

ICNARC report on COVID-19 in critical care

27 March 2020

This report contains data on all confirmed COVID-19 cases reported to ICNARC up to midnight on 26 March 2020 from critical care units participating in the Case Mix Programme (all NHS adult, general intensive care and combined intensive care/high dependency units in England, Wales and Northern Ireland, plus some specialist and non-NHS critical care units).

Reporting process

Critical care units participating in the Case Mix Programme are asked to:

- notify ICNARC as soon as they have an admission with confirmed COVID-19;
- submit early data for admissions with confirmed COVID-19, including demographics and first 24-hour physiology, as soon as possible after the end of the first 24 hours in the critical care unit;
- resubmit data, including critical care unit outcome and organ support, when the patient leaves the critical care unit; and
- submit final data when the patient leaves acute hospital.

Critical care unit participation

Total number of units:	285
Units with at least one patient notified:	178
Units with zero patients:	71
Units with uncertain participation:	36

Admissions to critical care

To date, ICNARC have been notified of 846 admissions to critical care units in England, Wales and Northern Ireland with confirmed COVID-19 either at or after admission to critical care. Of these, early data covering the first 24 hours in the critical care unit have been submitted to ICNARC for 795 admissions of 775 patients (Figure 1). Of the 775 patients, 79 patients have died, 86 patients were discharged alive from critical care and 609 patients were last reported as still being in critical care (Figure 2). The majority of patients (393) are being managed by the three London Operational Delivery Networks (Figure 3). Note that Figure 1 and Figure 2 are affected by a variable lag time in submission of data of about 1-3 days (shaded grey).

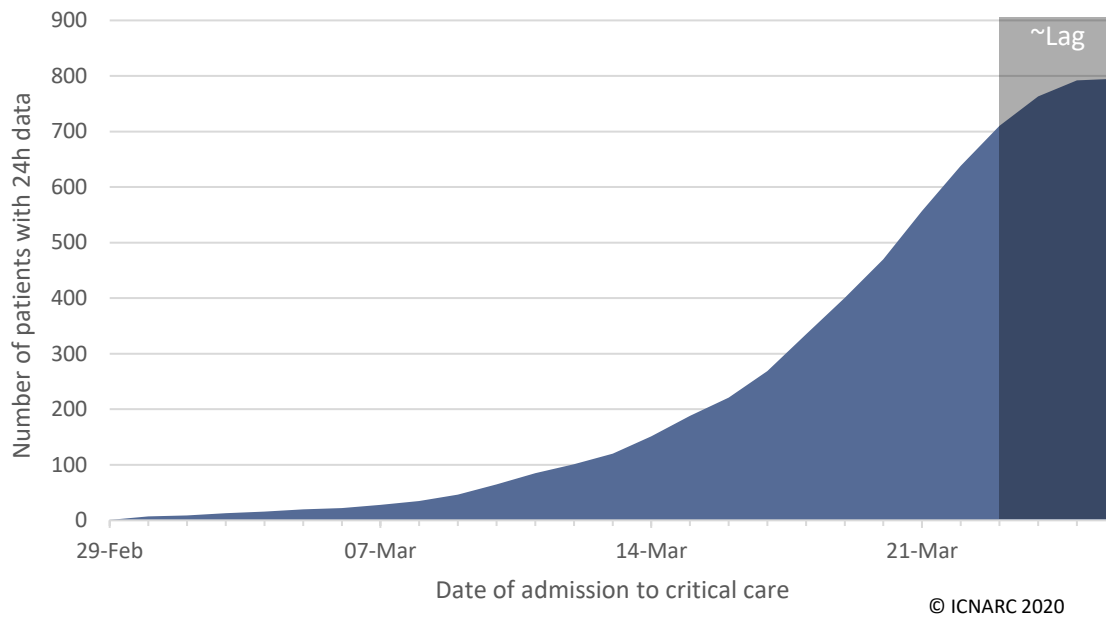


Figure 1 Cumulative number of critical care admissions with confirmed COVID-19 and 24h patient data received by date of admission to the critical care unit

