ICNARC report on COVID-19 in critical care
Wales
31 July 2020

This report contains data on patients critically ill with confirmed COVID-19 reported to ICNARC up to 4pm on 30 July 2020 from critical care units in Wales participating in the Case Mix Programme (the national clinical audit for adult critical care).

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 critical care;
- resubmit data for the whole critical care stay, including critical care outcome and organ support, when the patient leaves critical care; and
- submit final data when the patient leaves acute hospital.

The same data are reported for an historic cohort of patients critically ill with viral pneumonia (non-COVID-19) in England, Wales and Northern Ireland admitted between 1 January 2017 and 31 December 2019.

## Contents

Participation and population coverage

Critical care unit participation

Total number of units in Wales: <u>16</u>
    Units with at least one patient notified: 15
    Units with zero patients: 1
    Units with uncertain participation: 0

Admissions to critical care

To date, ICNARC have been notified of 437 admissions for critical care with confirmed COVID-19, either at or after the start of critical care, in Wales. Of these, early data covering the first 24 hours of critical care have been submitted to ICNARC for 429 admissions for 399 patients (Figure 1, Figure 2 and Figure 3). Of the 399 patients, 390 have outcomes reported and 9 patients were last reported as still receiving critical care (Figure 4). Please note that Figure 2, Figure 3 and Figure 4 are affected by a variable lag time for submission of data of about 1-3 days (shaded grey).
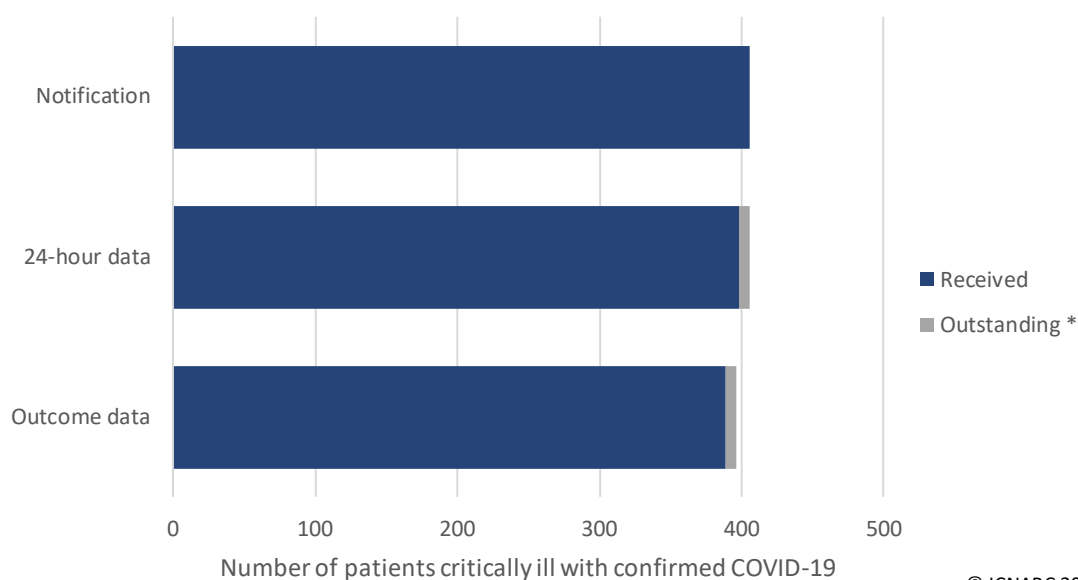
© ICNARC 2020

Figure 1   Numbers of patients with data included in this report and outstanding *

