



Supporting Information

Supplementary methods and results

**This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.**

Appendix to: Brown A, Udy A, Kirk M, et al. Outcomes for people admitted to Australian and New Zealand intensive care units with primary, exacerbating, or incidental SARS-CoV-2 infections, 2022–23: a retrospective analysis of ANZICS data. *Med J Aust* 2024; doi: 10.5694/mja2.52390.

Table 1. ANZICS modification of APACHE IV diagnostic code and corresponding severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection classification

System/ Category	Code	Diagnosis	SARS-CoV-2 infection classification
Cardiac	101	Cardiogenic shock	Exacerbating
	102	Cardiac arrest	Exacerbating
	104	Congestive heart failure	Exacerbating
	106	Rhythm disturbance	Exacerbating
	107	Acute myocardial infarction	Exacerbating
	110	Cardiomyopathy	Exacerbating
	103	Aortic aneurysm	Incidental
	105	Peripheral vascular disease	Incidental
	108	Hypertension	Incidental
	109	Other cardiovascular disease	Incidental
	111	Unstable angina	Incidental
	1202	Peripheral vascular disease	Incidental
	1203	Peripheral artery bypass graft	Incidental
	1204	Elective AAA	Incidental
	1205	Carotid endarterectomy	Incidental
	1206	Valvular heart surgery	Incidental
	1207	Coronary artery bypass grafts* (ANZICS Addition)	Incidental
	1208	Other cardiovascular diseases	Incidental
	1209	Dissecting aortic aneurysm	Incidental
	1210	Ruptured aortic aneurysm	Incidental
Respiratory	203	Respiratory arrest	Exacerbating
	206	Chronic obstructive pulmonary disease	Exacerbating
	207	Pulmonary embolism	Exacerbating
	208	Mechanical airway obstruction	Exacerbating
	209	Asthma	Exacerbating
	210	Parasitic pneumonia	Exacerbating
	212	Bacterial pneumonia	Exacerbating
	201	Aspiration pneumonia	Incidental
	202	Respiratory neoplasm including larynx/trachea	Incidental
	211	Other respiratory diseases	Incidental
	1301	Respiratory infection	Incidental
	1302	Respiratory neoplasm – lung	Incidental
	1303	Respiratory neoplasm – mouth, larynx, sinus, trachea	Incidental
	1304	Other respiratory diseases	Incidental
	204	Non-cardiogenic pulmonary oedema (Acute Respiratory Distress Syndrome)	Symptomatic COVID-19
	213	Viral pneumonia	Symptomatic COVID-19
	Gastrointestinal	301	Hepatic failure
303		GI bleeding – varices	Incidental
305		GI bleeding – ulcer/laceration	Incidental
306		GI bleeding – diverticulosis	Incidental
307		Other GI disease	Incidental
308		GI perforation	Incidental
309		GI obstruction	Incidental
310		GI vascular insufficiency	Incidental
311		Pancreatitis	Incidental
312		GI cancer	Incidental
313		Other GI inflammatory disease	Incidental
1401		GI perforation/rupture (not peritonitis)	Incidental
1403		GI bleeding	Incidental
1404		GI obstruction	Incidental
1405		GI neoplasm	Incidental
1406		Cholecystitis/Cholangitis	Incidental
1407		Liver transplant	Incidental
1408		Other GI diseases (surgical)	Incidental

System/ Category	Code	Diagnosis	SARS-CoV-2 infection classification
	1409	Fistula/Abscess surgery	Incidental
	1410	GI vascular ischaemia resection surgery	Incidental
	1411	Pancreatitis	Incidental
Neurological	404	Neurologic infection	Exacerbating
	401	Intracerebral haemorrhage	Incidental
	402	Subarachnoid haemorrhage	Incidental
	403	Stroke	Incidental
	405	Neurologic neoplasm	Incidental
	406	Neuromuscular disease	Incidental
	407	Seizure	Incidental
	408	Other neurologic disease	Incidental
	409	Epidural haematoma	Incidental
	410	Coma	Incidental
	1501	Intracerebral haemorrhage	Incidental
	1502	Subdural/Epidural haematoma	Incidental
	1503	Subarachnoid haemorrhage	Incidental
	1504	Laminectomy/Spinal cord surgery	Incidental
	1505	Craniotomy for neoplasm	Incidental
	1506	Other neurologic disease (surgical)	Incidental
Sepsis	501	Sepsis, other than urinary	Exacerbating
	502	Sepsis of urinary tract origin	Exacerbating
	503	Sepsis with shock, other than urinary	Exacerbating
	504	Sepsis of urinary tract origin with shock (ANZICS Addition)	Exacerbating
Metabolic	702	Diabetic ketoacidosis	Exacerbating
	704	Other metabolic disorders	Exacerbating
	701	Metabolic coma	Incidental
	703	Drug overdose	Incidental
	2201	Metabolic disease (surgical)	Incidental
Haematological	801	Coagulopathy/Neutropaenia/Thrombocytopenia	Incidental
	802	Other haematologic disorders	Incidental
	2101	Haematological disease	Incidental
Trauma	601	Head trauma +/- multi trauma	Incidental
	602	Multiple trauma excluding head	Incidental
	603	Burns (ANZICS Addition)	Incidental
	604	Multi trauma with spinal injury	Incidental
	605	Isolated cervical spine injury	Incidental
	1601	Head trauma +/- multi trauma (surgical)	Incidental
	1602	Multiple trauma excluding head (surgical)	Incidental
	1603	Burns (ANZICS Addition) (surgical)	Incidental
	1604	Multi trauma with spinal injury (surgical)	Incidental
	1605	Isolated cervical spine injury (surgical)	Incidental
Renal	901	Renal disorders	Exacerbating
Obstetric or Gynaecological	1801	Hysterectomy	Incidental
	902	Pre-eclampsia	Incidental
	903	Haemorrhage, post-partum (female only)	Incidental
	1802	Pregnancy-related disorder	Incidental
	1803	Other gynaecological disease	Incidental
Limb/Soft Tissue	1101	Musculoskeletal/Skin disease	Exacerbating
	1102	Cellulitis/Soft tissue infection (medical)	Exacerbating
	1902	Orthopaedic surgery	Incidental
	1903	Skin surgery	Incidental
	1904	Cellulitis/Soft tissue infection (surgical)	Incidental

