |            |                             |   |                   |                  |                 |
| <70 years                  | Unadjusted | 1.6% (1188/76188)           | 7.7% (23/298)   | 8.8% (23/261)     | 6.0% (12/200)    | 1.9% (14/756)   |
|                            | Adjusted   | 1.8% (1.7-1.9%)             | 6.0% (3.9-8.1%)   | 7.1% (4.7-9.5%)   | 5.7% (3.2-8.2%)  | 1.9% (1.1-2.7%) |
| ≥70 years                  | Unadjusted | 2.7% (532/19491)            | 20.0% (8/40)  | 23.1% (9/39)      | 21.9% (7/32)     | 5.9% (8/136)    |
|                            | Adjusted   | 1.9% (1.7-2.1%)             | 6.4% (4.2-8.6%)   | 7.5% (5.0-10.1%)  | 6.1% (3.4-8.8%)  | 2.1% (1.2-2.9%) |
| <b>ASA physical status</b> |            |                             |   |                   |                  |                 |
| 1–2                        | Unadjusted | 1.1% (775/73268)            | 5.2% (13/249)   | 5.1% (11/217)     | 3.5% (6/170)     | 1.3% (8/626)    |
|                            | Adjusted   | 1.2% (1.1-1.3%)             | 4.4% (2.8-6%)   | 5.2% (3.3-7.1%)   | 4.2% (2.2-6.1%)  | 1.3% (0.8-1.9%) |
| 3–5                        | Unadjusted | 4.2% (945/22372)            | 20.2% (18/89)   | 25.3% (21/83)     | 21.0% (13/62)    | 5.3% (14/266)   |
|                            | Adjusted   | 3.0% (2.7-3.2%)             | 9.8% (6.5-13.2%)  | 11.6% (7.8-15.4%) | 9.4% (5.4-13.4%) | 3.2% (1.9-4.5%) |
| <b>Grade of surgery</b>    |            |                             |   |                   |                  |                 |
| Minor                      | Unadjusted | 0.7% (258/38944)            | 9.6% (7/73)   | 19.3% (16/83)     | 7.6% (6/79)      | 1.2% (4/338)    |
|                            | Adjusted   | 0.9% (0.8-1%)               | 3.1% (1.9-4.3%)   | 3.8% (2.3-5.2%)   | 3.0% (1.6-4.4%)  | 1.0% (0.5-1.4%) |
| Major                      | Unadjusted | 2.6% (1459/56718)           | 9.1% (24/265)   | 7.4% (16/217)     | 8.5% (13/153)    | 3.3% (18/553)   |
|                            | Adjusted   | 2.3% (2.2-2.4%)             | 7.7% (5.1-10.3%)  | 9.1% (6.1-12.1%)  | 7.3% (4.2-10.5%) | 2.5% (1.5-3.5%) |

ASA, American Society of Anesthesiologists physical status.

Rates adjusted for age, sex, ASA, Revised Cardiac Risk Index, respiratory comorbidity, grade of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis. Full model presented in Supplementary Table S11



**Supplementary Table S13.** Unadjusted and adjusted models for 30-day postoperative pulmonary complications in patients with pre-operative SARS-CoV-2 infection. Values are OR (95% CI).