* Please note that 24-hour data are considered outstanding where ICNARC was notified of the admission at least 48 hours previously and outcome data are considered outstanding when 24-hour data have been received and at least 10 days have elapsed since the start of critical care.
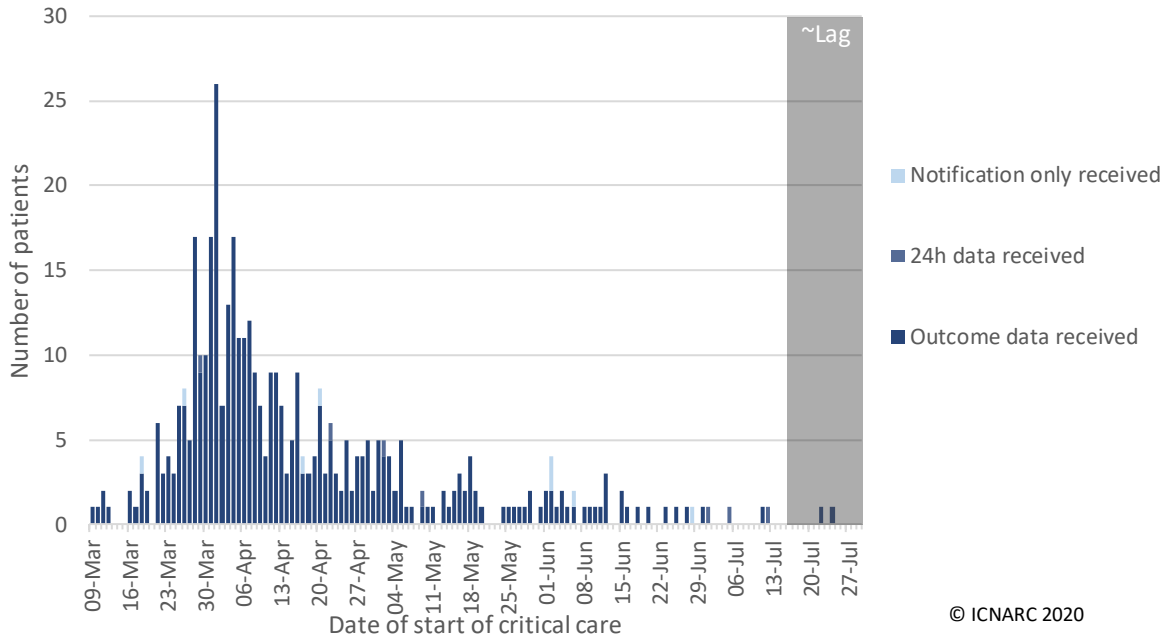
Figure 2   Number of new patients critically ill with confirmed COVID-19, by date of start of critical care
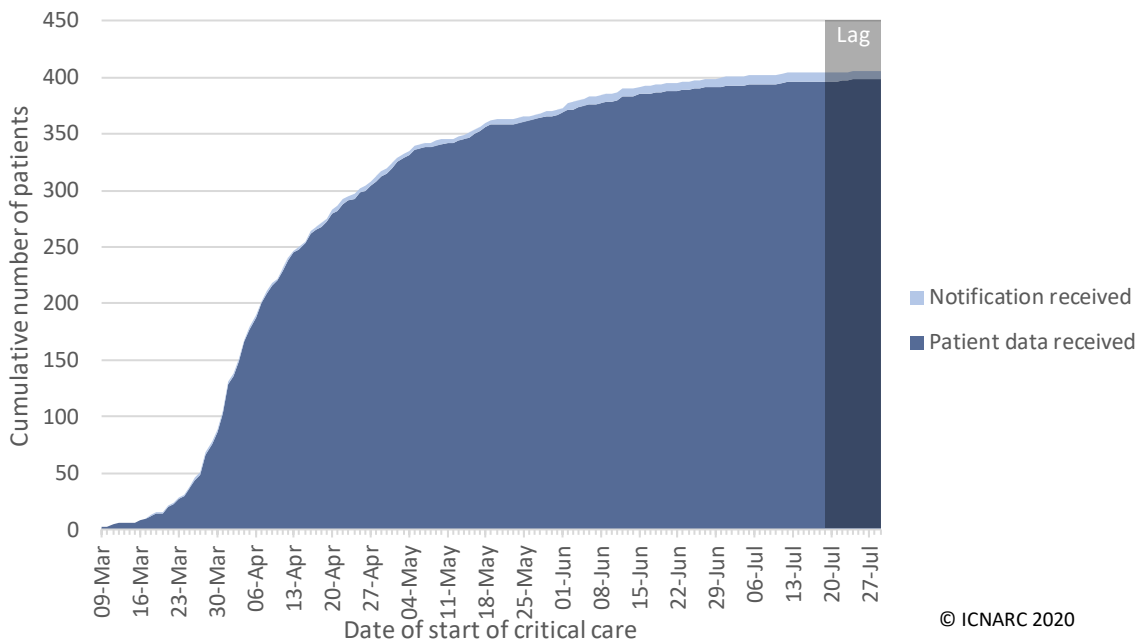

Figure 3   Cumulative number of patients critically ill with confirmed COVID-19, by date of start of critical care
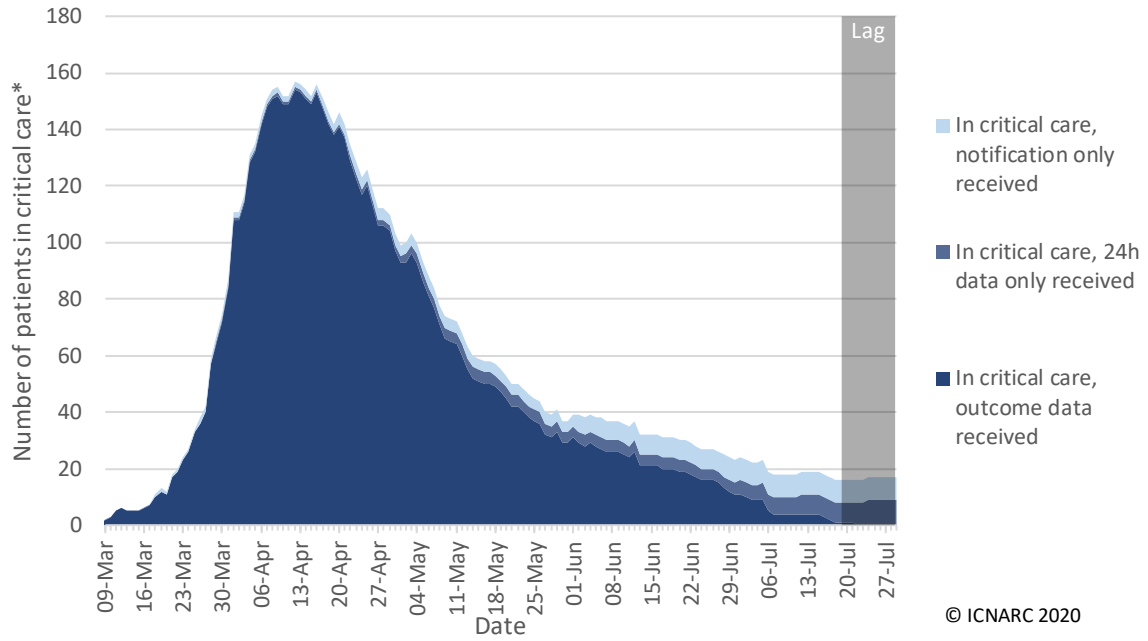
Figure 4 Total number of patients critically ill with confirmed COVID-19, by date *

* Please note that patients whose outcome data have not been received are assumed to remain in critical care as of 30 July 2020.

