

ICNARC report on COVID-19 in critical care: Wales 4 March 2022

This report presents analyses of data on patients critically ill with confirmed COVID-19, admitted up to 23:59 on 28 February 2022 (reported to ICNARC by 23:59 on 3 March 2022), from critical care units in Wales participating in the Case Mix Programme (the national clinical audit for adult critical care).

Data are reported separately for patients critically ill with confirmed COVID-19 either at or after the admission to critical care:

- admitted from 1 May 2021 to date; and
- admitted from 1 September 2020 to 30 April 2021.

For additional reporting on patients admitted up to 31 August 2020, please see the report dated 5 July 2021 available from <https://www.icnarc.org/Our-Audit/Audits/Cmp/Reports>.

Reporting process

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

- log a case with ICNARC by submitting a record, with minimal data, as soon as they have an admission with confirmed COVID-19;
- resubmit data, including 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.

Contents

Admissions to critical care	4
Patient characteristics	10
Patient characteristics – invasively ventilated first 24 hours	17
Outcomes, duration of critical care and organ support	20
Definitions	21
Publications	22
Acknowledgement	23

List of Figures

1	Numbers of patients with data included in this report and outstanding *	4
2	Number of new patients by date of admission to critical care	5
3	Number of new patients admitted by time period *	6
4	Cumulative number of patients by time period *	7
5	Number of patients in critical care *	8
6	Number of patients in critical care * by time period	9
7	Age and sex distribution	13
8	Ethnicity distribution compared with the local population	14
9	Index of Multiple Deprivation * distribution compared with the general population	15
10	Body mass index * distribution compared with the age- and sex-matched general population	16
11	Critical care and acute hospital outcomes	20

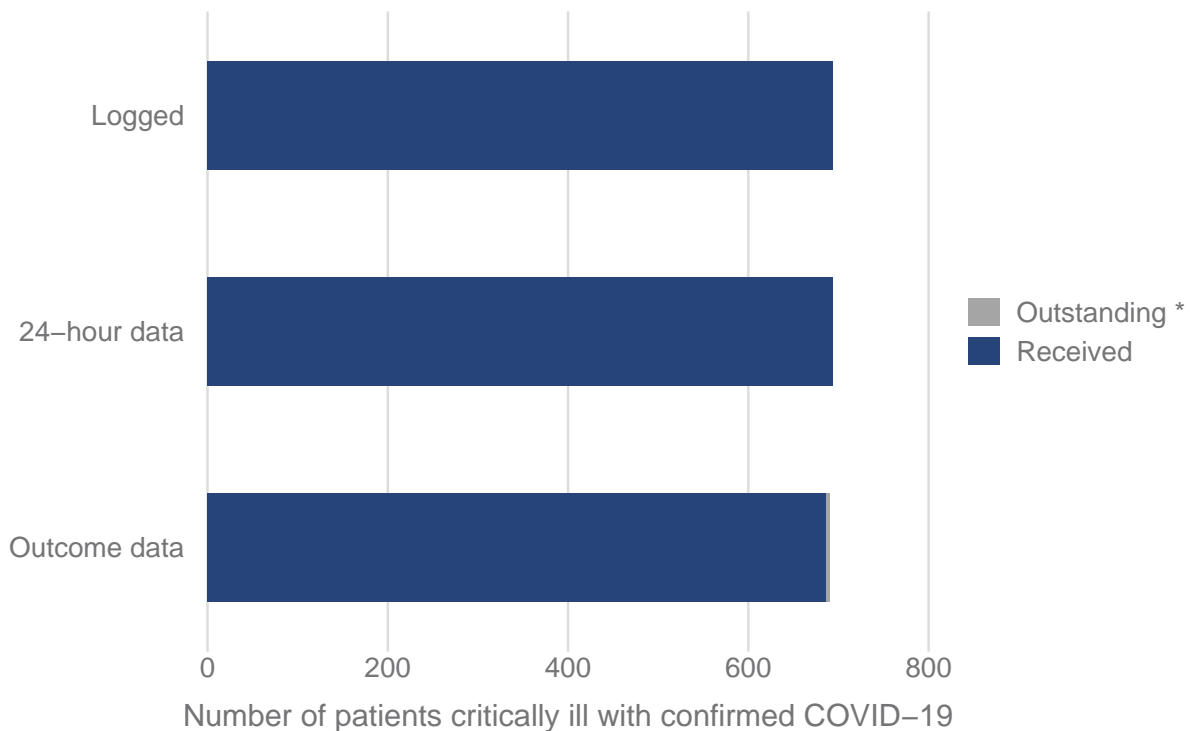
List of Tables

1	Patient characteristics: demographics	10
2	Patient characteristics: medical history	11
3	Patient characteristics: indicators of acute severity	12
4	Patient characteristics: demographics (invasively ventilated first 24 hours)	17
5	Patient characteristics: medical history (invasively ventilated first 24 hours)	18
6	Patient characteristics: indicators of acute severity (invasively ventilated first 24 hours)	19

* Please see individual notes for Figures/Tables.

Admissions to critical care

ICNARC have logged data for 743 admissions of 694 patients critically ill with confirmed COVID-19, either at or after admission to critical care, admitted from 1 May 2021 to date in Wales. Of these, data covering the first 24 hours of critical care have been submitted to ICNARC for 694 patients (Figure 1). Of the 694 total patients, 686 have outcomes reported and 8 patients were last reported as still receiving critical care. These patients are compared with a cohort of 905 patients with confirmed COVID-19 admitted from 1 September 2020 to 30 April 2021.