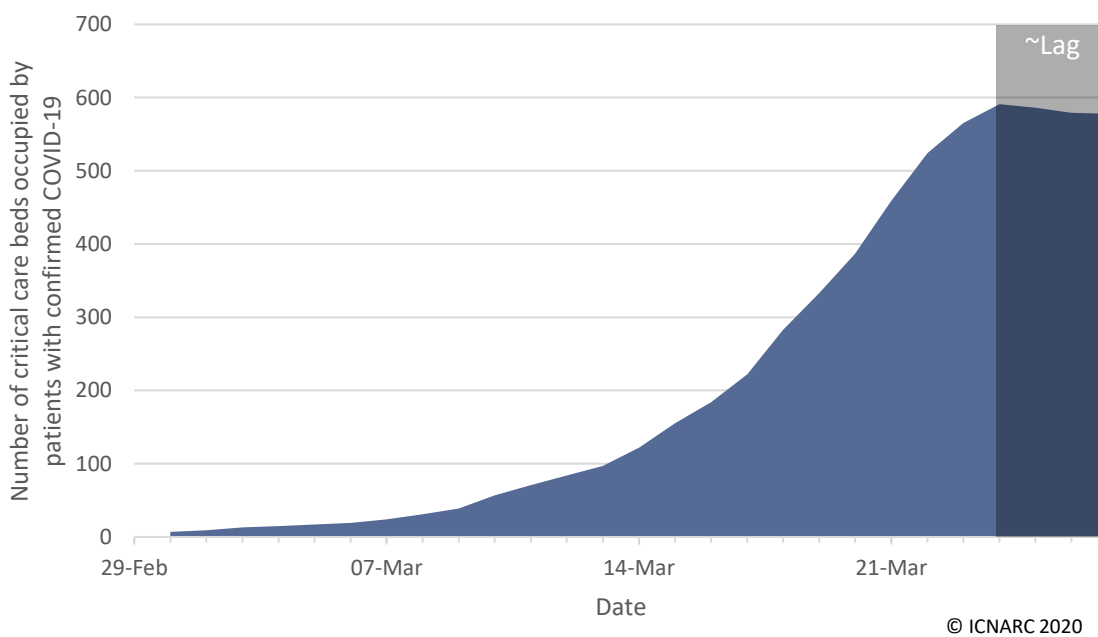


Figure 2 Number of critical care beds occupied by patients with confirmed COVID-19 by date