| Factor  | Unadjusted         |         | Adjusted          |         |
|---|--------------------|---------|-------------------|---------|
|   | OR (95% CI)        | p-value | OR (95% CI)       | p-value |
| <b>Age</b>  |                    |         |                   |         |
| 0–69 years  | Reference          | -       | Reference         | -       |
| ≥70 years   | 3.51 (2.70-4.57)   | <0.001  | 2.09 (1.49-2.92)  | <0.001  |
| <b>Sex</b>  |                    |         |                   |         |
| Female  | Reference          | -       | Reference         | -       |
| Male  | 1.68 (1.31-2.15)   | <0.001  | 1.25 (0.93-1.68)  | 0.135   |
| <b>ASA physical status</b>                              |                    |         |                   |         |
| 1–2   | Reference          | -       | Reference         | -       |
| 3–5   | 4.64 (3.59-6.01)   | <0.001  | 2.05 (1.46-2.87)  | <0.001  |
| <b>Revised cardiac risk index</b>                       |                    |         |                   |         |
| 0   | Reference          | -       | Reference         | -       |
| 1   | 2.10 (1.49-2.97)   | <0.001  | 1.58 (1.05-2.37)  | 0.030   |
| 2   | 5.60 (3.79-8.29)   | <0.001  | 2.11 (1.29-3.45)  | 0.003   |
| ≥3  | 10.73 (6.91-16.65) | <0.001  | 3.90 (2.18-6.97)  | <0.001  |
| <b>Respiratory comorbidities</b>                        |                    |         |                   |         |
| No  | Reference          | -       | Reference         | -       |
| Yes   | 3.03 (2.23-4.12)   | <0.001  | 1.86 (1.28-2.71)  | 0.001   |
| <b>Indication for surgery</b>                           |                    |         |                   |         |
| Benign  | Reference          | -       | Reference         | -       |
| Cancer  | 0.79 (0.56-1.12)   | 0.182   | 1.10 (0.72-1.68)  | 0.654   |
| Trauma  | 1.25 (0.88-1.77)   | 0.212   | 1.90 (1.19-3.03)  | 0.007   |
| Obstetrics  | 0.18 (0.08-0.41)   | <0.001  | 0.38 (0.15-0.97)  | 0.042   |
| <b>Grade of surgery</b>                                 |                    |         |                   |         |
| Minor   | Reference          | -       | Reference         | -       |
| Major   | 1.58 (1.20-2.08)   | 0.001   | 1.40 (1.01-1.94)  | 0.042   |
| <b>Urgency of surgery</b>                               |                    |         |                   |         |
| Elective  | Reference          | -       | Reference         | -       |
| Emergency   | 2.43 (1.89-3.13)   | <0.001  | 1.41 (1.01-1.98)  | 0.047   |
| <b>Country income</b>                                   |                    |         |                   |         |
| High  | Reference          | -       | Reference         | -       |
| Low / Middle  | 1.64 (1.27-2.11)   | <0.001  | 2.31 (1.68-3.17)  | <0.001  |
| <b>Pre-operative SARS-CoV-2, by timing of diagnosis</b> |                    |         |                   |         |
| 0–2 weeks   | Reference          | -       | Reference         | -       |
| 3–4 weeks   | 0.99 (0.72-1.37)   | 0.967   | 1.20 (0.81-1.79)  | 0.358   |
| 5–6 weeks   | 0.75 (0.50-1.11)   | 0.153   | 1.04 (0.64-1.70)  | 0.877   |
| ≥7 weeks  | 0.24 (0.17-0.34)   | <0.001  | 0.36 (0.23-0.56)  | <0.001  |
| <b>COVID-19 symptoms</b>                                |                    |         |                   |         |
| Asymptomatic  | Reference          | -       | Reference         | -       |
| Symptomatic - resolved                                  | 1.46 (1.03-2.07)   | 0.033   | 2.04 (1.36-3.05)  | 0.001   |
| Symptomatic - ongoing                                   | 12.04 (8.65-16.75) | <0.001  | 8.60 (5.95-12.41) | <0.001  |

ASA, American Society of Anesthesiologists physical status.

**Supplementary Table S14.** Unadjusted and adjusted 30-day postoperative pulmonary complications in patients with pre-operative SARS-CoV-2 infection in key subgroups. Values are proportion (rate) or proportion (95% CI).