Characteristics of patients

Characteristics of patients critically ill with confirmed COVID-19 are summarised in Table 1 and Table 2 and compared with an historic cohort of patients critically ill with viral pneumonia (non-COVID-19) admitted between 1 January 2017 and 31 December 2019.

Table 1   Patient characteristics: demographics

Demographics	Patients with confirmed COVID-19 and 24h data (N=399)	Patients with viral pneumonia (non-COVID-19), 2017-19 (N=5782)
Age at admission (years) [N=399]		
Mean (SD)	56.9 (12.8)	58.0 (17.4)
Median (IQR)	57 (49, 66)	61 (48, 71)
Sex, n (%) [N=399]		
Female	131 (32.8)	2641 (45.7)
Male	268 (67.2)	3141 (54.3)
Currently or recently pregnant, n (% of females aged 16-49) [N=41]		
Currently pregnant	0 (0.0)	56 (7.4)
Recently pregnant (within 6 weeks)	1 (2.4)	29 (3.8)
Not known to be pregnant	40 (97.6)	674 (88.8)
Ethnicity *, n (%) [N=398]		
White	347 (87.2)	4951 (88.4)
Mixed	6 (1.5)	52 (0.9)
Asian	25 (6.3)	325 (5.8)
Black	5 (1.3)	155 (2.8)
Other	15 (3.8)	117 (2.1)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=350]		
1 (least deprived)	47 (13.4)	873 (15.3)
2	56 (16.0)	999 (17.5)
3	65 (18.6)	1115 (19.5)
4	70 (20.0)	1232 (21.6)
5 (most deprived)	112 (32.0)	1489 (26.1)
Body mass index *, n (%) [N=399]		
<18.5	1 (0.3)	310 (5.5)
18.5-<25	114 (28.6)	1933 (34.2)
25-<30	135 (33.8)	1691 (29.9)
30-<40	118 (29.6)	1330 (23.5)
40+	31 (7.8)	394 (7.0)

* Please see Definitions on page 13.

Table 2   Patient characteristics: medical history and indicators of acute severity *

Medical history	Patients with confirmed COVID-19 and 24h data (N=399)	Patients with viral pneumonia (non-COVID-19), 2017-19 (N=5782)
Dependency prior to admission to acute hospital *, n (%) [N=396]		
Able to live without assistance in daily activities	353 (89.1)	4244 (73.6)
Some assistance with daily activities	42 (10.6)	1392 (24.1)
Total assistance with all daily activities	1 (0.3)	134 (2.3)
Very severe comorbidities *, n (%) [N=397]		
Cardiovascular	2 (0.5)	78 (1.4)
Respiratory	6 (1.5)	295 (5.1)
Renal	2 (0.5)	120 (2.1)
Liver	1 (0.3)	54 (0.9)
Metastatic disease	2 (0.5)	68 (1.2)
Haematological malignancy	5 (1.3)	268 (4.6)
Immunocompromise	12 (3.0)	503 (8.7)
Prior hospital length of stay [N=398]		
Mean (SD)	2.4 (5.5)	2.7 (13.0)
Median (IQR)	1 (0, 3)	1 (0, 2)
CPR within previous 24h, n (%) [N=398]		
In the community	3 (0.8)	21 (0.4)
In hospital	1 (0.3)	85 (1.5)
Indicator of acute severity		
Mechanically ventilated within first 24h *, n (%) [N=374]	257 (68.7)	2482 (43.0)
APACHE II Score [N=380]		
Mean (SD)	14.5 (5.7)	17.2 (6.3)
Median (IQR)	14 (11, 17)	17 (13, 21)
PaO_2/FiO_2 ratio † (kPa), median (IQR) [N=370]	18.2 (12.6, 24.0)	18.0 (11.6, 26.4)
PaO_2/FiO_2 ratio †, n (%) [N=370]		
≤ 13.3 kPa (≤ 100 mmHg)	105 (28.4)	1819 (33.3)
> 13.3 and ≤ 26.7 kPa (> 100 and ≤ 200 mmHg)	194 (52.4)	2318 (42.4)
> 26.7 kPa (> 200 mmHg)	71 (19.2)	1328 (24.3)

* Please see Definitions on page 13. Indices of acute severity are based on data from the first 24 hours of critical care. † Derived from the arterial blood gas with the lowest PaO_2 during the first 24 hours of critical care.