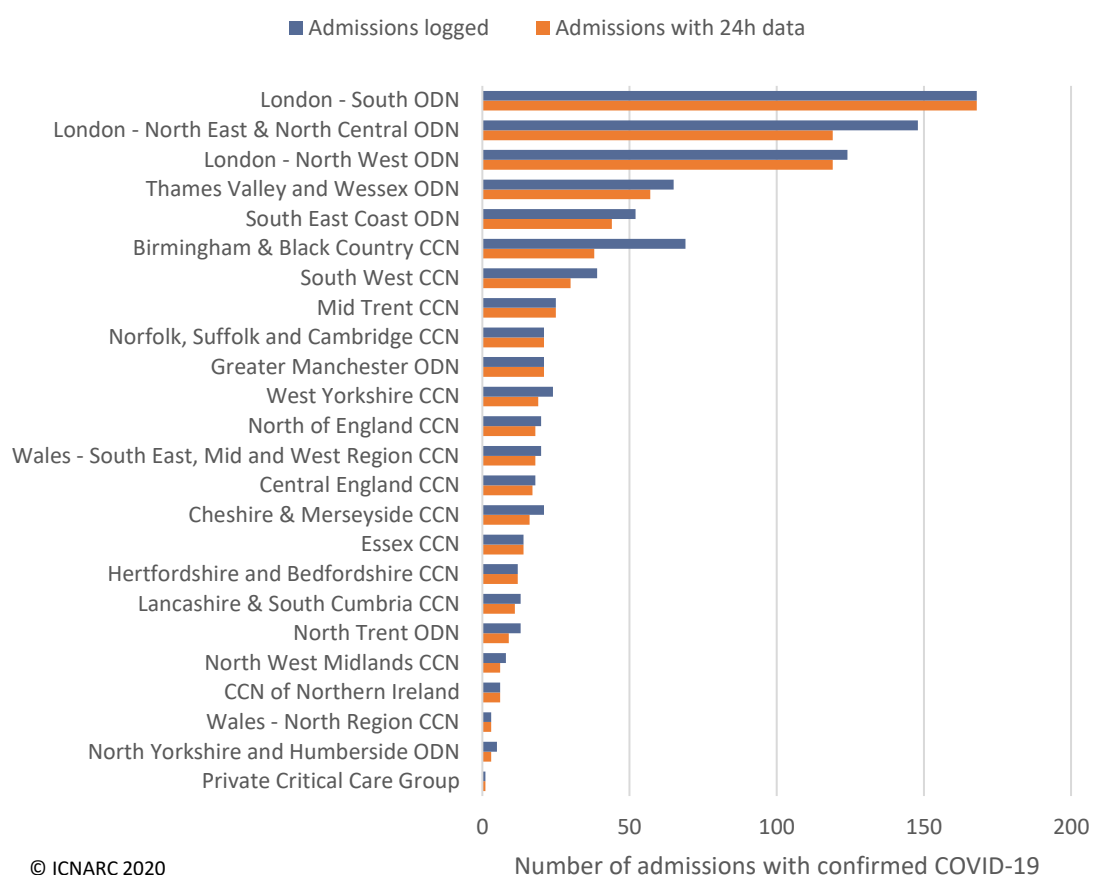


Figure 3 Admissions by Critical Care Network

ODN: Organisational Delivery Network; CCN: Critical Care Network.

Characteristics of admitted patients

Characteristics of patients with confirmed COVID-19 admitted to critical care are summarised in Table 1, and compared with patients critically ill with viral pneumonia (non-COVID-19) during 2017-19. The distribution of age and sex is shown in Figure 4 and the distribution of body mass index (BMI) is shown in Figure 5.

Table 1 Characteristics of patients admitted to critical care with confirmed COVID-19

Demographics	Patients with confirmed COVID-19 (N=775)	Patients with viral pneumonia (non-COVID-19), 2017-19 (N=5755)
Age at admission (years) [N=774]		
Mean (SD)	60.2 (13.6)	58.0 (17.5)
Median (IQR)	61 (51, 71)	60 (48, 71)
Sex, n (%) [N=774]		
Female	228 (29.5)	2632 (45.7)
Male	546 (70.5)	3123 (54.3)
Currently or recently pregnant, n (% of females) [N=216]		
Currently pregnant	1 (0.5)	57 (2.2)
Recently pregnant (within 6 weeks)	4 (1.9)	29 (1.1)
Not known to be pregnant	211 (97.7)	2546 (96.7)
Body mass index, n (%) [N=672]		
<18.5	9 (1.3)	308 (5.5)
18.5-<25	179 (26.6)	1912 (33.9)
25-<30	231 (34.4)	1693 (30.0)
30-<40	208 (31.0)	1330 (23.6)
40+	45 (6.7)	394 (7.0)
Medical history		
Dependency prior to admission to acute hospital, n (%) [N=700]		
Able to live without assistance in daily activities	634 (90.6)	4213 (73.4)
Some assistance with daily activities	65 (9.3)	1394 (24.3)
Total assistance with all daily activities	1 (0.1)	136 (2.4)
Very severe comorbidities*, n (%) [N=732]		
Cardiovascular	1 (0.1)	77 (1.3)
Respiratory	9 (1.2)	297 (5.2)
Renal	17 (2.3)	118 (2.1)
Liver	3 (0.4)	54 (0.9)
Metastatic disease	5 (0.7)	69 (1.2)
Haematological malignancy	7 (1.0)	262 (4.6)
Immunocompromise	22 (3.0)	503 (8.8)
Acute severity†		
Mechanically ventilated, n (%) [N=658]	518 (78.7)	2481 (43.2)
APACHE II Score [N=682]		
Mean (SD)	15.4 (5.1)	15.4 (6.2)
Median (IQR)	15 (12, 18)	16 (13, 21)