|                            |            | Pre-operative SARS-CoV-2, by timing of diagnosis prior to surgery |                    |                    |                   |
|----------------------------|------------|---|--------------------|--------------------|-------------------|
|                            |            | 0–2 weeks   | 3–4 weeks          | 5–6 weeks          | ≥7 weeks          |
| <b>Overall</b>             |            |   |                    |                    |                   |
| All patients               | Unadjusted | 13.1% (149/1138)  | 13.0% (60/461)     | 10.1% (33/326)     | 3.5% (42/1202)    |
|                            | Adjusted   | 10.7% (8.9-12.5%)   | 12.1% (9.6-14.7%)  | 11.0% (7.9-14.1%)  | 5.0% (3.6-6.3%)   |
| <b>Age</b>                 |            |   |                    |                    |                   |
| <70 years                  | Unadjusted | 9.5% (90/951)   | 11.1% (44/395)     | 7.4% (20/272)      | 2.6% (26/1004)    |
|                            | Adjusted   | 9.3% (7.5-11%)  | 10.6% (8.2-13.1%)  | 9.6% (6.6-12.5%)   | 4.1% (2.8-5.4%)   |
| ≥70 years                  | Unadjusted | 31.6% (59/187)  | 24.2% (16/66)      | 24.1% (13/54)      | 8.1% (16/198)     |
|                            | Adjusted   | 15.5% (11.9-19.1%)  | 17.5% (13.0-22.0%) | 15.9% (11.0-20.8%) | 7.4% (5.1-9.8%)   |
| <b>ASA physical status</b> |            |   |                    |                    |                   |
| 1–2                        | Unadjusted | 6.7% (52/779)   | 6.0% (19/316)      | 5.7% (13/227)      | 1.9% (15/805)     |
|                            | Adjusted   | 8.1% (6.3-9.9%)   | 9.3% (6.8-11.9%)   | 8.3% (5.4-11.3%)   | 3.5% (2.2-4.7%)   |
| 3–5                        | Unadjusted | 27.0% (97/359)  | 28.3% (41/145)     | 20.2% (20/99)      | 6.8% (27/397)     |
|                            | Adjusted   | 13.7% (10.8-16.6%)  | 15.6% (11.9-19.3%) | 14.1% (9.9-18.3%)  | 6.3% (4.5-8.2%)   |
| <b>Grade of surgery</b>    |            |   |                    |                    |                   |
| Minor                      | Unadjusted | 9.1% (36/395)   | 15.9% (21/132)     | 10.3% (12/117)     | 1.5% (7/473)      |
|                            | Adjusted   | 9.1% (6.9-11.3%)  | 10.4% (7.5-13.2%)  | 9.4% (6.2-12.5%)   | 4.1% (2.7-5.5%)   |
| Major                      | Unadjusted | 15.2% (113/743)   | 11.9% (39/329)     | 10.0% (21/209)     | 4.8% (35/728)     |
|                            | Adjusted   | 11.5% (9.5-13.6%)   | 13.1% (10.3-15.9%) | 11.8% (8.4-15.3%)  | 5.4% (3.8-6.9%)   |
| <b>Urgency of surgery</b>  |            |   |                    |                    |                   |
| Elective                   | Unadjusted | 9.2% (31/338)   | 10.7% (32/300)     | 8.2% (19/232)      | 2.5% (22/892)     |
|                            | Adjusted   | 9.4% (7.1-11.7%)  | 10.8% (8.1-13.4%)  | 9.7% (6.7-12.7%)   | 4.2% (2.9-5.6%)   |
| Emergency                  | Unadjusted | 14.8% (118/800)   | 17.4% (28/161)     | 14.9% (14/94)      | 6.5% (20/310)     |
|                            | Adjusted   | 12.0% (9.8-14.2%)   | 13.6% (10.4-16.9%) | 12.3% (8.5-16.2%)  | 5.6% (3.9-7.3%)   |
| <b>COVID-19 symptoms</b>   |            |   |                    |                    |                   |
| Asymptomatic               | Unadjusted | 5.5% (40/731)   | 4.4% (9/203)       | 3.0% (4/133)       | 1.6% (5/317)      |
|                            | Adjusted   | 5.2% (3.8-6.6%)   | 6.1% (4.0-8.3%)    | 5.4% (3.1-7.7%)    | 2.0% (1.2-2.9%)   |
| Symptomatic – resolved     | Unadjusted | 9.7% (12/124)   | 9.3% (18/193)      | 11.0% (18/163)     | 3.7% (30/820)     |
|                            | Adjusted   | 9.5% (6.7-12.4%)  | 11.0% (7.8-14.3%)  | 9.8% (6.4-13.3%)   | 3.9% (2.7-5.2%)   |
| Symptomatic – ongoing      | Unadjusted | 34.7% (96/277)  | 50.8% (33/65)      | 39.3% (11/28)      | 12.5% (7/56)      |
|                            | Adjusted   | 26.6% (21.9-31.3%)  | 29.7% (23.2-36.3%) | 27.2% (19.3-35.2%) | 13.1% (8.8-17.5%) |

ASA, American Society of Anesthesiologists physical status.