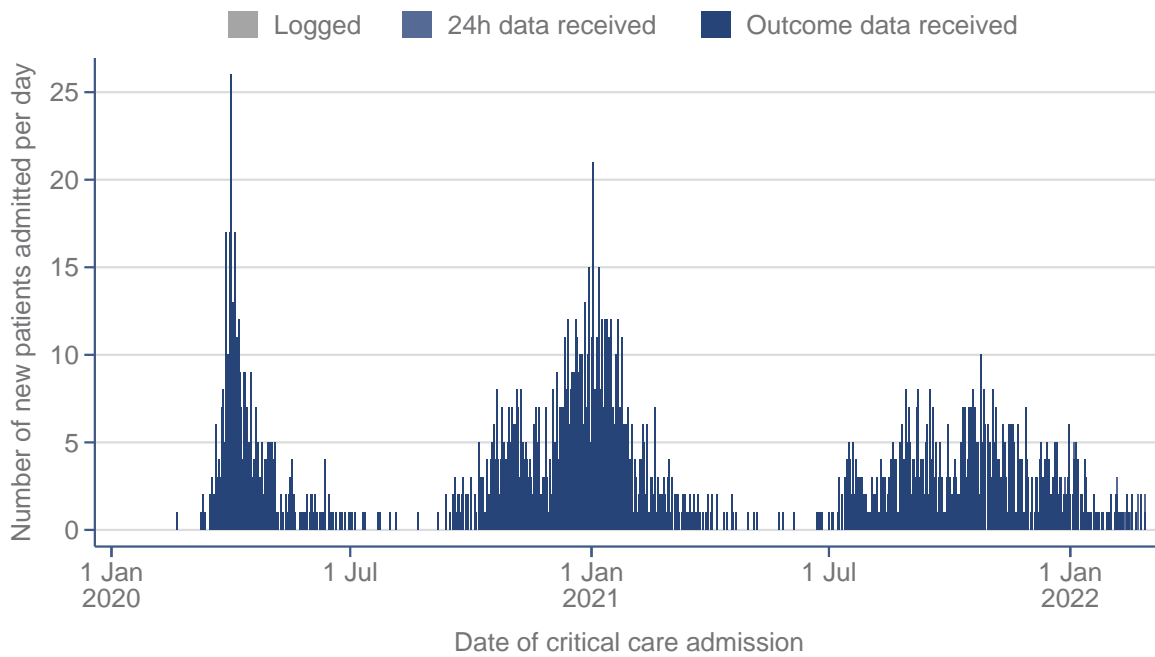
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Figure 1. Numbers of patients with data included in this report and outstanding *

Numbers of critically ill patients with confirmed COVID-19 admitted from 1 May 2021 to date with data included in this report and outstanding *.

* Please note that 24-hour data are considered outstanding when a case was logged 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 admission to critical care.

The numbers of new patients, cumulative numbers of patients and numbers of patients in critical care by date are shown in Figures 2-6. Please note that these figures are affected by a variable lag time for submission of data.



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Figure 2. Number of new patients by date of admission to critical care

Number of new patients critically ill with confirmed COVID-19 by date of admissions to critical care over the entire epidemic.

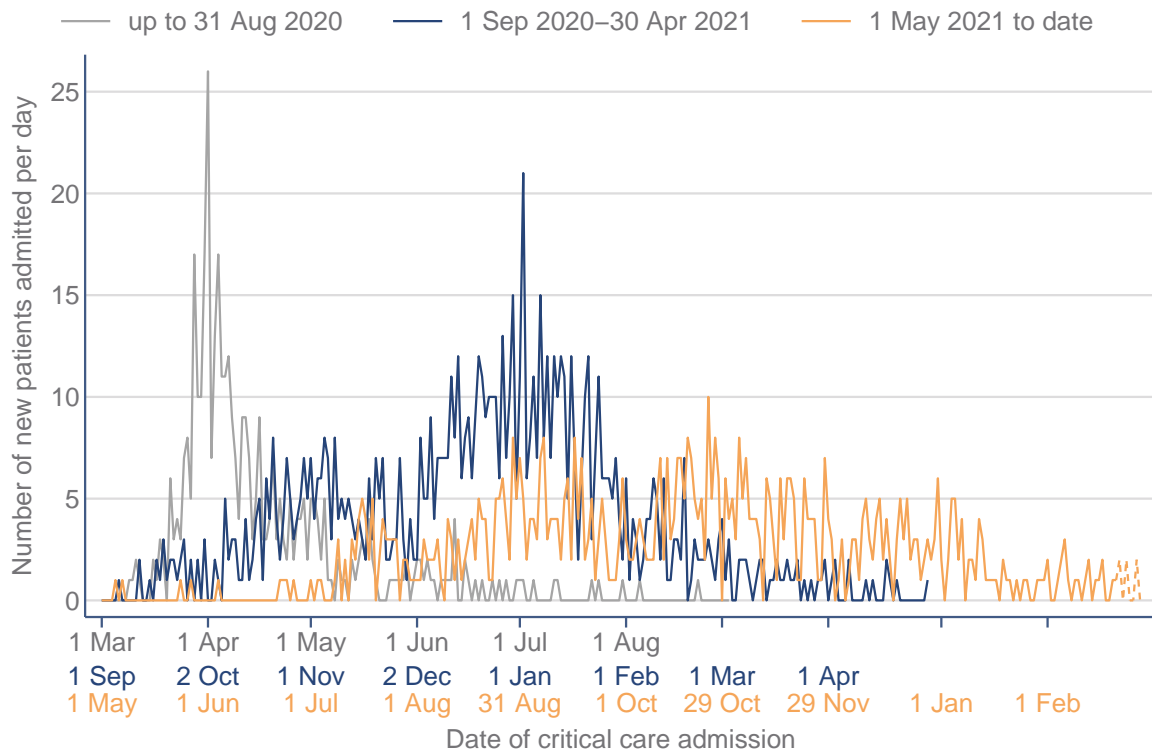
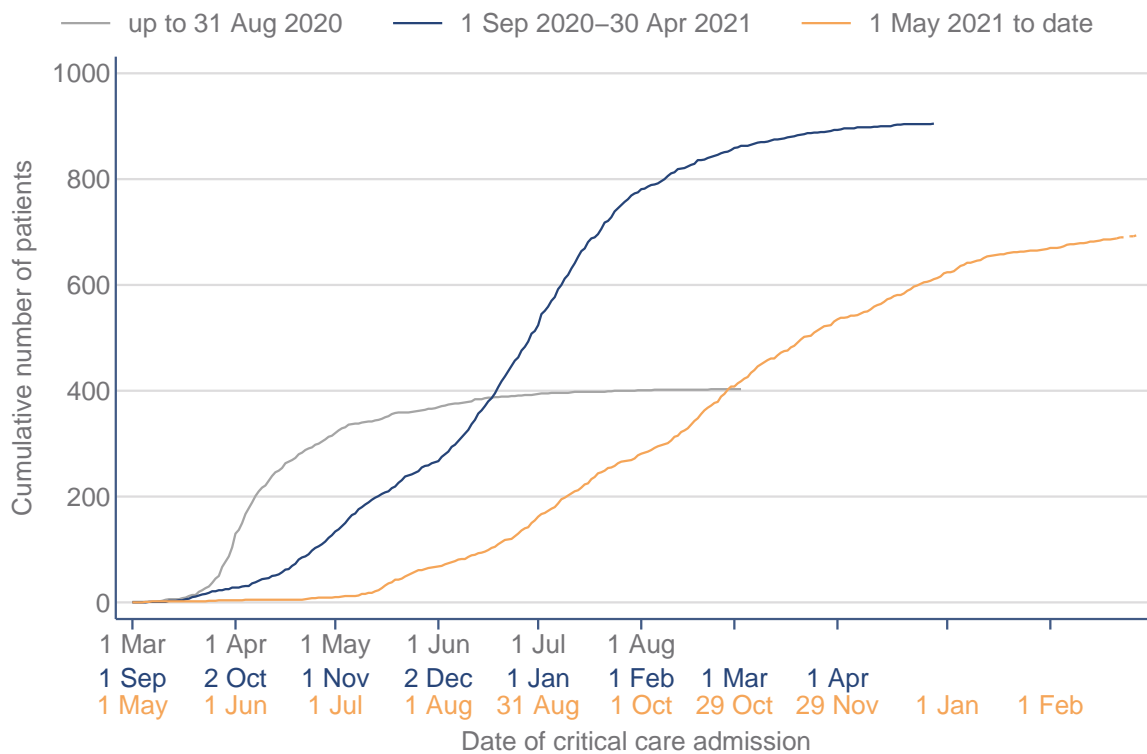


Figure 3. Number of new patients admitted by time period *

Comparison of the number of new patients critically ill with confirmed COVID-19 by date of admission to critical care from 1 May 2021 to date compared with 1 September 2020 to 30 April 2021 and 1 March 2020 to 31 August 2020.