* Very severe comorbidities are defined as: Cardiovascular: symptoms at rest; Respiratory: shortness of breath with light activity or home ventilation; Renal: RRT for end-stage renal disease; Liver: biopsy-proven cirrhosis, portal hypertension or hepatic encephalopathy; Metastatic disease: distant metastases; Haematological malignancy: acute or chronic leukaemia, multiple myeloma or lymphoma; Immunocompromise: chemotherapy, radiotherapy or daily high dose steroid treatment in previous 6 months, HIV/AIDS or congenital immune deficiency

† Based on data from the first 24 hours following admission to the critical care unit

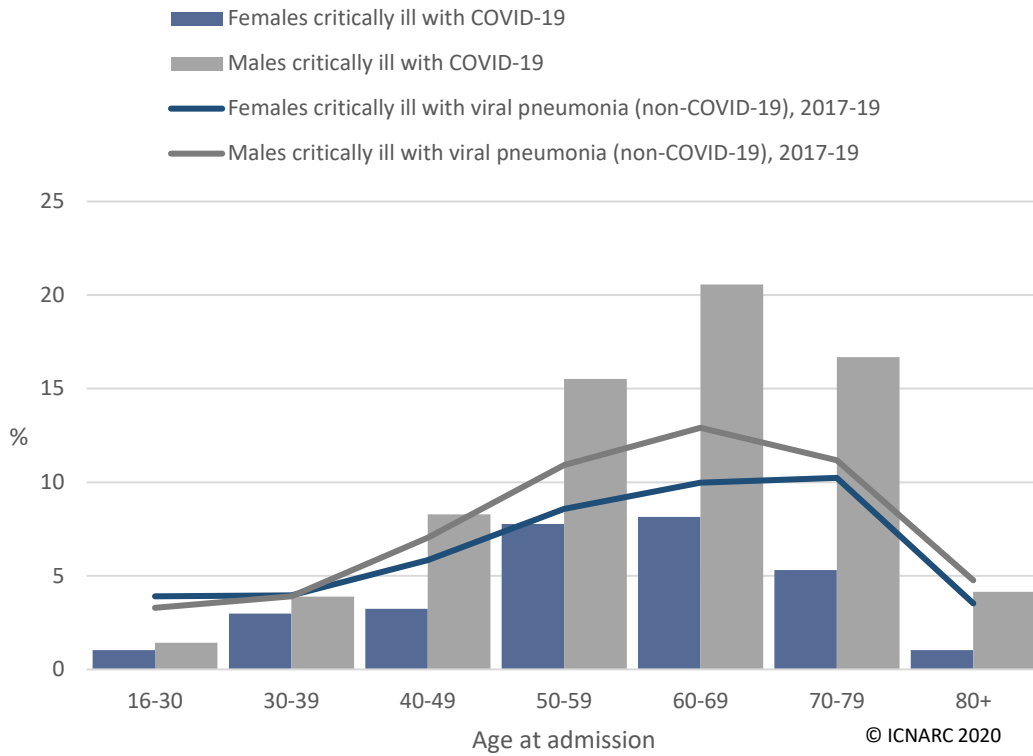


Figure 4 Age and sex distribution of patients admitted to critical care with confirmed COVID-19