AAA = Abdominal Aortic Aneurysm, ANZICS = Australia and New Zealand Intensive Care Society, APACHE = Acute Physiology and Chronic Health Evaluation, CABG = Coronary Artery Bypass Graft, GI = Gastrointestinal.

Table 2. Australia and New Zealand Risk of Death (ANZROD)

The ANZROD is a highly discriminating (area under the receiver operating characteristic >0.9) and locally calibrated mortality prediction model. The model includes age, acute and chronic illness severity derived from Acute physiology and chronic health evaluation (APACHE) III sub-scores, treatment limitations on admission to the intensive care unit (ICU), source of admission to ICU and hospital, and diagnosis (ANZICS modification of the APACHE IV diagnostic list). ANZROD is the primary method of risk adjustment for the routine benchmarking of mortality outcomes of patients admitted ICUs in Australia and New Zealand.

Table 3. Baseline characteristics of intensive care unit (ICU) patients included in our analysis and of those excluded because SARS-CoV-2 infection status was unknown

Variable	Overall	Study cohort	Unknown SARS-CoV-2 infection Status	P
Number of patients	266,712	207,684	59,028	
Demographic characteristics				
Age (years), mean (SD)	62.4 (17.5)	62.5 (17.4)	61.9 (17.6)	<0.001
Sex (men)	150,348 (56.4%)	117,095 (56.4%)	33,253 (56.4%)	0.79
Other medical conditions				
Diabetes	60,155 (22.6%)	48,240 (23.2%)	11,915 (20.2%)	<0.001
Chronic; cardiovascular	23,640 (8.9%)	18,251 (8.8%)	5,389 (9.1%)	0.010
Chronic; respiratory	20,209 (7.6%)	16,364 (7.9%)	3,845 (6.5%)	<0.001
Chronic; dialysis	9,184 (3.4%)	7,124 (3.4%)	2,060 (3.5%)	0.48
Immunosuppressed	19,687 (7.4%)	15,372 (7.4%)	4,315 (7.3%)	0.45
Cancer	16,409 (6.2%)	12,882 (6.2%)	3,527 (6.0%)	0.042
Clinical Frailty Scale score ²				<0.001
Not frail (1–3)	134,567 (50.5%)	107,524 (51.8%)	27,043 (45.8%)	
Pre-frail (4 or 5)	72,094 (27.0%)	58,157 (28.0%)	13,937 (23.6%)	
Frail (6–9)	25,915 (9.7%)	20,754 (10.0%)	5,161 (8.7%)	
Frailty status unknown	34,136 (12.8%)	21,249 (10.2%)	12,887 (21.8%)	
Illness severity				
ANZROD, mean (SD)	8.3% (16.7)	8.5% (16.8)	7.7% (16.4)	<0.001
ANZROD, median (IQR)	1.5% (0.4–6.8%)	1.5% (0.5–7.2%)	1.2% (0.4–5.6%)	<0.001
APACHE III score, mean (SD)	51.4 (24.1)	51.7 (24.1)	50.1 (23.9)	<0.001
Mechanical ventilation	86,521 (32.4%)	68,238 (32.9%)	18,283 (31.0%)	<0.001
Blood values				
pH, mean (SD) [†]	7.36 (0.09)	7.37 (0.09)	7.36 (0.10)	<0.001
PaO ₂ (mmHg), median (IQR)*	86 (70–123)	86 (69–123)	89 (72–125)	<0.001
P/F ratio, median (IQR) [°]	294 (203–375)	292 (200–371)	303 (213–383)	<0.001
Admission category				<0.001
Elective surgical	99,438 (37.3%)	75,026 (36.1%)	24,412 (41.4%)	
Emergency surgical	42,434 (15.9%)	32,341 (15.6%)	10,093 (17.1%)	
Medical	124,840 (46.8%)	100,317 (48.3%)	24,523 (41.5%)	
Primary outcome				
In-hospital deaths	22,317 (8.4%)	17,532 (8.4%)	4,785 (8.1%)	0.009
Secondary outcome				
ICU length of stay (days), median (IQR)	1.8 (0.9–3.5)	1.9 (0.9–3.7)	1.6 (0.9–3.0)	<0.001
Other outcomes: general				
In-ICU deaths	14,683 (5.5%)	11,544 (5.6%)	3,139 (5.3%)	0.028
Hospital length of stay (days), median (IQR)	7.8 (4.0–14.3)	7.8 (4.0–14.4)	7.5 (3.9–14.0)	<0.001
Other outcomes: people discharged from ICU alive				
ICU readmission	10,142 (4.0%)	7,891 (4.0%)	2,251 (4.0%)	0.92
Discharge delay (hours), median (IQR) [¶]	5.0 (2.6–9.3)	5.0 (2.8–9.7)	4.4 (2.0–8.0)	<0.001
Discharge delay greater than 12 hours	44,546 (17.7%)	36,695 (18.7%)	7,851 (14.1%)	<0.001
After-hours discharge	35,763 (14.2%)	29,335 (15.0%)	6,428 (11.5%)	<0.001