* Dashed line indicates lag in data submission.

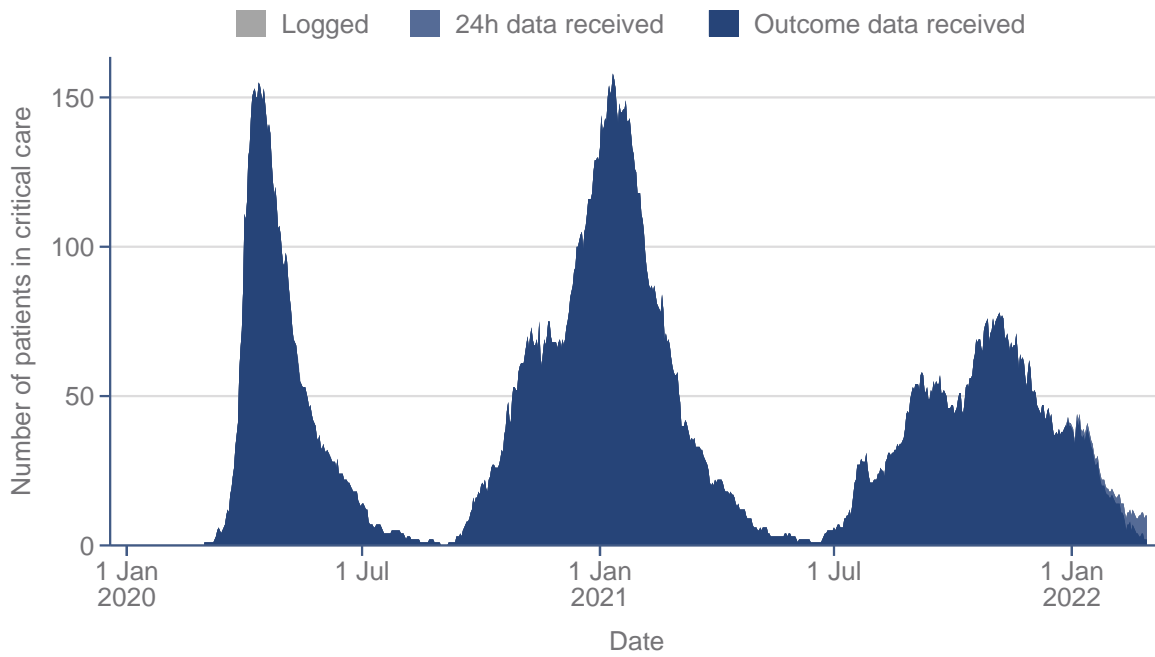


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Figure 4. Cumulative number of patients by time period *

Comparison of the cumulative number of patients critically ill with confirmed COVID-19 by date of admission to critical care from 1 May 2021 to date compared with 1 September 2020 to 30 April 2021 and 1 March 2020 to 31 August 2020.

* Dashed line indicates lag in data submission.

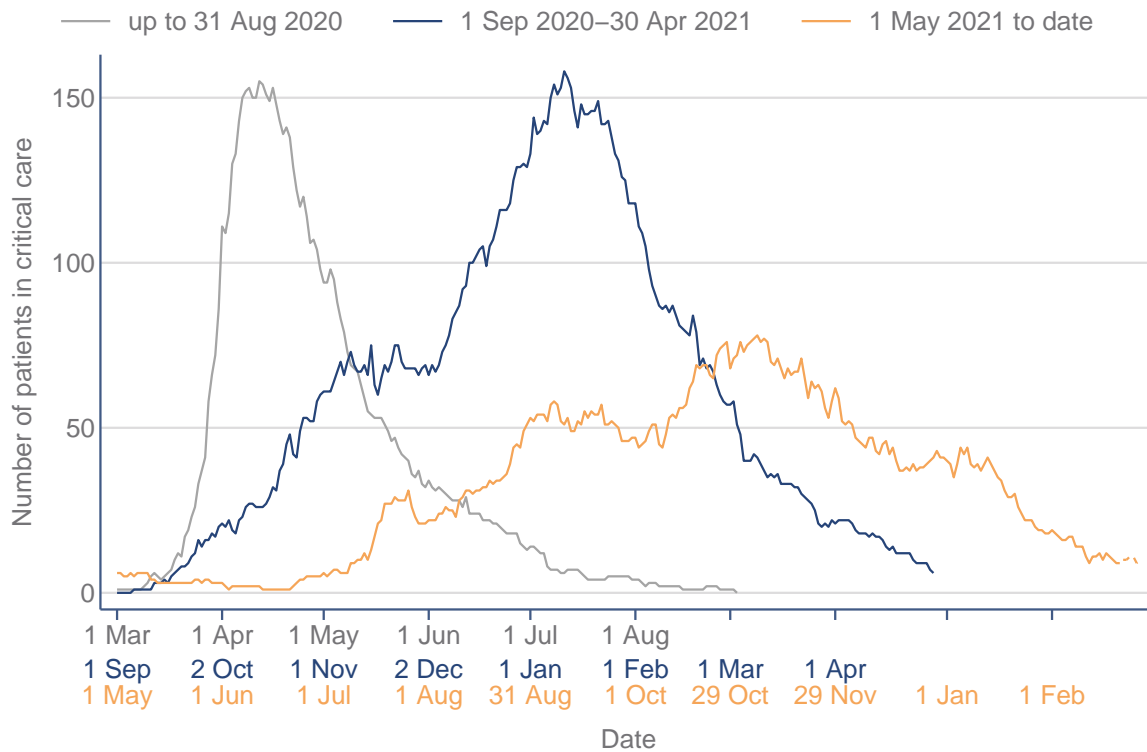


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Figure 5. Number of patients in critical care *

Number of patients with confirmed COVID-19 in critical care * by date over the entire epidemic.

* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 28 February 2022.



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Figure 6. Number of patients in critical care * by time period

Number of patients with confirmed COVID-19 in critical care * by date from 1 May 2021 to date compared with 1 September 2020 to 30 April 2021 and 1 March 2020 to 31 August 2020.

* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 28 February 2022. Dashed line indicates lag in data submission.

Patient characteristics

Characteristics of patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date are summarised in Tables 1-3 and compared with those admitted from 1 September 2020 to 30 April 2021.

Table 1. Patient characteristics: demographics

Demographics	Patients with confirmed COVID-19	
	Admitted 1 May 2021 to date (N=694)	Admitted 1 Sep 2020-30 Apr 2021 (N=905)
Age at admission (years) [N=693]		
Mean (SD)	55.1 (14.5)	58.8 (12.1)
Median (IQR)	57 (46, 66)	60 (52, 68)
Sex, n (%) [N=694]		
Female	263 (37.9)	303 (33.5)
Male	431 (62.1)	602 (66.5)
Ethnicity, n (%) [N=661]		
White	625 (94.6)	834 (93.3)
Mixed	1 (0.2)	7 (0.8)
Asian	22 (3.3)	42 (4.7)
Black	9 (1.4)	6 (0.7)
Other	4 (0.6)	5 (0.6)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=688]		
1 (least deprived)	85 (12.4)	132 (14.7)
2	125 (18.2)	152 (16.9)
3	135 (19.6)	144 (16.0)
4	169 (24.6)	206 (22.9)
5 (most deprived)	174 (25.3)	266 (29.6)

* Please see Definitions on page 21.

Table 2. Patient characteristics: medical history

Medical history	Patients with confirmed COVID-19	
	Admitted 1 May 2021 to date (N=694)	Admitted 1 Sep 2020-30 Apr 2021 (N=905)
Dependency prior to admission to acute hospital, n (%) [N=680]		
Able to live without assistance in daily activities	592 (87.1)	764 (84.5)
Some assistance with daily activities	85 (12.5)	139 (15.4)
Total assistance with all daily activities	3 (0.4)	1 (0.1)
Very severe comorbidities *, n (%) [N=680]		
Cardiovascular	3 (0.4)	6 (0.7)
Respiratory	15 (2.2)	16 (1.8)
Renal	6 (0.9)	17 (1.9)
Liver	5 (0.7)	7 (0.8)
Metastatic disease	4 (0.6)	2 (0.2)
Haematological malignancy	26 (3.8)	17 (1.9)
Immunocompromised	36 (5.3)	36 (4.0)
Body mass index *, n (%) [N=693]		
<18.5	8 (1.2)	2 (0.2)
18.5-<25	130 (18.8)	183 (20.2)
25-<30	206 (29.7)	274 (30.3)
30-<40	240 (34.6)	336 (37.1)
≥40	109 (15.7)	110 (12.2)
CPR within previous 24h, n (%) [N=692]		
In the community	9 (1.3)	11 (1.2)
In hospital	11 (1.6)	11 (1.2)
Prior hospital length of stay [N=694]		
Mean (SD)	2.1 (4.1)	4.1 (7.5)
Median (IQR)	1 (0, 3)	2 (0, 5)
Currently or recently pregnant, n (% of females aged 16-49) [N=99]		
Currently pregnant	7 (7.1)	3 (3.8)
Recently pregnant (within 6 weeks)	11 (11.1)	4 (5.1)
Not known to be pregnant	81 (81.8)	72 (91.1)
COVID-19 reported as primary, rather than secondary, reason for admission to critical care †, n (%) [N=694]	598 (86.2)	831 (91.8)

* Please see Definitions on page 21.

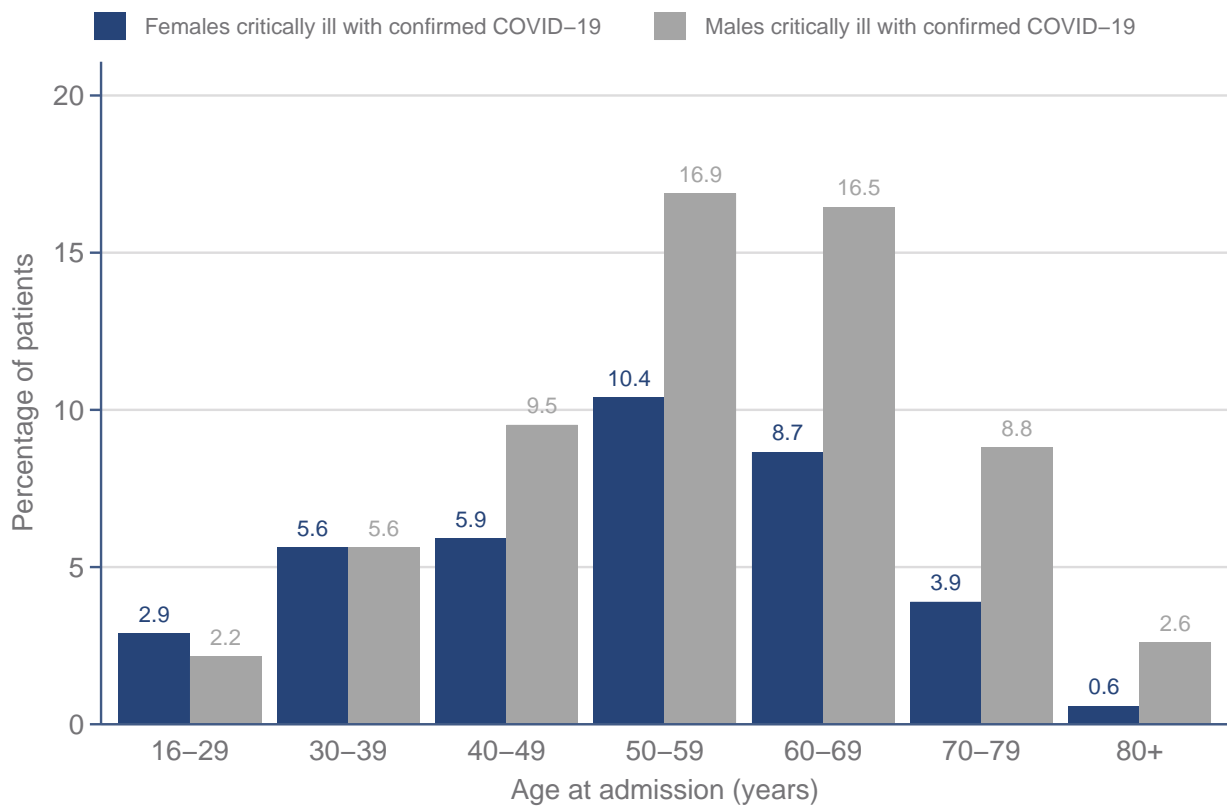
Table 3. Patient characteristics: indicators of acute severity