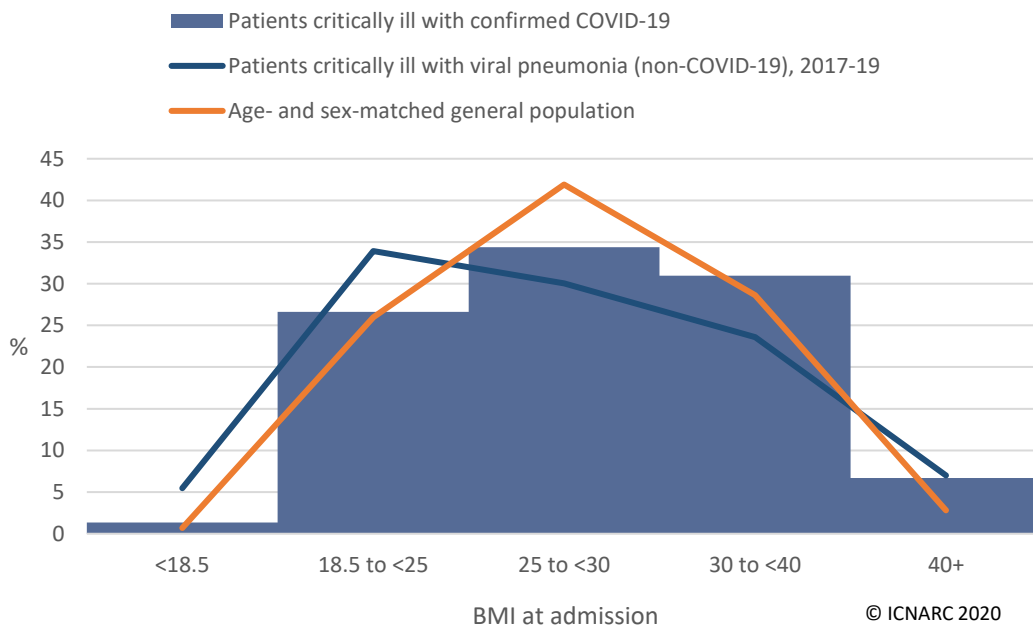


Figure 5 BMI distribution of patients admitted to critical care with confirmed COVID-19

Outcome, length of stay and organ support

Critical care unit outcomes have been received for 165 patients, of whom 79 patients have died and 86 were discharged alive from critical care (Figure 6). Lengths of stay and organ support are summarised in Table 2 and compared with those for patients critically ill with viral pneumonia (non-COVID-19) during 2017-19. Receipt and duration of organ support are summarised graphically in Figure 7 and Figure 8, respectively.

Note that Figure 6 will be biased towards longer durations due to lags in notification of patients' discharge or death, while Table 2 and Figures 7 and 8 will be biased towards patients with shorter durations due to the emerging nature of the epidemic. Figure 6 assumes that patients are still in critical care unless ICNARC have been notified otherwise, and Table 2 and Figures 7 and 8 include only those patients who have been discharged from critical care or who died in critical care.

The critical care unit outcomes for patients critically ill with COVID-19 across major patient subgroups are summarised in Table 3 and compared with those for patients critically ill with viral pneumonia (non-COVID-19) during 2017-19.