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; 19 COVID-19 = coronavirus disease 2019; ICU = Intensive Care Unit, IQR = interquartile range; PaO₂ = partial pressure of oxygen in arterial blood; P/F ratio = ratio of arterial oxygen partial pressure to fractional inspired oxygen (= PaO₂/FiO₂); SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; SD = standard deviation[†]

[†]Missing data for pH – Study cohort: 54,975 (26.5%), Unknown SARS CoV-2 infection status: 16,255 (27.5%)

* Missing data for PaO₂ - Study cohort: 55,019 (26.5%), Unknown SARS CoV-2 infection status: 16,213 (27.5%)

[°]Missing data for P/F Ratio – Study cohort: 55,051 (26.5%), Unknown SARS CoV-2 infection status: 17,063 (28.9%)

[¶] Missing data for discharge delay - Study cohort: 25,040 (12.8%), Unknown SARS CoV-2 infection status: 11,18 (19.9%)

Table 4. Missingness of data

Variable	No SARS-CoV-2 infection	Incidental SARS-CoV-2 infection	Exacerbating SARS-CoV-2 infection	Primary COVID-19
Demographic characteristics				
Age (years), mean (SD)	7 (0.0%)	0	0	0
Sex (men)	194 (0.1%)	4 (0.1%)	4 (0.1%)	3 (0.1%)
Other medical conditions				
Diabetes	0	0	0	0
Chronic; cardiovascular	0	0	0	0
Chronic; respiratory	0	0	0	0
Chronic; dialysis	0	0	0	0
Immunosuppressed	0	0	0	0
Cancer	0	0	0	0
Clinical Frailty Scale score ²⁰	20,260 (10.3%)	415 (11.5%)	390 (7.9%)	184 (6.9%)
Illness severity				
ANZROD, mean (SD)	239 (0.1%)	0	1 (0.0%)	1 (0.0%)
ANZROD, median (IQR)	239 (0.1%)	0	1 (0.0%)	1 (0.0%)
APACHE III score, mean (SD)	239 (0.1%)	0	1 (0.0%)	1 (0.0%)
Mechanical ventilation	0	0	0	0
Blood values				
pH, mean (SD) [†]	51,858 (26.4%)	1,020 (28.2%)	1,395 (28.3%)	702 (26.3%)
PaO ₂ (mmHg), median (IQR)*	51,908 (26.4%)	1,018 (28.1%)	1,393 (28.3%)	700 (26.2%)
P/F ratio, median (IQR) [°]	51,935 (26.4%)	1,018 (28.1%)	1,397 (28.4%)	701 (26.2%)
Admission Category	0	0	0	0
Primary outcome				
In-hospital deaths	0	0	0	0
Secondary outcome				
ICU length of stay (days), median (IQR)	348 (0.2%)	5 (0.1%)	10 (0.2%)	4 (0.1%)
Other outcomes: general				
In-ICU deaths	252 (0.1%)	1 (0.0%)	6 (0.1%)	3 (0.1%)
Hospital length of stay (days), median (IQR)	357 (0.2%)	4 (0.1%)	12 (0.2%)	5 (0.2%)
Other outcomes: people discharged from ICU alive				
ICU readmission	0	0	0	0
Discharge delay (hours), median (IQR) [‡]	23,962 (12.9%)	302 (9.9%)	465 (10.9%)	311 (12.5%)
Discharge delay greater than 12 hours	0	0	0	0
After-hours discharge	0	0	0	0