Indicators of acute severity	Patients with confirmed COVID-19 and 24h data received	
	Admitted 1 May 2021 to date (N=694)	Admitted 1 Sep 2020-30 Apr 2021 (N=905)
Invasively ventilated within first 24h *, n (%) [N=689]	229 (33.2)	453 (50.3)
APACHE II Score [N=691]		
Mean (SD)	14.2 (5.6)	15.0 (5.3)
Median (IQR)	13 (11, 17)	14 (11, 18)
PaO ₂ /FiO ₂ ratio † (kPa), median (IQR) [N=667]	13.2 (9.7, 19.8)	12.6 (8.9, 18.2)
PaO ₂ /FiO ₂ ratio †, n (%) [N=667]		
< 13.3 kPa (< 100 mmHg)	337 (50.5)	483 (54.4)
13.3-26.6 kPa (100-200 mmHg)	239 (35.8)	314 (35.4)
≥ 26.7 kPa (≥ 200 mmHg)	91 (13.6)	91 (10.2)
FiO ₂ †, median (IQR) [N=667]	0.60 (0.40, 0.80)	0.65 (0.50, 0.80)

* Please see Definitions on page 21. Indicators of acute severity are based on data from the first 24 hours of critical care.

† Derived from the arterial blood gas with the lowest PaO₂ during the first 24 hours of critical care.

The distribution of age and sex for patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date is presented in Figure 7.

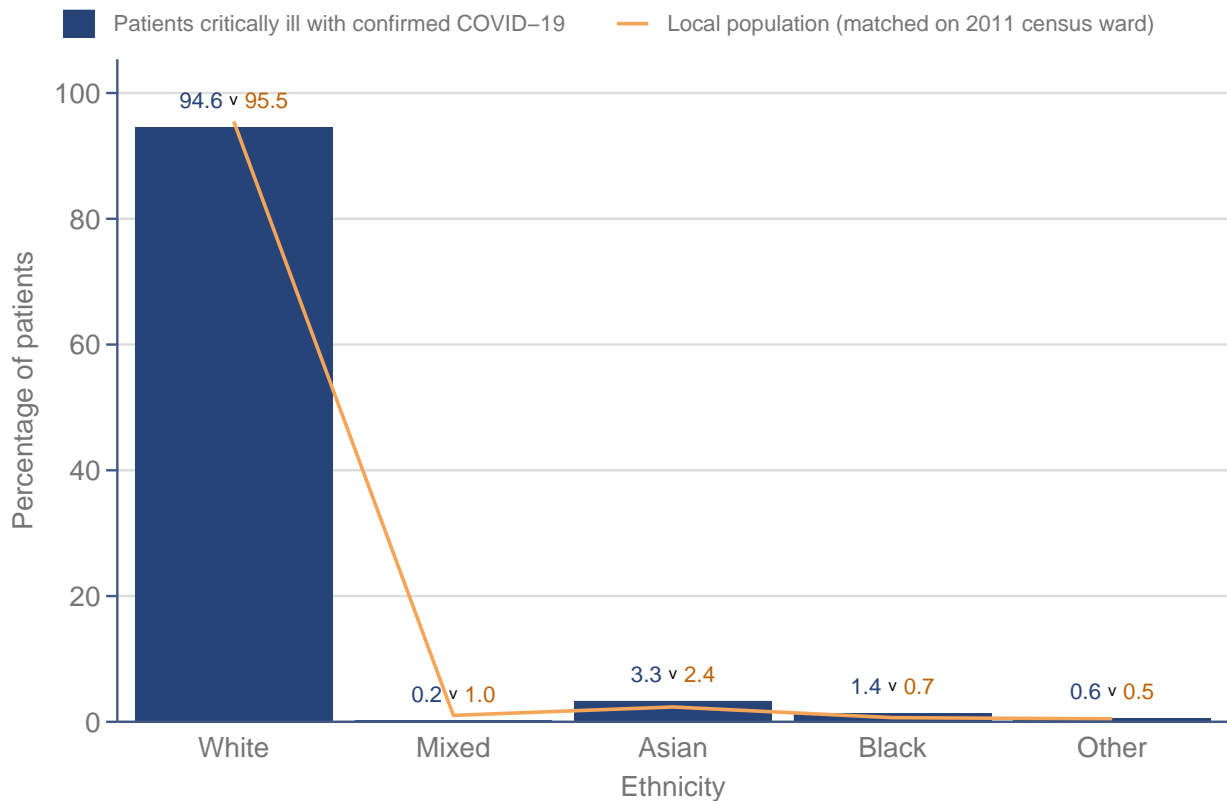


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Figure 7. Age and sex distribution

Age and sex distribution of patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date.

The distribution of ethnicity for patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date, compared with a local population matched on 2011 census ward for residence of patients critically ill with COVID-19, is presented in Figure 8.