The distribution of age and sex is presented in Figure 5. The distribution of ethnicity, matched on 2011 census ward for location of patients critically ill with COVID-19, is presented in Figure 6.
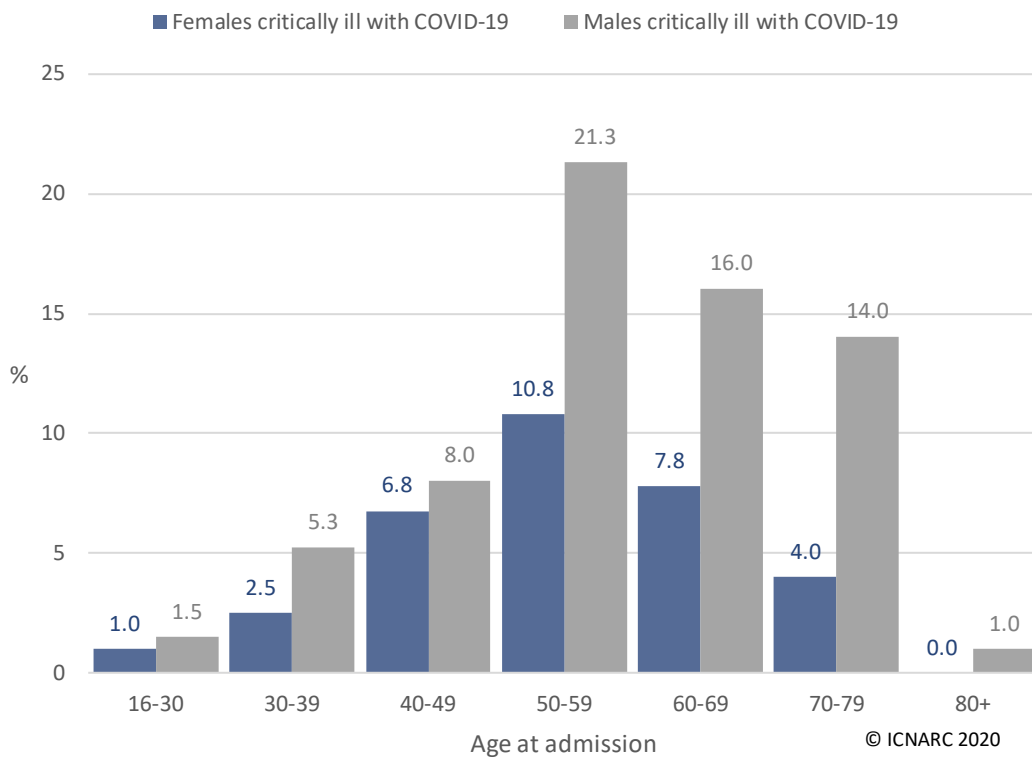

Figure 5   Age and sex distribution of patients critically ill with confirmed COVID-19
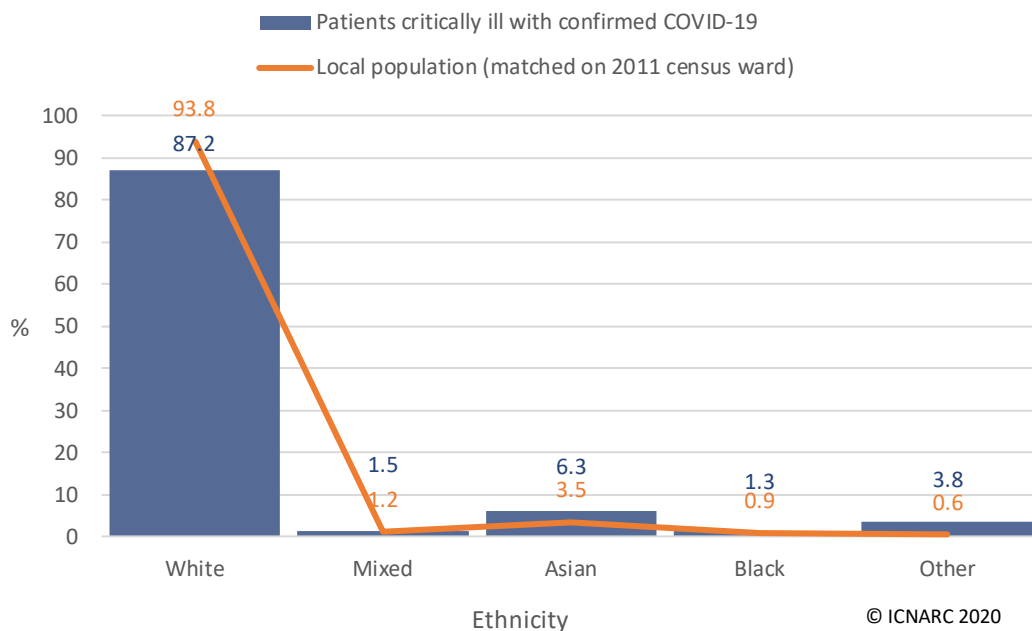

Figure 6   Ethnicity distribution of patients critically ill with confirmed COVID-19