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; 19 COVID-19 = coronavirus disease 2019; ICU = Intensive Care Unit, IQR = interquartile range; PaO₂ = partial pressure of oxygen in arterial blood; P/F ratio = ratio of arterial oxygen partial pressure to fractional inspired oxygen (= PaO₂/FiO₂); SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; SD = standard deviation[†]

[†]Missing data for pH – Study cohort: 54,975 (26.5%), Unknown SARS CoV-2 infection status: 16,255 (27.5%)

* Missing data for PaO₂ - Study cohort: 55,019 (26.5%), Unknown SARS CoV-2 infection status: 16,213 (27.5%)

[°]Missing data for P/F Ratio – Study cohort: 55,051 (26.5%), Unknown SARS CoV-2 infection status: 17,063 (28.9%)

[‡] Missing data for discharge delay - Study cohort: 25,040 (12.8%), Unknown SARS CoV-2 infection status: 11,18 (19.9%)

Table 5. Admissions to Australian and New Zealand intensive care units (ICUs) of people with SARS-CoV-2 infections, 1 January 2022 – 30 June 2023, by infection classification

Month	Number of admissions				Incidence per 1000 ICU admissions			
	COVID-19	Exacerbating	Incidental	Unknown	COVID-19	Exacerbating	Incidental	Total
2022								
Jan	1057	404	155	5,418	83.4	31.9	12.2	127.5
Feb	276	216	96	4,668	20.7	16.2	7.2	44.1
Mar	195	225	140	3,848	12.1	14.0	8.7	34.8
Apr	213	321	206	3,165	15.0	22.7	14.5	52.2
May	198	335	189	3,095	12.6	21.4	12.1	46.1
Jun	175	338	186	2,227	11.3	21.9	12.0	45.2
Jul	268	482	288	1,937	18.1	32.5	19.4	69.9
Aug	152	359	215	2,207	9.4	22.3	13.3	45.0
Sep	69	169	109	2,200	4.4	10.9	7.0	22.3
Oct	77	172	85	2,398	4.9	10.9	5.4	21.1
Nov	137	237	159	2,479	8.5	14.8	9.9	33.2
Dec	224	413	216	2,256	15.2	28.0	14.6	57.8
2023								
Jan	124	278	155	2,133	8.9	19.8	11.1	39.8
Feb	55	140	74	2,471	3.8	9.6	5.1	18.5
Mar	71	158	83	2,993	4.4	9.8	5.1	19.3
Apr	108	220	90	2,276	8.2	16.7	6.8	31.7
May	116	260	127	2,741	7.7	17.2	8.4	33.4
Jun	105	196	101	2,341	7.9	14.8	7.6	30.4

COVID-19 = coronavirus disease 2019; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Table 6. Characteristics and outcomes of incidental infection patients and non-infected patients with equivalent diagnoses