Rates adjusted for age, sex, ASA, Revised Cardiac Risk Index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis, COVID-19 symptoms. Full model presented in Supplementary Table S13

**Supplementary Table S15: List of excluded procedures**

| Specialty                      | Excluded procedures  |
|--------------------------------|--|
| Abdominal surgery              | Ascitic drain (drainage of peritoneal cavity)  |
|                                | Endoscopic ultrasound  |
|                                | Laparoscopic ultrasound  |
| Breast surgery                 | Breast biopsy  |
| Cardiac surgery                | Insertion of cardiac pacemaker   |
|                                | Percutaneous coronary intervention   |
|                                | Transluminal balloon angioplasty of coronary artery  |
| Colorectal surgery             | Colonoscopy (diagnostic or therapeutic)  |
|                                | Flexible sigmoidoscopy (diagnostic or therapeutic)   |
|                                | Proctoscopy (diagnostic or therapeutic)  |
| Dental procedures              | Implantation of tooth  |
|                                | Insertion of dental prosthesis   |
|                                | Orthodontic operations   |
|                                | Restoration of tooth   |
|                                | Extraction of tooth  |
| Gynaecology                    | Cervical biopsy  |
|                                | Colposcopy (diagnostic or therapeutic)   |
| Obstetrics                     | Any vaginal delivery (normal delivery, breech delivery, forceps delivery, vacuum delivery) |
|                                | Surgical termination of pregnancy  |
| Ophthalmology                  | Removal of foreign body from cornea  |
| Orthopaedics                   | Bone biopsy  |
|                                | Injection in to joint  |
|                                | Muscle biopsy  |
| Otolaryngology                 | Laryngoscopy (diagnostic or therapeutic)   |
|                                | Nasendoscopy (diagnostic)  |
|                                | Packing of cavity of nose  |
| Thoracic surgery               | Bronchoscopy (diagnostic)  |
|                                | Insertion of chest drain   |
| Upper gastrointestinal surgery | Endoscopic retrograde cholangiopancreatography (diagnostic or therapeutic)                 |
|                                | Liver biopsy   |
|                                | Oesophago-gastro-duodenoscopy (diagnostic or therapeutic)                                  |
| Urology*                       | Bladder biopsy   |
|                                | Extracorporeal shock-wave lithotripsy  |
|                                | Flexible cystoscopy (diagnostic)   |
|                                | Percutaneous nephrostomy   |

|                  |  |
|------------------|--|
| Vascular surgery | Endovenous laser treatment for varicose veins  |
|                  | Insertion or removal of dialysis catheter  |
|                  | injection into varicose vein of leg  |
|                  | Transluminal (endovascular) procedures on arteries (diagnostic or therapeutic), including with open cut down to the artery |
|                  | Transluminal (endovascular) procedures on veins (diagnostic or therapeutic)  |
|                  | Insertion or removal of Hickmann line  |
| Other            | Insertion of central venous catheter/ line   |
|                  | Insertion of chest drain   |
|                  | Lumbar (spinal) puncture   |
|                  | Percutaneous tracheostomy  |
|                  | Skin biopsy (including shave biopsy of skin)   |
|                  | Therapeutic epidural injection   |
|                  | Vacuum dressing  |

\*Transurethral resection of the prostate, transurethral resection of bladder tumour, rigid cystoscopy under general anaesthesia, and insertion of ureteric stent should be included.

**Supplementary Table S16.** 30-day postoperative mortality and postoperative pulmonary complication rates stratified by timing of surgery after SARS-CoV-2 diagnosis. Values are proportion (rate).

| Time from SARS-CoV-2 diagnosis to surgery | 30-day postoperative mortality |                               | 30-day postoperative pulmonary complications |                               |
|---|--------------------------------|-------------------------------|--|-------------------------------|
|   | All patients<br>n=140,231      | Elective patients<br>n=97,442 | All patients<br>n=140,231                    | Elective patients<br>n=97,442 |
| No SARS-CoV-2                             | 1.4% (1973/137104)             | 0.6% (588/95680)              | 2.7% (3654/137104)                           | 1.8% (1720/95680)             |
| 0–2 weeks                                 | 9.1% (104/1138)                | 5.0% (17/338)                 | 13.1% (149/1138)                             | 9.2% (31/338)                 |
| 3–4 weeks                                 | 6.9% (32/461)                  | 4.3% (13/300)                 | 13.0% (60/461)                               | 10.7% (32/300)                |
| 5–6 weeks                                 | 5.5% (18/326)                  | 3.9% (9/232)                  | 10.1% (33/326)                               | 8.2% (19/232)                 |
| 7–8 weeks                                 | 2.4% (8/330)                   | 1.2% (3/249)                  | 3.9% (13/330)                                | 1.2% (3/249)                  |
| 3–4 months                                | 2.3% (10/436)                  | 1.3% (4/313)                  | 4.4% (19/436)                                | 3.5% (11/313)                 |
| 5–6 months                                | 0.8% (2/246)                   | 0% (0/187)                    | 2.0% (5/246)                                 | 2.7% (5/187)                  |
| ≥7 months                                 | 2.1% (4/190)                   | 0.7% (1/143)                  | 2.6% (5/190)                                 | 2.1% (3/143)                  |