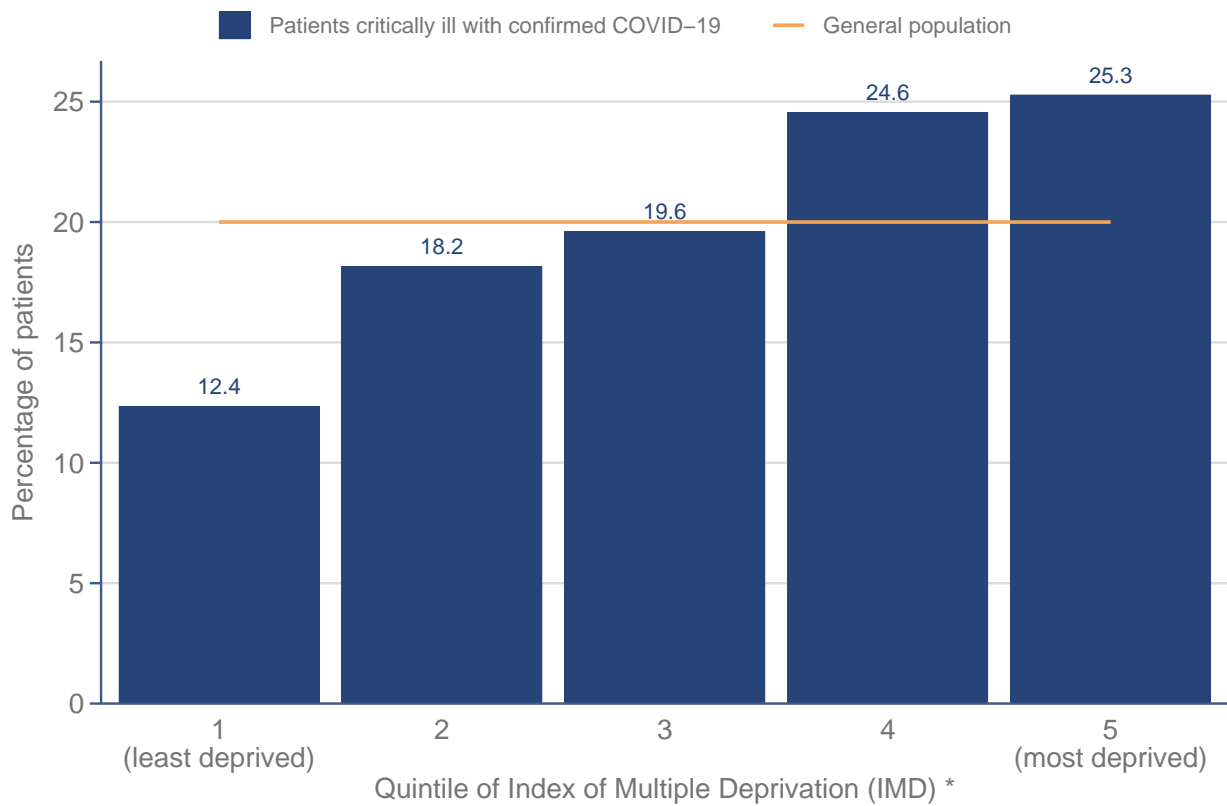


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Figure 8. Ethnicity distribution compared with the local population

Ethnicity distribution of patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date compared with the local population (linked to 2011 census ward).

The distribution of Index of Multiple Deprivation (IMD) for patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date, compared with the general population, is presented in Figure 9.



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Figure 9. Index of Multiple Deprivation * distribution compared with the general population

Index of Multiple Deprivation (IMD) * distribution of patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date compared with the general population.

* Please see Definitions on page 21.

The distribution of body mass index (BMI) for patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date, compared with an age- and sex-matched population (from the Health Survey for England 2018), is presented in Figure 10.

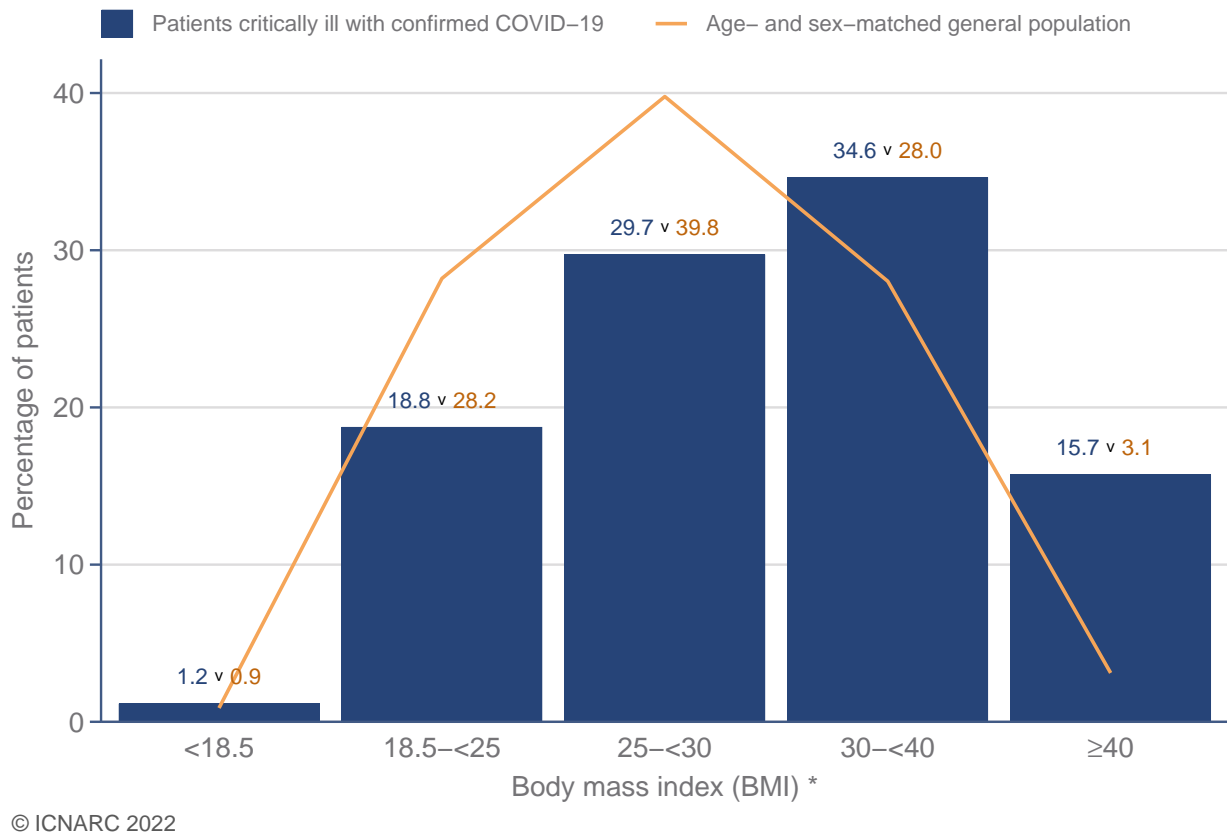


Figure 10. Body mass index * distribution compared with the age- and sex-matched general population

Body mass index (BMI) * distribution of patients critically ill with confirmed COVID-19 admitted from 1 May 2021 compared with the age- and sex-matched general population (Health Survey for England 2018).

* Please see Definitions on page 21.

Patient characteristics – invasively ventilated first 24 hours

Characteristics of patients critically ill with confirmed COVID-19 and receiving invasive ventilation during the first 24 hours in critical care admitted from 1 May 2021 to date are summarised in Tables 4-6 and compared with those admitted from 1 September 2020 to 30 April 2021.

Table 4. Patient characteristics: demographics (invasively ventilated first 24 hours)

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Demographics	Admitted 1 May 2021 to date (N=229)	Admitted 1 Sep 2020-30 Apr 2021 (N=453)
Age at admission (years) [N=228]		
Mean (SD)	55.0 (13.9)	59.7 (11.7)
Median (IQR)	57 (47, 65)	61 (53, 68)
Sex, n (%) [N=229]		
Female	106 (46.3)	138 (30.5)
Male	123 (53.7)	315 (69.5)
Ethnicity, n (%) [N=223]		
White	210 (94.2)	403 (90.4)
Mixed	0 (0.0)	6 (1.3)
Asian	8 (3.6)	29 (6.5)
Black	3 (1.3)	4 (0.9)
Other	2 (0.9)	4 (0.9)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=227]		
1 (least deprived)	26 (11.5)	63 (14.0)
2	36 (15.9)	60 (13.4)
3	31 (13.7)	68 (15.1)
4	60 (26.4)	102 (22.7)
5 (most deprived)	74 (32.6)	156 (34.7)

* Please see Definitions on page 21.