Variable	Overall	Incidental SARS-CoV-2 infection	Equivalent to Incidental SARS-CoV-2 infection	P
Number of patients	130,473	2,674	127,799	
Demographic characteristics				
Age (years), mean (SD)	62.0 (17.6)	58.7 (19.3)	62.1 (17.6)	<0.001
Sex (men)	74,391 (57.1%)	1,573 (58.9%)	72,818 (57.0%)	0.06
Other medical conditions				
Diabetes	25,771 (19.8%)	565 (21.1%)	25,206 (19.7%)	0.07
Chronic; cardiovascular	9,992 (7.7%)	159 (5.9%)	9,833 (7.7%)	<0.001
Chronic; respiratory	6,764 (5.2%)	120 (4.5%)	6,644 (5.2%)	0.10
Chronic; dialysis	2,886 (2.2%)	84 (3.1%)	2,802 (2.2%)	<0.001
Immunosuppressed	1,894 (1.5%)	51 (1.9%)	1,843 (1.4%)	0.047
Cancer	7,076 (5.4%)	205 (7.7%)	6,871 (5.4%)	<0.001
Clinical Frailty Scale score ²				<0.001
Not frail (1–3)	75,121 (57.6%)	1,511 (56.5%)	73,610 (57.6%)	
Pre-frail (4 or 5)	33,496 (25.7%)	711 (26.6%)	32,785 (25.7%)	
Frail (6–9)	8,838 (6.8%)	268 (10.0%)	8,570 (6.7%)	
Frailty status unknown	13,018 (10.0%)	12,834 (10.0%)	184 (6.9%)	
Illness severity				
ANZROD, mean (SD)	4.9 (12.3)	9.7 (16.8)	4.8 (12.2)	<0.001
ANZROD, median (IQR)	0.8 (0.3-2.9)	2.5 (0.7-9.4)	0.8 (0.3-2.8)	<0.001
APACHE III score, mean (SD)	13.9 (6.4)	16.3 (7.4)	13.9 (6.3)	<0.001
Mechanical Ventilation	47,398 (36.3%)	1,349 (50.4%)	46,049 (36.0%)	<0.001
Blood values				
pH, mean (SD) [†]	7.37 (0.07)	7.37 (0.09)	7.37 (0.07)	0.41
PaO ₂ (mmHg), median (IQR)*	94 (74-135)	85 (69-123)	94 (74-135)	<0.001
P/F ratio, median (IQR) [°]	310 (228-386)	285 (200-370)	310 (229-386)	<0.001
Admission category				<0.001
Elective surgical	67,675 (51.9%)	390 (14.6%)	67,285 (52.6%)	
Emergency surgical	29,580 (22.7%)	819 (30.6%)	28,761 (22.5%)	
Medical	33,218 (25.5%)	1,465 (54.8%)	31,753 (24.8%)	
Primary outcome				
In-hospital deaths	6,293 (4.8%)	288 (10.8%)	6,005 (4.7%)	<0.001
Secondary outcome				
ICU length of stay (days), median (IQR)	1.6 (0.9-3.0)	2.3 (1.1-4.9)	1.6 (0.9-2.9)	<0.001
Other outcomes: general				
In-ICU deaths	3,889 (3.0%)	182 (6.8%)	3,707 (2.9%)	<0.001
Hospital length of stay (days), median (IQR)	7.4 (3.9-13.9)	7.4 (3.9-13.8)	9.5 (4.3-19.2)	<0.001
Other outcomes: people discharged from ICU alive				
ICU readmission	4,832 [3.8%]	126 [5.1%]	4,706 [3.8%]	0.001
Discharge delay (hours), median (IQR) [¶]	4.7 (2.6-8.1)	5.9 (3.0-14.2)	4.7 (2.6-8.0)	<0.001
Discharge delay greater than 12 hours	19,605 [15.5%]	589 [23.7%]	19,016 [15.3%]	<0.001
After-hours discharge	15,609 [12.3%]	508 [20.4%]	15,101 [12.2%]	<0.001

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; 19 COVID-19 = coronavirus disease 2019; ICU = Intensive Care Unit, IQR = interquartile range; PaO₂ = partial pressure of oxygen in arterial blood; P/F ratio = ratio of arterial oxygen partial pressure to fractional inspired oxygen (= PaO₂/FiO₂); SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; SD = standard deviation[†]

[†]Missing data for pH – Incidental SARS- CoV-2 infection: 31,989 (25.0%), Equivalent to Incidental SARS CoV-2 infection status: 702 (26.3%)

* Missing data for PaO₂ - Incidental SARS- CoV-2 infection: 31,974 (25.0%) Equivalent to Incidental SARS CoV-2 infection status: 700 (26.2%)

[°]Missing data for P/F Ratio – Incidental SARS- CoV-2 infection: 31,979 (25.0%), Equivalent to Incidental SARS CoV-2 infection status: 701 (26.2%)

[¶] Missing data for discharge delay -- Incidental SARS- CoV-2 infection: 16,090 (13.0%), Equivalent to Incidental SARS CoV-2 infection status: 311 (12.5%)

Table 7. Characteristics and outcomes of exacerbating SARS-CoV-2 infection patients and non-infected patients with equivalent diagnoses