The distribution of Index of Multiple Deprivation is presented in Figure 7. The distribution of body mass index (BMI), compared with an age- and sex-matched population (from the Health Survey for England 2018), is presented in Figure 8.
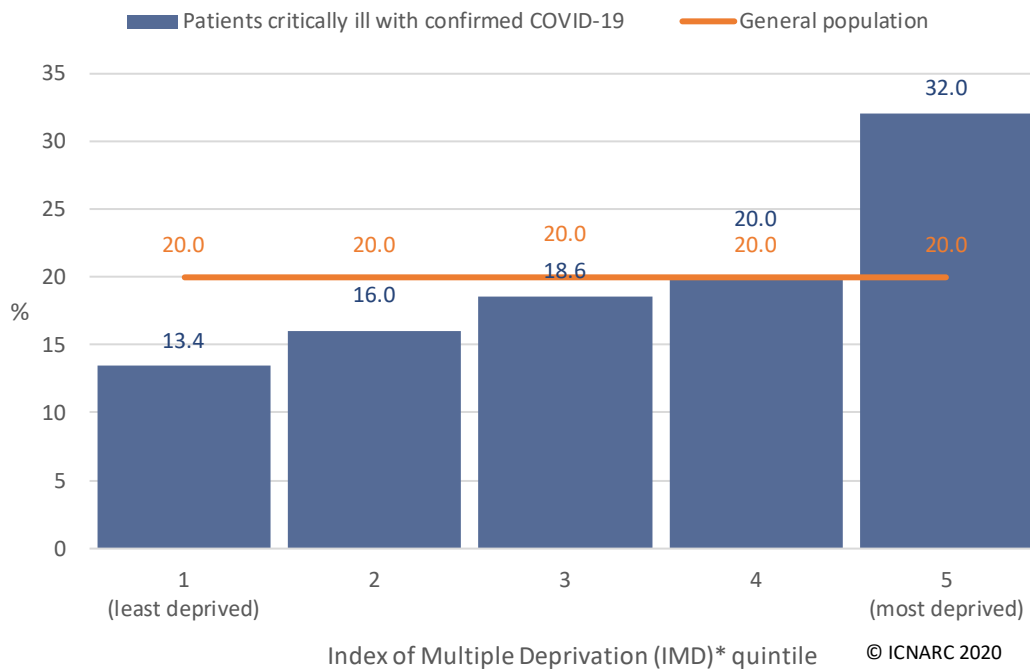

Figure 7   Index of Multiple Deprivation (IMD) * distribution of patients critically ill with confirmed COVID-19
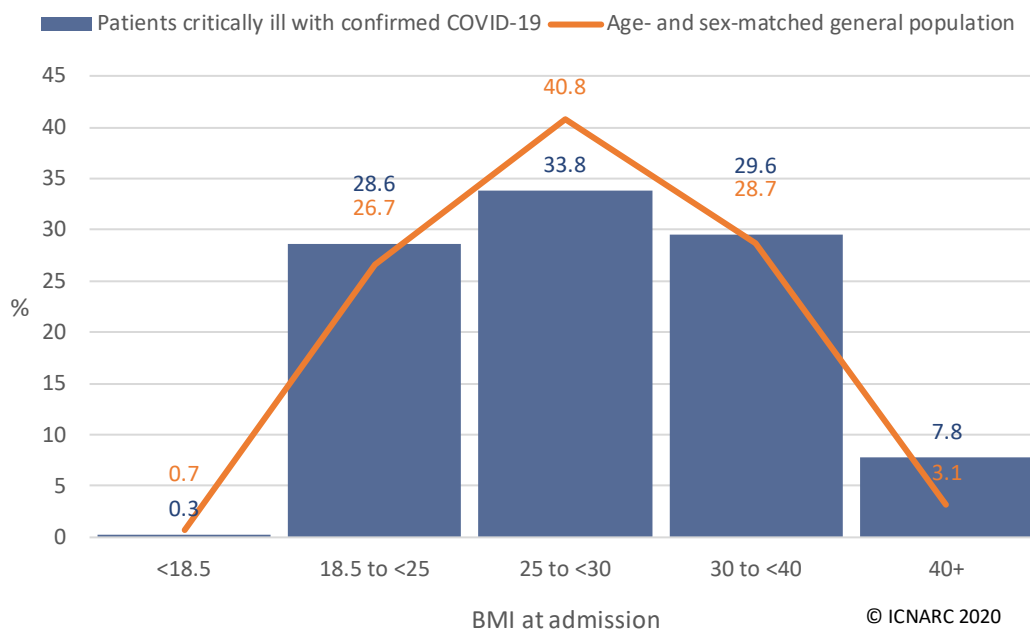
* Please see Definitions on page 13.

Figure 8   BMI distribution of patients critically ill with confirmed COVID-19

Patient outcomes

Critical care outcomes have been received for 390 (of 399) patients, of whom 148 patients have died and 242 have been discharged alive from critical care (Figure 9 and Figure 10). Duration of critical care and receipt and duration of organ support in critical care are summarised in Table 3 and compared with an historic cohort of patients critically ill with viral pneumonia (non-COVID-19) admitted between 1 January 2017 and 31 December 2019. Receipt and duration of organ support are summarised graphically in Figure 11 and in Figure 12, respectively.