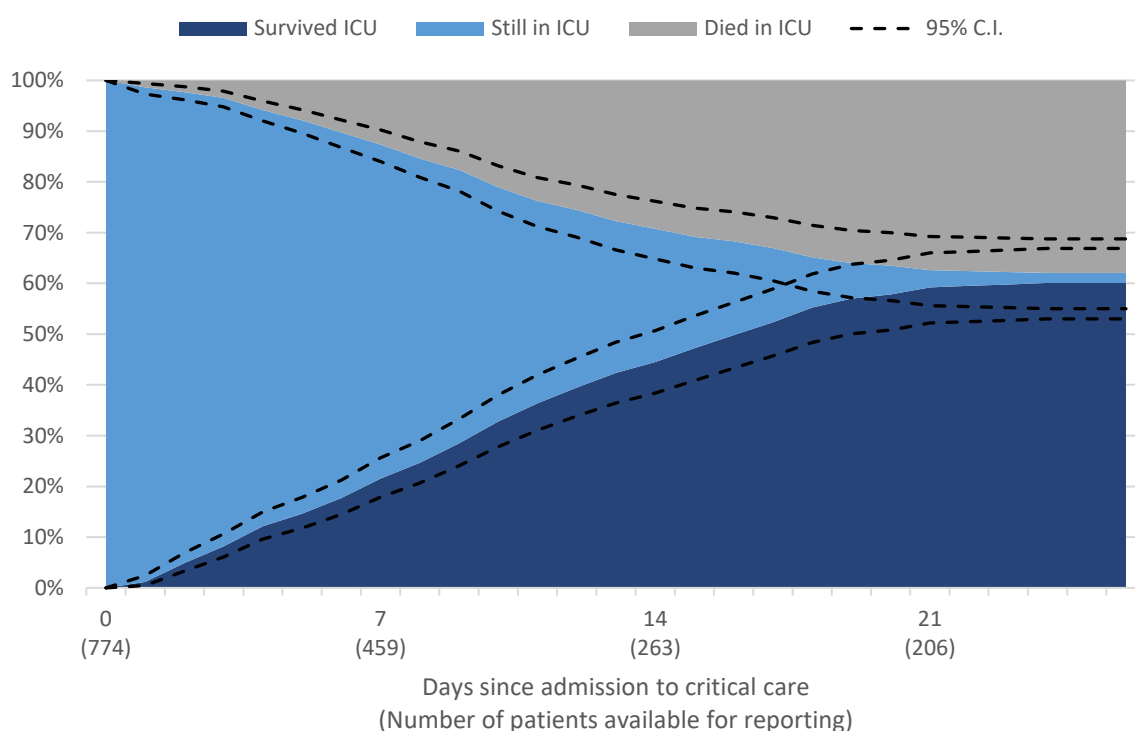


Figure 6 Survival to discharge from critical care

Note: Owing to lags in notification of patients' discharge or death, this figure is expected to be biased towards longer lengths of stay in critical care.

Table 2 Outcome, length of stay and organ support for patients admitted to critical care with confirmed COVID-19

Critical care unit outcome	Patients with confirmed COVID-19 and critical care outcome reported (N=165)	Patients with viral pneumonia (non-COVID-19), 2017-19 (N=5,338)
Outcome at end of critical care, n (%)		
Alive	86 (52.1)	4,155 (77.8)
Dead	79 (47.9)	1,183 (22.2)
Length of stay		
Length of stay in critical care (days), median (IQR)		
Survivors [N=86]	3 (2, 7)	6 (3, 12)
Non-survivors [N=79]	4 (2, 6)	6 (2, 13)
Organ support (Critical Care Minimum Dataset, CCMDS)*		
Receipt of organ support, n (%)		
Advanced respiratory support	97 (58.8)	2,520 (47.2)
Basic respiratory support	83 (50.3)	4,346 (81.4)
Advanced cardiovascular support	34 (20.6)	1,173 (22.0)
Basic cardiovascular support	139 (84.2)	4,953 (92.8)
Renal support	28 (17.0)	881 (16.5)
Liver support	0 (0.0)	44 (0.8)
Neurological support	4 (2.4)	283 (5.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support [N=97]	5 (4, 8)	8.5 (4, 16.5)
Total (advanced + basic) respiratory support [N=147]	4 (2, 7)	6 (3, 12)
Advanced cardiovascular support [N=6]	2 (1, 5)	3 (2, 5)
Total (advanced + basic) cardiovascular support [N=148]	4 (3, 7)	6 (3, 12)
Renal support [N=28]	3 (2, 4.5)	6 (3, 12)

Note: Owing to the emerging nature of the epidemic, the sample of patients represented in this table is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death.