Variable	Overall	Exacerbating SARS-CoV-2 infection	Equivalent to Exacerbating SARS-CoV-2 infection	P
Number of patients	59,602	4,923	54,679	
Demographic characteristics				
Age (years), mean (SD)	63.1 (17.2)	64.0 (16.6)	63.0 (17.3)	<0.001
Sex (men)	32,525 (54.6%)	2,713 (55.2%)	29,812 (54.6%)	0.43
Other medical conditions				
Diabetes	18,588 (31.2%)	1,613 (32.8%)	16,975 (31.0%)	0.013
Chronic; cardiovascular	6,402 (10.7%)	516 (10.5%)	5,886 (10.8%)	0.54
Chronic; respiratory	7,955 (13.3%)	793 (16.1%)	7,162 (13.1%)	<0.001
Chronic; dialysis	3,413 (5.7%)	294 (6.0%)	3,119 (5.7%)	0.44
Immunosuppressed	6,640 (11.1%)	769 (15.6%)	5,871 (10.7%)	<0.001
Cancer	4,770 (8.0%)	396 (8.0%)	4,374 (8.0%)	0.91
Clinical Frailty Scale score ²				<0.001
Not frail (1–3)	24,323 (40.8%)	2,005 (40.7%)	22,318 (40.8%)	
Pre-frail (4 or 5)	20,069 (33.7%)	1,625 (33.0%)	18,444 (33.7%)	
Frail (6–9)	10,342 (17.4%)	903 (18.3%)	9,439 (17.3%)	
Frailty status unknown	6,246 (10.8%)	390 (7.9%)	5,856 (11.1%)	
Illness severity				
ANZROD, mean (SD)	16.7 (22.3)	18.1 (22.8)	16.6 (22.2)	<0.001
ANZROD, median (IQR)	6.7 (2.1-21.8)	8.3 (2.5-24.6)	6.6 (2.1-21.5)	<0.001
APACHE III score, mean (SD)	63.2 (27.9)	64.4 (28.0)	63.0 (27.9)	<0.001
Mechanical Ventilation	14,620 (24.5%)	1,230 (25.0%)	13,390 (24.5%)	0.44
Blood values				
pH, mean (SD) [†]	7.35 (0.12)	7.35 (0.12)	7.35 (0.12)	0.74
PaO ₂ (mmHg), median (IQR)*	74 (64-94)	72 (63-91)	74 (64-94)	<0.001
P/F ratio, median (IQR) [°]	247 (160-340)	228 (149-329)	248 (161-341)	<0.001
Admission Category				
Elective surgical	59 (0.1%)	3 (0.1%)	56 (0.1%)	0.39
Emergency surgical	-	-	-	
Medical	59,543 (99.9%)	4,920 (99.9%)	54,623 (99.9%)	
Primary outcome				
In-hospital deaths	9,730 (16.3%)	928 (18.9%)	8,802 (16.1%)	<0.001
Secondary outcome				
ICU length of stay (days), median (IQR)	2.6 (1.4-4.7)	2.8 (1.5-5.3)	2.6 (1.4-4.7)	<0.001
Other outcomes: general				
In-ICU deaths	6,669 (11.2%)	641 (13.0%)	6,028 (11.0%)	<0.001
Hospital length of stay (days), median (IQR)	8.0 (4.1-15.7)	8.3 (4.5-16.2)	8.0 (4.1-15.6)	<0.001
Other outcomes: people discharged from ICU alive				
ICU readmission	2,369 (4.5%)	177 (4.1%)	2,192 (4.5%)	0.26
Discharge delay (hours), median (IQR) [¶]	6.6 (3.4-21.1)	6.7 (3.3-23.3)	6.5 (3.4-21.0)	0.19
Discharge delay greater than 12 hours	14,588 (27.6%)	1,253 (29.3%)	13,335 (27.4%)	0.009
After-hours discharge	11,661 (22.1%)	978 (22.9%)	10,683 (22.0%)	0.18

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; 19 COVID-19 = coronavirus disease 2019; ICU = Intensive Care Unit, IQR = interquartile range; PaO₂ = partial pressure of oxygen in arterial blood; P/F ratio = ratio of arterial oxygen partial pressure to fractional inspired oxygen (= PaO₂/FiO₂); SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; SD = standard deviation[†]

[†]Missing data for pH – Exacerbating SARS- CoV-2 infection: 16,655 (30.5%), Equivalent to Exacerbating SARS CoV-2 infection status: 1,395 (28.3%)

* Missing data for PaO₂ - Exacerbating SARS- CoV-2 infection: 16,673 (30.5%), Equivalent to Exacerbating SARS CoV-2 infection status: 1,393 (28.3%)

[°]Missing data for P/F Ratio – Exacerbating SARS- CoV-2 infection: 16,694 (30.5%), Equivalent to Exacerbating SARS CoV-2 infection status: 1,397 (28.4%)

[¶] Missing data for discharge delay -- Exacerbating SARS- CoV-2 infection: 6,041 (12.4%), Equivalent to Exacerbating SARS CoV-2 infection status: 465 (10.9%)

Table 8. Mixed effects hierarchical multivariable logistic regression for in-hospital mortality (with site as a random effect)