Please note that Figure 10 is biased towards longer lengths of stay in critical care due to the time lag in notification of a patients' discharge or death, while Table 3, Figure 11 and Figure 12 are biased towards patients with shorter lengths of stay in critical care due to the emerging nature of the UK epidemic. Figure 9 and Figure 10 assume that patients are still in critical care unless ICNARC has been notified otherwise, and Table 3, Figure 11 and Figure 12 include only those patients who have either died or been discharged from critical care.
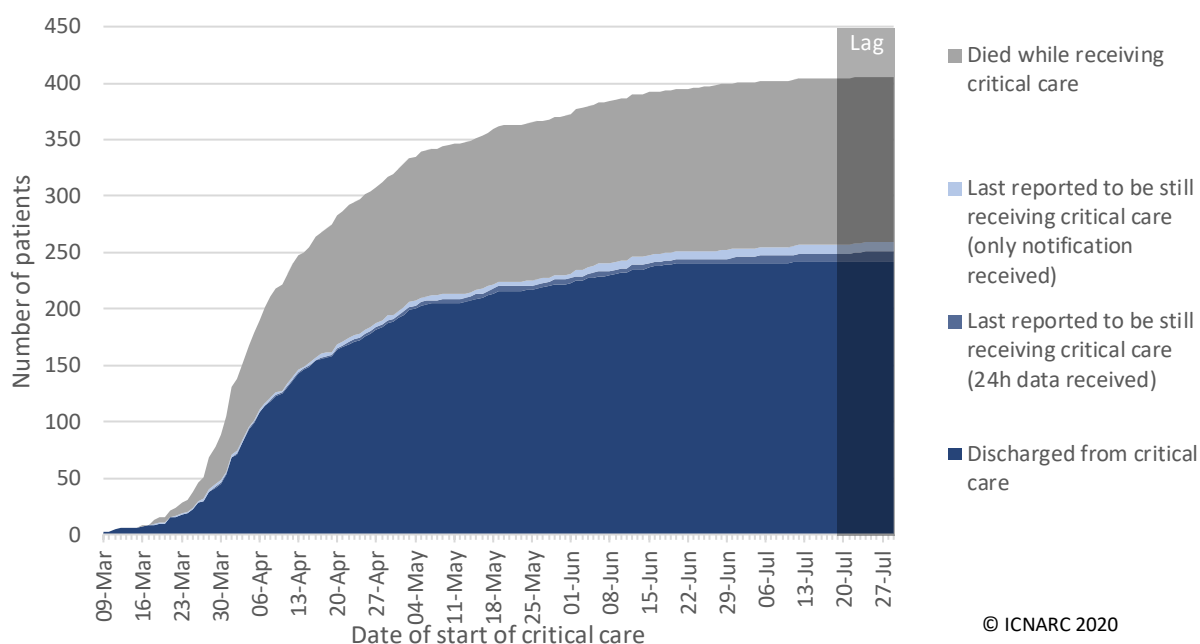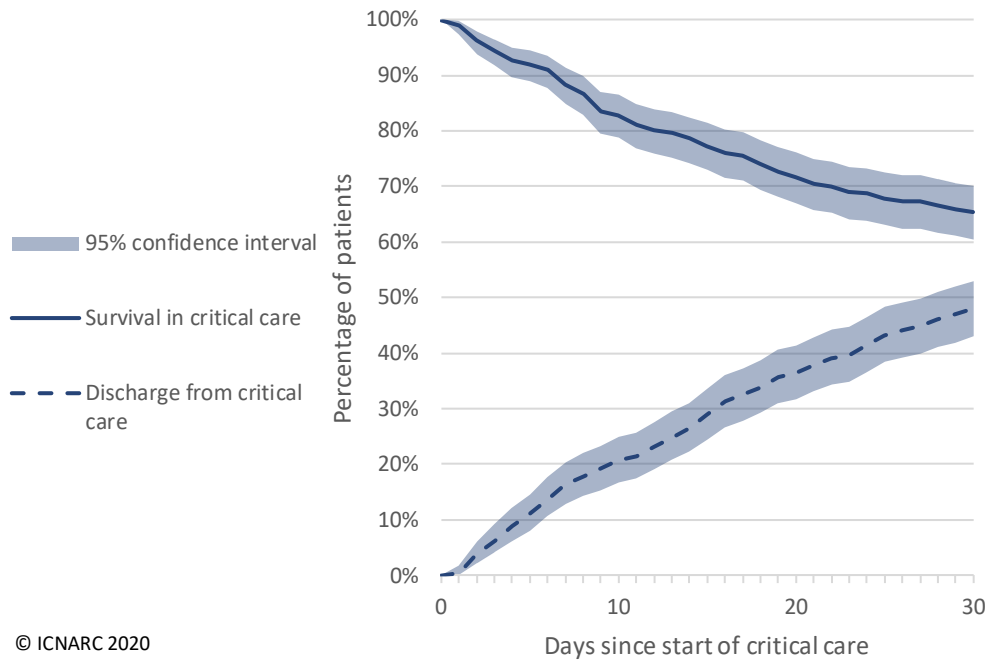

© ICNARC 2020

Figure 9   Cumulative outcomes by date of start of critical care *

* Please note that patients whose outcome data have not been received are assumed to remain in critical care as of 30 July 2020.

Died while receiving critical care	0	68	112	136
Still receiving critical care	398	247	140	69
Discharged from critical care	0	82	144	189
Censored	0	1	2	4

Figure 10   30-day survival among patients with at least 24h data received

Please note that due to the time lag in notification of patients' discharge or death, this figure is expected to be biased towards *longer* lengths of stay in critical care. Patients who are still in critical care are included only for the period in which they are known to have been in critical care, i.e. from their date of admission until yesterday. Due to the emerging nature of the UK epidemic, the total number of patients available for reporting becomes smaller at longer lengths of follow-up. Compared with the survival statistics presented in Table 3, this approach makes better use of all available data, including data about patients who are still in critical care.