* Recorded as number of calendar days (00:00-23:59) on which support was received at any time. Advanced respiratory: invasive ventilation, BPAP via trans-laryngeal tube or tracheostomy, CPAP via translaryngeal tube, or extracorporeal respiratory support; Basic respiratory: >50% oxygen by face mask, close observation due to potential for acute deterioration, physiotherapy/suction to clear secretions at least two-hourly, recently extubated after a period of mechanical ventilation, mask/hood CPAP/BPAP, non-invasive ventilation, CPAP via a tracheostomy, intubated to protect airway; Advanced cardiovascular: multiple IV/rhythm controlling drugs (at least one vasoactive), continuous observation of cardiac output, intra-aortic balloon pump, temporary cardiac pacemaker; Basic cardiovascular: central venous catheter, arterial line, single IV vasoactive/rhythm controlling drug; Renal: acute renal replacement therapy, renal replacement therapy for chronic renal failure where other organ support is received; Liver: management of coagulopathy and/or portal hypertension for acute on chronic hepatocellular failure or primary acute hepatocellular failure; Neurological: CNS depression sufficient to prejudice airway, invasive neurological monitoring, continuous IV medication to control seizures, therapeutic hypothermia

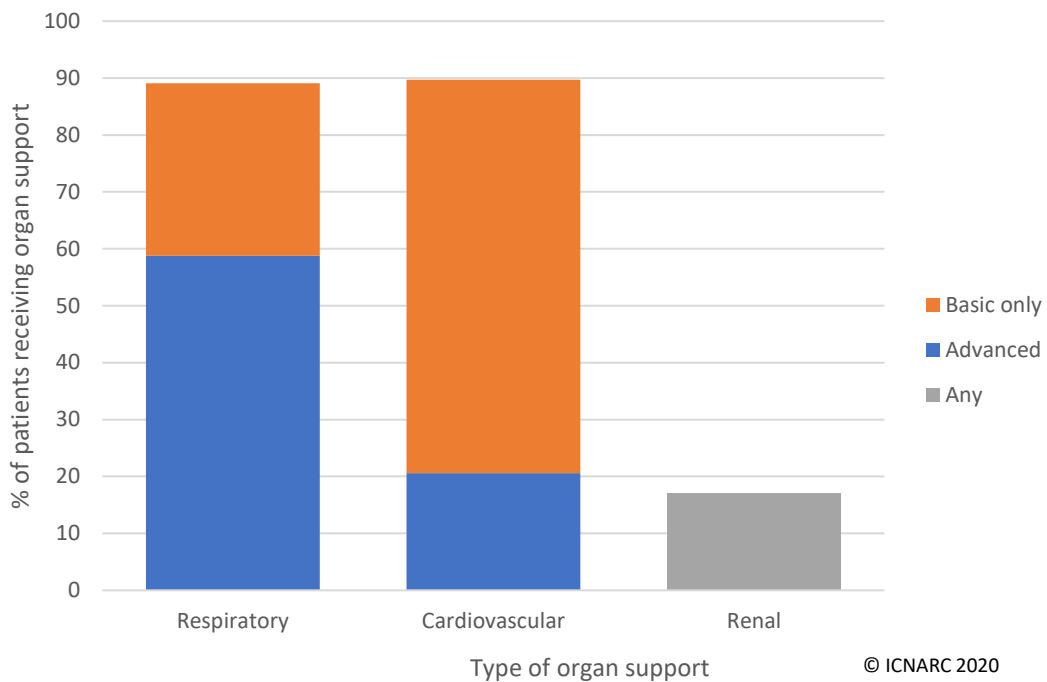


Figure 7 Percentage of patients receiving organ support

Note: Owing to the emerging nature of the epidemic, the sample of patients represented in this figure is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death.