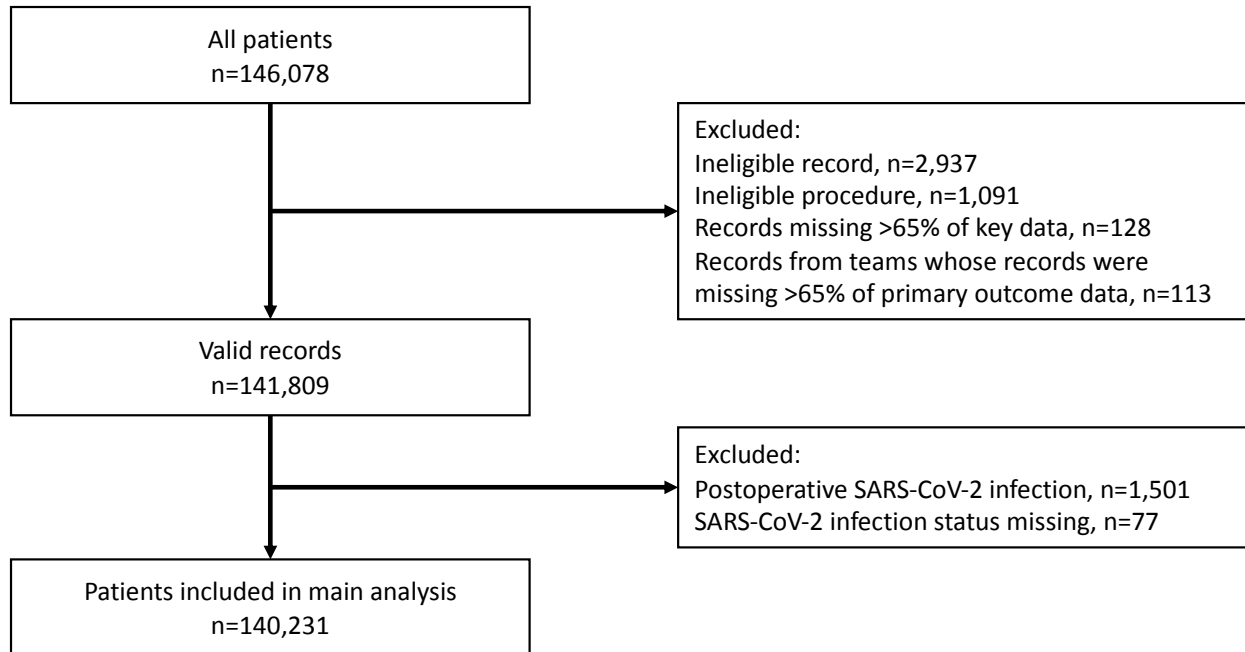
**Supplementary Table S17.** 30-day postoperative mortality and postoperative pulmonary complication rates in patients operated  $\geq 3$  weeks after SARS-CoV-2 diagnosis, stratified by results of most recent repeat RT-PCR nasopharyngeal swab. Values are proportion (rate).

| Time from SARS-CoV-2 diagnosis to surgery           | Negative      | Positive      | No repeat swab performed |
|---|---------------|---------------|--------------------------|
| <b>30-day postoperative mortality</b>               |               |               |                          |
| 3–4 weeks   | 4.9% (12/244) | 15.8% (9/57)  | 6.9% (11/160)            |
| 5–6 weeks   | 3.6% (8/221)  | 19.0% (4/21)  | 7.1% (6/84)              |
| $\geq 7$ weeks                                      | 1.6% (14/875) | 3.1% (1/32)   | 3.1% (9/295)             |
| <b>30-day postoperative pulmonary complications</b> |               |               |                          |
| 3–4 weeks   | 9.8% (24/244) | 31.6% (18/57) | 11.3% (18/160)           |
| 5–6 weeks   | 7.2% (16/221) | 28.6% (6/21)  | 13.1% (11/84)            |
| $\geq 7$ weeks                                      | 3.0% (26/875) | 3.1% (1/32)   | 5.1% (15/295)            |

RT-PCR, reverse transcription-polymerase chain reaction.