Table 3   Outcome, duration of critical care and organ support *

Critical care outcomes among patients who have been discharged or died	Patients with COVID-19 and outcome reported (N=390)	Patients with viral pneumonia (non-COVID-19), 2017-19 (N=5626)
Outcome at end of critical care, n (%)		
Discharged	242 (62.1)	4423 (78.6)
Died	148 (37.9)	1203 (21.4)
Duration of critical care		
Duration of critical care † (days), median (IQR)		
Survivors	15 (6, 27.5)	6 (3, 13)
Non-survivors	10 (6, 19)	6 (3, 13)
Organ support (Critical Care Minimum Dataset) *		
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	319 (81.8)	2721 (48.4)
Basic respiratory support	210 (53.8)	4527 (80.5)
Advanced cardiovascular support	105 (26.9)	1261 (22.4)
Basic cardiovascular support	377 (96.7)	5219 (92.8)
Renal support	118 (30.3)	957 (17.0)
Liver support	0 (0.0)	53 (0.9)
Neurological support	37 (9.5)	320 (5.7)
Combinations of advanced respiratory, advanced cardiovascular and renal support, n (%):		
Advanced respiratory support only	154 (39.5)	1257 (22.3)
Advanced cardiovascular support only	1 (0.3)	79 (1.4)
Renal support only	7 (1.8)	116 (2.1)
Advanced respiratory and advanced cardiovascular support only	55 (14.1)	640 (11.4)
Advanced respiratory and renal support only	62 (15.9)	299 (5.3)
Advanced cardiovascular and renal support only	1 (0.3)	17 (0.3)
Advanced respiratory, advanced cardiovascular and renal support	48 (12.3)	525 (9.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	15 (8, 23)	9 (4, 17)
Total (advanced + basic) respiratory support	14 (6, 23)	6 (3, 12)
Advanced cardiovascular support	3 (2, 6)	3 (2, 5)
Total (advanced + basic) cardiovascular support	14 (7, 24)	6 (3, 12)
Renal support	8 (3, 15)	6 (3, 12)

Please note that owing to the emerging nature of the epidemic, the sample of patients with confirmed COVID-19 represented in this table is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly. This does not apply to the comparison patients with viral pneumonia (non-COVID-19), 2017-19. * Please see Definitions on page 13. † Duration of critical care is from original admission to critical care until final unit outcome and includes any time spent outside critical care areas (e.g. prior to any readmissions).
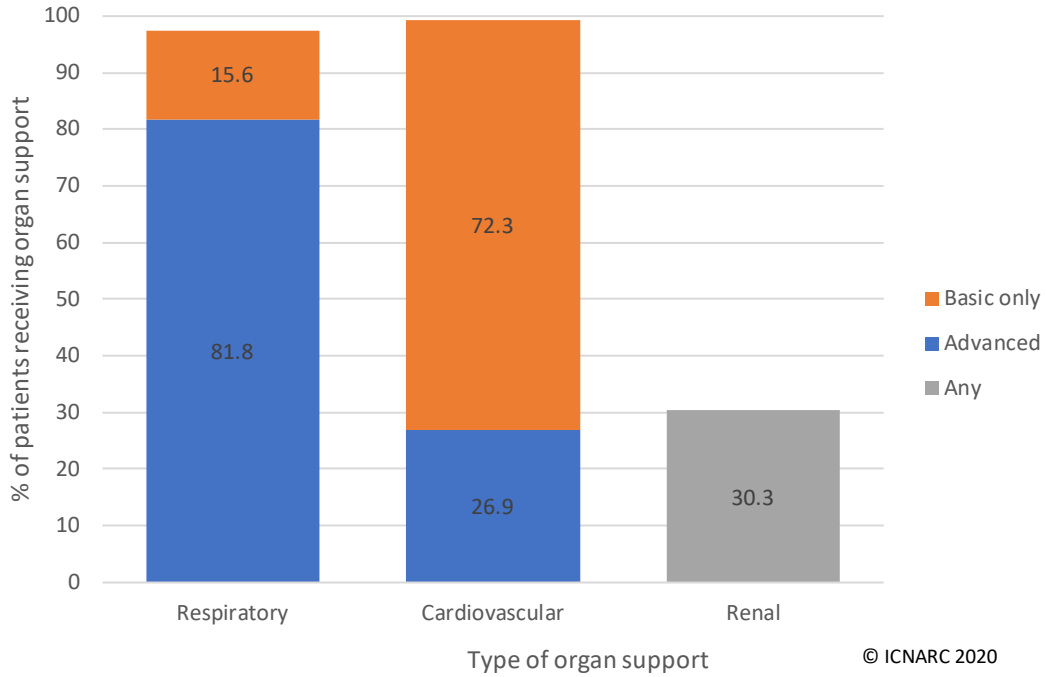
Figure 11   Percentage of patients receiving organ support *