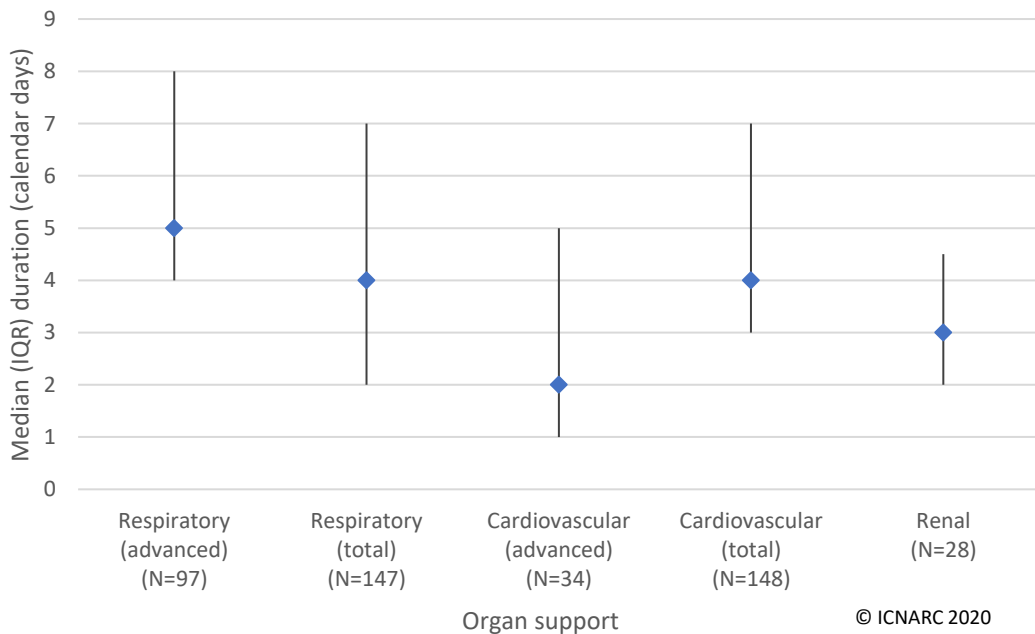


Figure 8 Duration of organ support received (calendar days; median and interquartile range)

Note: Owing to the emerging nature of the epidemic, the sample of patients represented in this figure is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death.

Table 3 Critical care outcomes, by patient subgroup

Patient subgroup	Patients with confirmed COVID-19 and critical care outcome reported		Patients with viral pneumonia (non-COVID-19), 2017-19
	Discharged alive from critical care	Died in critical care	Died in critical care
	n (%)	n (%)	(%)
Age at admission to critical care			
16-49	28 (75.7)	9 (24.3)	(9.9)
50-69	43 (59.7)	29 (40.3)	(23.4)
70+	15 (26.8)	41 (73.2)	(31.6)
Sex			
Female	35 (62.5)	21 (37.5)	(19.7)
Male	51 (46.8)	58 (53.2)	(24.3)
BMI			
<25	33 (57.9)	24 (42.1)	(23.6)
25 to <30	28 (58.3)	20 (41.7)	(23.6)
30+	18 (39.1)	28 (60.9)	(18.6)
Assistance required with daily activities			
No	70 (56.5)	54 (43.5)	(20.1)
Yes	12 (34.3)	23 (65.7)	(28.1)
Any very severe comorbidities*			
No	76 (52.4)	69 (47.6)	(19.4)
Yes	7 (41.2)	10 (58.8)	(34.1)
Received advanced respiratory support			
No	49 (80.3)	12 (19.7)	(10.3)
Yes	33 (33.7)	65 (66.3)	(36.1)

Note: Owing to the emerging nature of the epidemic, the sample of patients represented in this table is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death.

* Very severe comorbidities are defined as: Cardiovascular: symptoms at rest; Respiratory: shortness of breath with light activity or home ventilation; Renal: RRT for end-stage renal disease; Liver: biopsy-proven cirrhosis, portal hypertension or hepatic encephalopathy; Metastatic disease: distant metastases; Haematological malignancy: acute or chronic leukaemia, multiple myeloma or lymphoma; Immunocompromise: chemotherapy, radiotherapy or daily high dose steroid treatment in previous 6 months, HIV/AIDS or congenital immune deficiency

Acknowledgement

Please acknowledge the source of these data in all future presentations (oral and/or written), as follows:

“These data derive from the ICNARC Case Mix Programme Database. The Case Mix Programme is the national clinical audit of patient outcomes from adult critical care coordinated by the Intensive Care National Audit & Research Centre (ICNARC). For more information on the representativeness and quality of these data, please contact ICNARC.”