Patients who received a positive SARS-CoV-2 RT-PCR nasopharyngeal swab result within the 7 days before surgery were classified as having a positive result, even if they subsequently received a negative RT-PCR nasopharyngeal swab result

**Figure S1.** Study flowchart



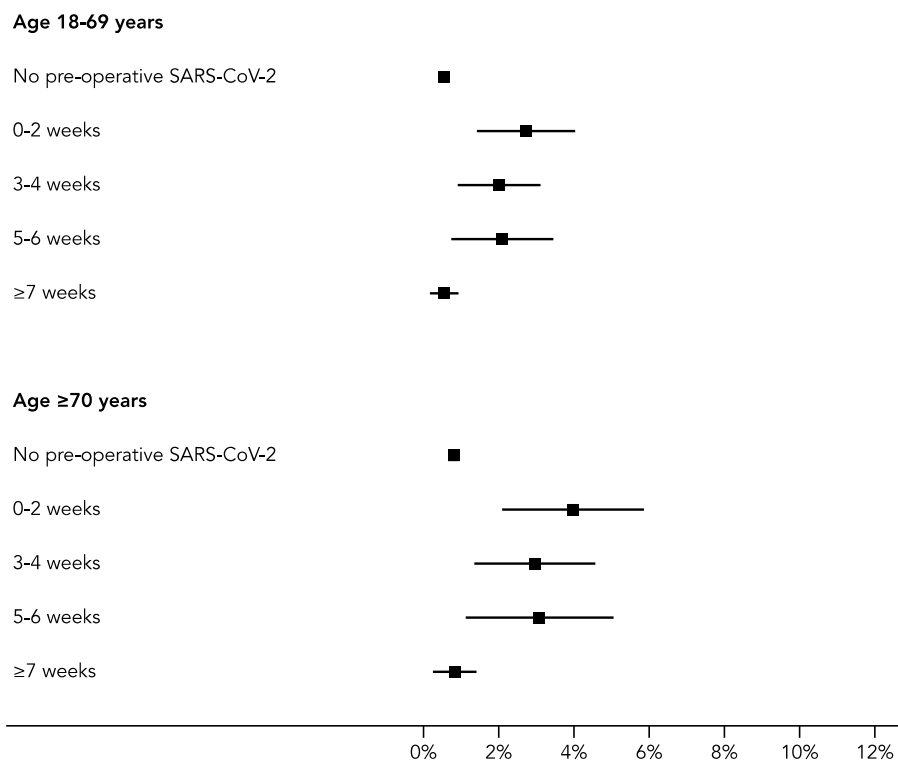
**Figure S2.** Adjusted 30-day postoperative mortality rates from sensitivity analysis for elective patients, stratified by pre-defined subgroups

ASA: American Society of Anesthesiologists physical status grade; CI: confidence interval

Adjusted 30-day postoperative mortality rates are presented alongside 95% confidence intervals

Rates adjusted for age, sex, ASA, revised cardiac risk index, respiratory comorbidity, grade of surgery, urgency of surgery, country income, timing of surgery following SARS-CoV-2 diagnosis, COVID-19 symptoms. Full model and results presented in Supplementary Tables S11–12

**(a) Sub-groups by age**



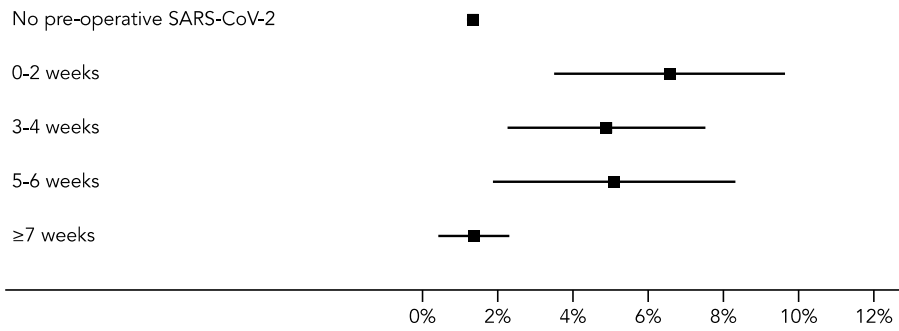


**(b) Sub-groups by ASA physical status**

**ASA grades 1-2**



**ASA grades 3-5**



### (c) Subgroups by grade of surgery