Please note that owing to the emerging nature of the epidemic, the sample of patients with confirmed COVID-19 represented in this table is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death, i.e. patients who died or recovered quickly. * Please see Definitions on page 13.
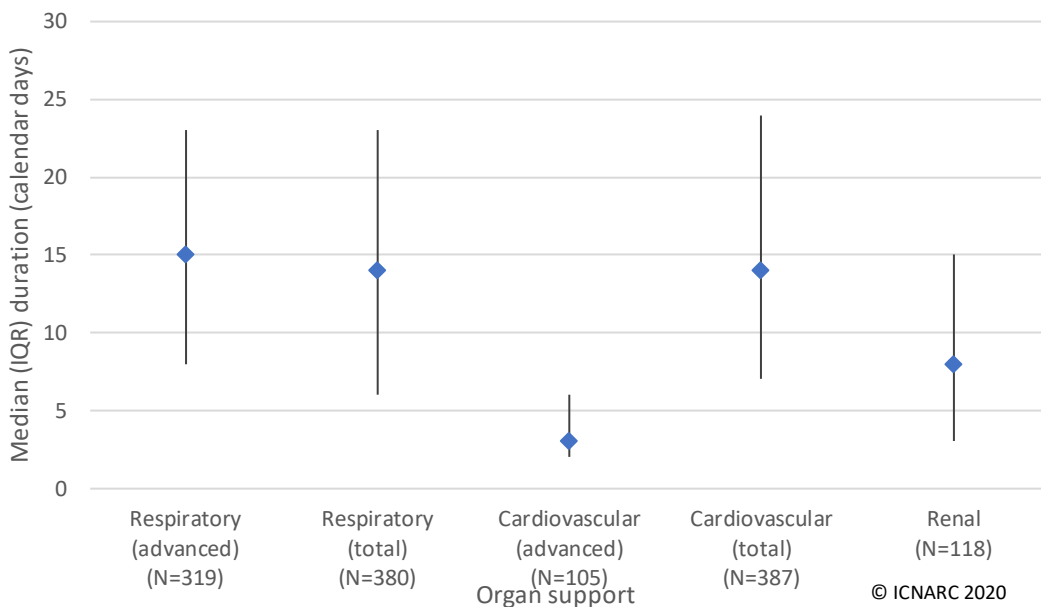

Figure 12   Duration of organ support received *

This Figure presents median and interquartile range, in calendar days. Please note that owing to the emerging nature of the epidemic, the sample of patients with confirmed COVID-19 represented in this table is biased towards patients with *shorter* lengths of stay in critical care prior to discharge or death, i.e. patients who died or recovered quickly. * Please see Definitions on page 13.

Definitions

Patients are classified as either:

- Notification received only: ICNARC has received a notification of the patient's admission to critical care but has not received any patient data from the first 24 hours or beyond
- 24h data received only: ICNARC has received patient data relating to the first 24 hours in critical care but has not yet been notified of the patient's critical care outcome
- Outcome data received: ICNARC has received submission of data relating to the patient's <u>critical care</u> outcome (e.g. survival, length of stay, duration of organ support)
- Hospital outcome data received: Data have been updated with outcomes at ultimate discharge from hospital (Please note that these data are currently limited for patients with COVID-19 and not included in this report)

Ethnicity is recorded using the ethnic category codes from the 2001 census and grouped as:

- White: White – British; White – Irish; White – any other
- Mixed: Mixed – white and black Caribbean; Mixed – white and black African; Mixed – white and Asian; Mixed – any other
- Asian: Asian or Asian British – Indian; Asian or Asian British – Pakistani; Asian or Asian British – Bangladeshi; Asian or Asian British – any other
- Black: Black or black British – Caribbean; Black or black British – African; Black or black British – any other
- Other: Other ethnic group – Chinese; Any other ethnic group
- Not stated or not recorded

Index of Multiple Deprivation (IMD) is based on the patient's usual residential postcode (assigned at the level of Lower Layer Super Output Area) according to:

- English Index of Multiple Deprivation 2019 for postcodes in England
- Welsh Index of Multiple Deprivation 2019 for postcodes in Wales
- Northern Ireland Multiple Deprivation Measure 2017 for postcodes in Northern Ireland

Body mass index is calculated as the weight in kilograms divided by the height in metres squared. Weight and height values may have been measured or estimated.

Dependency prior to admission to acute hospital is assessed as the best description for the dependency of the patient in the two weeks prior to admission to acute hospital and prior to the onset of the acute illness, i.e. "usual" dependency. It is assessed according to the amount of personal assistance they receive with daily activities (bathing, dressing, going to the toilet, moving in/out of bed/chair, continence and eating).

Very severe comorbidities must have been evident within the six months prior to critical care and documented at or prior to critical care:

- Cardiovascular: symptoms at rest
- Respiratory: shortness of breath with light activity or home ventilation
- Renal: renal replacement therapy 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 six months, HIV/AIDS or congenital immune deficiency

Mechanical ventilation during the first 24 hours was identified by the recording of a ventilated respiratory rate, indicating that all or some of the breaths or a portion of the breaths (pressure support) were delivered by a mechanical device. This usually indicates invasive ventilation; BPAP (bilevel positive airway pressure) would meet this definition but CPAP (continuous positive airway pressure) does not.

Organ support is recorded as the number of calendar days (00:00-23:59) on which the support was received at any time, defined as:

- Advanced respiratory: invasive ventilation, BPAP via trans-laryngeal tube or tracheostomy, CPAP via trans-laryngeal tube, 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: central nervous system depression sufficient to prejudice airway, invasive neurological monitoring, continuous IV medication to control seizures, therapeutic hypothermia

Acknowledgement