Table 5. Patient characteristics: medical history (invasively ventilated first 24 hours)

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Medical history	Admitted 1 May 2021 to date (N=229)	Admitted 1 Sep 2020-30 Apr 2021 (N=453)
Dependency prior to admission to acute hospital, n (%) [N=225]		
Able to live without assistance in daily activities	192 (85.3)	394 (87.2)
Some assistance with daily activities	33 (14.7)	57 (12.6)
Total assistance with all daily activities	0 (0.0)	1 (0.2)
Very severe comorbidities *, n (%) [N=225]		
Cardiovascular	0 (0.0)	1 (0.2)
Respiratory	4 (1.8)	2 (0.4)
Renal	2 (0.9)	3 (0.7)
Liver	2 (0.9)	5 (1.1)
Metastatic disease	1 (0.4)	2 (0.4)
Haematological malignancy	10 (4.4)	7 (1.5)
Immunocompromised	15 (6.7)	18 (4.0)
Body mass index *, n (%) [N=229]		
<18.5	1 (0.4)	0 (0.0)
18.5-<25	43 (18.8)	87 (19.2)
25-<30	66 (28.8)	148 (32.7)
30-<40	81 (35.4)	162 (35.8)
≥40	38 (16.6)	56 (12.4)
CPR within previous 24h, n (%) [N=228]		
In the community	8 (3.5)	11 (2.4)
In hospital	8 (3.5)	9 (2.0)
Prior hospital length of stay [N=229]		
Mean (SD)	2.5 (4.0)	4.1 (6.2)
Median (IQR)	1 (0, 4)	2 (0, 5)
Currently or recently pregnant, n (% of females aged 16-49) [N=35]		
Currently pregnant	1 (2.9)	2 (6.3)
Recently pregnant (within 6 weeks)	4 (11.4)	1 (3.1)
Not known to be pregnant	30 (85.7)	29 (90.6)
COVID-19 reported as primary, rather than secondary, reason for admission to critical care †, n (%) [N=229]	186 (81.2)	411 (90.7)

* Please see Definitions on page 21.

Table 6. Patient characteristics: indicators of acute severity (invasively ventilated first 24 hours)

Indicators of acute severity	Patients with confirmed COVID-19 invasively ventilated first 24 hours *	
	Admitted 1 May 2021 to date (N=229)	Admitted 1 Sep 2020-30 Apr 2021 (N=453)
APACHE II Score [N=229]		
Mean (SD)	16.4 (6.0)	16.0 (5.0)
Median (IQR)	16 (12, 20)	16 (13, 19)
PaO ₂ /FiO ₂ ratio † (kPa), median (IQR) [N=225]	11.8 (8.4, 19.6)	12.3 (8.2, 17.6)
PaO ₂ /FiO ₂ ratio †, n (%) [N=225]		
< 13.3 kPa (< 100 mmHg)	127 (56.4)	255 (57.0)
13.3-26.6 kPa (100-200 mmHg)	68 (30.2)	155 (34.7)
≥ 26.7 kPa (≥ 200 mmHg)	30 (13.3)	37 (8.3)
FiO ₂ †, median (IQR) [N=225]	0.65 (0.40, 0.90)	0.70 (0.50, 0.93)

* Please see Definitions on page 21. Indicators of acute severity are based on data from the first 24 hours of critical care.

† Derived from the arterial blood gas with the lowest PaO₂ during the first 24 hours of critical care.

Outcomes, duration of critical care and organ support

Critical care outcomes have been received for 686 (of 694) patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date. Of these, 224 have died and 462 have been discharged from critical care (Figures 11). The remaining 8 were last reported to still be receiving critical care.

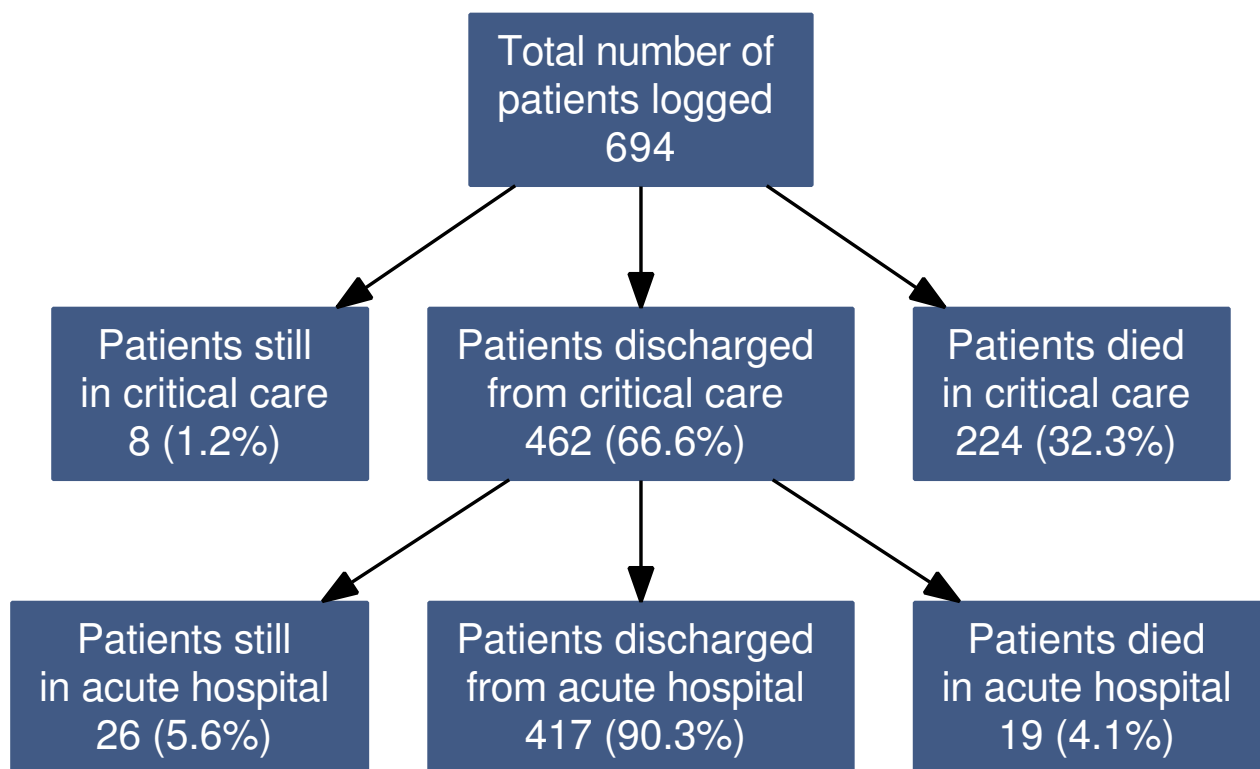


Figure 11. Critical care and acute hospital outcomes

Critical care and acute hospital outcomes for patients critically ill with confirmed COVID-19 admitted from 1 May 2021 to date.