Characteristic	Adjusted odds ratio (95% CI)
SARS-CoV-2 infection status	
No SARS-COV-2 infection	1
Incidental infection	1.28 (1.10–1.50)
Exacerbating infection	1.35 (1.22–1.48)
COVID-19	2.54 (2.30–2.81)
ANZROD (%)	1.066 (1.065–1.067)
Clinical Frailty Scale (CFS)	
Not frail (CFS < 4)	1
Pre-frail (CFS 4 or 5)	1.81 (1.73–1.90)
Frail (CFS > 5)	3.21 (3.03–3.40)
Frailty score missing	1.74 (1.56–1.94)
Region	
Australian Capital Territory	1
New South Wales	1.01 (0.68–1.51)
Northern Territory	0.83 (0.43–1.61)
New Zealand	1.31 (0.85–2.01)
Queensland	1.43 (0.95–2.15)
South Australia	1.01 (0.64–1.58)
Tasmania	1.27 (0.74–2.17)
Victoria	1.22 (0.81–1.82)
Western Australia	1.15 (0.74–1.79)
Hospital type	
Rural/regional	1
Metropolitan	1.14 (0.97–1.34)
Tertiary	1.18 (1.00–1.38)
Private	0.51 (0.43–0.60)
Month of admission to ICU	
2022-Jan	1
2022-Feb	0.80 (0.69–0.92)
2022-Mar	0.75 (0.66–0.86)
2022-Apr	0.72 (0.63–0.82)
2022-May	0.83 (0.73–0.95)
2022-Jun	0.79 (0.70–0.90)
2022-Jul	0.80 (0.71–0.91)
2022-Aug	0.79 (0.70–0.90)
2022-Sep	0.77 (0.67–0.87)
2022-Oct	0.75 (0.66–0.85)
2022-Nov	0.76 (0.67–0.87)
2022-Dec	0.76 (0.67–0.86)
2023-Jan	0.71 (0.62–0.81)
2023-Feb	0.72 (0.63–0.83)
2023-Mar	0.75 (0.65–0.85)
2023-Apr	0.76 (0.67–0.87)
2023-May	0.80 (0.71–0.91)
2023-Jun	0.78 (0.69–0.89)

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; 19 COVID-19 = coronavirus disease 2019; CI = Confidence Interval,

Area under receiver operating characteristic = 0.91; Brier score = 0.0526.

Table 9. Mixed effects hierarchical multivariable log-linear regression for ICU length of stay (with site as a random effect)

Characteristic	β coefficient (95% CI)
SARS-COV-2 infection status	
No SARS-COV-2 infection	Reference
Incidental infection	0.130 (0.097 to 0.162)
Exacerbating infection	0.034 (0.009 to 0.059)
COVID-19	0.039 (-0.013 to 0.092)
ANZROD risk category (% increments)	
<5	Reference
5 to 9	0.378 (0.364 to 0.391)
10 to 14	0.481 (0.462 to 0.499)
15 to 19	0.530 (0.507 to 0.552)
20 to 24	0.566 (0.540 to 0.592)
25 to 29	0.603 (0.573 to 0.632)
30 to 34	0.590 (0.558 to 0.623)
35 to 39	0.577 (0.540 to 0.613)
40 to 44	0.588 (0.549 to 0.627)
45 to 49	0.595 (0.552 to 0.638)
50 to 54	0.565 (0.520 to 0.610)
55 to 59	0.581 (0.531 to 0.630)
60 to 64	0.411 (0.359 to 0.464)
65 to 69	0.423 (0.368 to 0.477)
70 to 79	0.365 (0.322 to 0.408)
80 to 89	0.132 (0.085 to 0.179)
≥ 90	-0.223 (-0.276 to -0.171)
Clinical Frailty Scale (CFS)	
Not frail (CFS < 4)	Reference
Pre-frail (CFS 4 or 5)	0.054 (0.045 to 0.063)
Frail (CFS > 5)	0.005 (-0.009 to 0.019)
Frailty score missing	-0.109 (-0.131 to -0.086)
ICU admission diagnostic code*	
0	Reference
101	0.279 (0.157 to 0.402)
102	0.329 (0.209 to 0.449)
103	0.326 (0.188 to .463)
104	0.281 (0.159 to 0.403)
105	0.270 (0.090 to 0.450)
106	0.034 (-0.088 to 0.156)
107	-0.011 (-0.137 to 0.115)
108	0.318 (0.169 to 0.466)
109	0.029 (-0.091 to 0.149)
110	0.189 (0.027 to 0.352)
111	0.183 (-0.007 to 0.373)
201	0.495 (0.369 to 0.622)
202	0.045 (-0.110 to 0.200)
203	0.353 (0.210 to 0.496)
204	0.454 (0.321 to 0.586)
205	0.923 (-0.243 to 2.09)
206	0.343 (0.222 to 0.464)
207	0.293 (0.169 to 0.417)
208	0.130 (0.001 to 0.259)
209	0.379 (0.254 to 0.504)
210	0.813 (0.628 to 0.998)
211	0.370 (0.250 to 0.491)
212	0.615 (0.496 to 0.735)
213	0.711 (0.585 to 0.837)
301	0.598 (0.469 to 0.728)
303	0.169 (0.010 to 0.329)
305	0.180 (0.055 to 0.306)
306	0.033 (-0.109 to 0.176)
307	0.232 (0.100 to 0.363)
308	0.487 (0.338 to 0.637)
309	0.325 (0.182 to 0.468)
310	0.149 (-0.056 to 0.355)
311	0.732 (0.606 to 0.859)
312	0.099 (-0.089 to 0.286)
313	0.274 (0.135 to 0.413)
401	0.249 (0.121 to 0.377)
402	0.826 (0.695 to 0.957)