Definitions

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

Invasive ventilation during the first 24 hours was defined as mechanical ventilation (identified by the recording of a ventilated respiratory rate, indicating that all or some of the breaths or a portion of the breaths were delivered by a mechanical device) and sedation (receiving continuous or intermittent doses of agents to produce and maintain a continuous decreased level of consciousness with or without paralysing agents) at any time during the first 24 hours and not reported as having zero days of advanced respiratory support.

Publications

The following publications, based on Case Mix Programme data for patients critically ill with confirmed COVID-19, are published, in press or in preprint:

- Richards-Belle A, Orzechowska I, Doidge J, Thomas K, Harrison DA, Koelewyn A, Christian MD, Shankar-Hari M, Rowan KM, Gould DW. Critical care outcomes, for the first 200 patients with confirmed COVID-19, in England, Wales and Northern Ireland: a report from the ICNARC Case Mix Programme. *J Intensive Care Soc* 2020; doi:[10.1177/1751143720961672](https://doi.org/10.1177/1751143720961672)
- Richards-Belle A, Orzechowska I, Gould DW, Thomas K, Doidge JC, Mouncey PR, Christian MD, Shankar-Hari M, Harrison DA, Rowan KM. COVID-19 in critical care: epidemiology of the first epidemic wave across England, Wales and Northern Ireland. *Intensive Care Med* 2020; 46:2035-47. doi:[10.1007/s00134-020-06267-0](https://doi.org/10.1007/s00134-020-06267-0)
- Ferrando-Vivas P, Doidge J, Thomas K, Gould DW, Mouncey P, Shankar-Hari M, Young JD, Rowan KM, Harrison DA. Prognostic Factors for 30-day Mortality in Critically Ill Patients with Coronavirus Disease 2019: An Observational Cohort Study. *Crit Care Med* 2021; 49:102-11. doi:[10.1097/CCM.0000000000004740](https://doi.org/10.1097/CCM.0000000000004740)
- Doidge JC, Gould DW, Ferrando-Vivas P, Mouncey PR, Thomas K, Shankar-Hari M, Harrison DA, Rowan KM. Trends in intensive care for patients with COVID-19 in England, Wales and Northern Ireland. *Am J Respir Crit Care Med* 2021; 203:565-74. doi:[10.1164/rccm.202008-3210C](https://doi.org/10.1164/rccm.202008-3210C)
- Wilcox ME, Rowan KM, Harrison DA, Doidge JC. Does Unprecedented ICU Capacity Strain, As Experienced During the COVID-19 Pandemic, Impact Patient Outcome? *Crit Care Med* 2022; doi:[10.1097/CCM.0000000000005464](https://doi.org/10.1097/CCM.0000000000005464)
- Ferrando-Vivas P, Doidge J, Thomas K, Gould DW, Mouncey P, Shankar-Hari M, Young JD, Rowan KM, Harrison DA. Development and validation of a prediction model for 28-day in-hospital mortality in critically ill patients with COVID-19. *Preprints.org* 2021; doi:[10.20944/preprints202102.0059.v1](https://doi.org/10.20944/preprints202102.0059.v1)
- Harrison DA, Gould DW, Rowan KM. Potential impact of the UK vaccination strategy on the numbers of patients becoming critically ill with COVID-19. *OSF Preprints* 2021; doi:[10.31219/osf.io/yks8c](https://doi.org/10.31219/osf.io/yks8c)

The following publications, based on external data sources linked with Case Mix Programme data for patients critically ill with confirmed COVID-19, are published, in press or in preprint:

- Hippisley-Cox J, Young D, Coupland C, et al. Risk of severe COVID-19 disease with ACE inhibitors and angiotensin receptor blockers: cohort study including 8.3 million people. *Heart* 2020; 106:1503-11. doi:[10.1136/heartjnl-2020-317393](https://doi.org/10.1136/heartjnl-2020-317393)
- Pairo-Castineira E, Clohisey S, Klaric L, et al. Genetic mechanisms of critical illness in Covid-19. *Nature* 2021; 591:92-8. doi:[10.1038/s41586-020-03065-y](https://doi.org/10.1038/s41586-020-03065-y)
- Forbes H, Morton CE, Bacon S, et al. Association between living with children and outcomes from covid-19: OpenSAFELY cohort study of 12 million adults in England. *BMJ* 2021; 372:n628. doi:[10.1136/bmj.n628](https://doi.org/10.1136/bmj.n628)
- Aveyard P, Gao M, Lindson N, et al. Association between pre-existing respiratory disease and its treatments and severe COVID-19: a population cohort study. *Lancet Respir Med* 2021; doi:[10.1016/S2213-2600\(21\)00095-3](https://doi.org/10.1016/S2213-2600(21)00095-3)
- Mathur R, Rentsch CT, Morton C, et al. Ethnic differences in SARS-CoV-2 infection and COVID-19-related hospitalisation, intensive care unit admission, and death in 17 million adults in England: an observational cohort study using the OpenSAFELY platform. *Lancet* 2021; 397:1711-24. doi:[10.1016/S0140-6736\(21\)00634-6](https://doi.org/10.1016/S0140-6736(21)00634-6)

- Patone M, Thomas K, Hatch R, et al. Mortality and critical care unit admission associated with the SARS-CoV-2 lineage B.1.1.7 in England: an observational cohort study. *Lancet Infect Dis* 2021; doi:[10.1016/S1473-3099\(21\)00318-2](https://doi.org/10.1016/S1473-3099(21)00318-2)
- Edwards JM, Nolan JP, Soar J, et al. Impact of the COVID-19 pandemic on in-hospital cardiac arrests in the UK. *Resuscitation* 2022; 173:4-11. doi:[10.1016/j.resuscitation.2022.02.007](https://doi.org/10.1016/j.resuscitation.2022.02.007)
- Gao M, Aveyard P, Lindson N, et al. Association between smoking, e-cigarette use and severe COVID-19: a cohort study. *Int J Epidemiol* 2022; doi:[10.1093/ije/dyac028](https://doi.org/10.1093/ije/dyac028)
- MacKenna B, Kennedy NA, Mehkar A, et al. Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune modifying therapies: a nationwide cohort study in the OpenSAFELY platform. *medRxiv* 2021; doi:[10.1101/2021.09.03.21262888](https://doi.org/10.1101/2021.09.03.21262888)

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.”