Characteristic	β coefficient (95% CI)
403	-0.051 (-0.175 to 0.073)
404	0.903 (0.77 to 1.035)
405	0.207 (0.047 to 0.367)
406	1.157 (1.013 to 1.301)
407	0.410 (0.288 to 0.531)
408	0.437 (0.307 to 0.568)
409	0.166 (-0.01 to 0.341)
410	0.316 (0.19 to 0.443)
501	0.358 (0.239 to 0.477)
502	0.322 (0.199 to 0.445)
503	0.466 (0.347 to 0.585)
504	0.37 (0.247 to 0.493)
601	0.6 (0.477 to 0.723)
602	0.357 (0.235 to 0.478)
603	0.617 (0.461 to 0.772)
604	0.517 (0.385 to 0.65)
605	0.837 (0.657 to 1.018)
701	0.534 (0.392 to 0.676)
702	0.300 (0.180 to 0.421)
703	0.092 (-0.027 to 0.211)
704	0.292 (0.172 to 0.412)
801	0.252 (0.105 to 0.398)
802	0.266 (0.131 to 0.400)
901	0.439 (0.318 to 0.561)
902	-0.143 (-0.302 to 0.016)
903	-0.196 (-0.36 to -0.033)
1002	-0.166 (-0.846 to 0.514)
1101	0.322 (0.170 to 0.475)
1102	0.302 (0.156 to 0.449)
1201	0.970 (-0.196 to 2.137)
1202	0.0701 (-0.058 to 0.200)
1203	0.057 (-0.082 to 0.196)
1204	0.244 (0.114 to 0.373)
1205	-0.108 (-0.234 to 0.018)
1206	0.587 (0.468 to 0.706)
1207	0.497 (0.379 to 0.615)
1208	0.190 (0.071 to 0.310)
1209	0.931 (0.787 to 1.074)
1210	0.372 (0.21 to 0.535)
1211	0.105 (-0.060 to 0.271)
1212	0.788 (0.665 to 0.911)
1213	-0.02 (-0.153 to 0.113)
1301	0.284 (0.148 to 0.420)
1302	-0.031 (-0.153 to 0.091)
1303	0.364 (0.238 to 0.49)
1304	-0.054 (-0.173 to 0.065)
1401	0.421 (0.297 to 0.545)
1403	0.168 (0.043 to 0.292)
1404	0.240 (0.118 to 0.361)
1405	0.125 (0.006 to 0.243)
1406	0.015 (-0.109 to 0.138)
1407	0.719 (0.566 to 0.873)
1408	-0.042 (-0.160 to 0.077)
1409	0.259 (0.114 to 0.404)
1410	0.378 (0.236 to 0.519)
1411	0.171 (-0.016 to 0.359)
1412	0.434 (0.283 to 0.585)
1413	0.118 (-0.019 to 0.255)
1501	0.894 (0.752 to 1.036)
1502	0.184 (0.046 to 0.322)
1503	0.628 (0.497 to 0.758)
1504	-0.121 (-0.240 to -0.002)
1505	-0.063 (-0.184 to 0.058)
1506	-0.056 (-0.176 to 0.065)
1601	1.092 (0.960 to 1.224)
1602	0.256 (0.133 to 0.379)
1603	1.155 (0.929 to 1.380)
1604	0.882 (0.717 to 1.047)
1605	0.586 (0.400 to 0.772)
1701	0.035 (-0.088 to 0.158)

Characteristic	β coefficient (95% CI)
1703	0.098 (-0.026 to 0.223)
1704	0.272 (0.092 to 0.453)
1705	0.198 (0.072 to 0.325)
1801	-0.093 (-0.224 to 0.038)
1802	-0.267 (-0.392 to -0.142)
1803	-0.104 (-0.246 to 0.037)
1902	-0.073 (-0.192 to 0.045)
1903	0.059 (-0.067 to 0.185)
1904	0.47 (0.343 to 0.598)
2101	0.013 (-0.342 to 0.367)
2201	-0.174 (-0.298 to -0.051)
Region	
Australian Capital Territory	Reference
New South Wales	0.128 (-0.042 to 0.298)
Northern Territory	-0.042 (-0.347 to 0.263)
New Zealand	-0.181 (-0.368 to 0.006)
Queensland	0.008 (-0.165 to 0.182)
South Australia	-0.014 (-0.209 to 0.182)
Tasmania	0.190 (-0.054 to 0.434)
Victoria	0.016 (-0.155 to 0.188)
Western Australia	0.092 (-0.101 to 0.284)
Hospital type	
Rural/regional	Reference
Metropolitan	0.061 (-0.020 to 0.142)
Tertiary	0.091 (0.010 to 0.172)
Private	-0.011 (-0.084 to 0.062)
Died in ICU	-0.215 (-0.235 to -0.196)

ANZROD = Australian and New Zealand Risk of Death mortality prediction model; COVID-19 = coronavirus disease 2019; CI = Confidence Interval, ICU = Intensive Care Unit.

* Diagnoses correspond to codes in Table 1.

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