

# ICNARC report on COVID-19 in critical care: Northern Ireland 17 February 2023

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This report presents analyses of data on patients critically ill with confirmed COVID-19, admitted up to 23:59 on 31 December 2022 (reported to ICNARC by 23:59 on 14 February 2023), from critical care units in Northern Ireland 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 January 2022 to 31 December 2022; and
- admitted from 1 May 2021 to 31 December 2021.

For additional reporting on patients admitted up to 31 August 2020 and patients admitted from 1 September 2020 to 30 April 2021, please see the reports dated 5 July 2021 and 8 April 2022, respectively, available from <https://www.icnarc.org/Our-Audit/Audits/Cmp/Reports>.

## Reporting process

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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.

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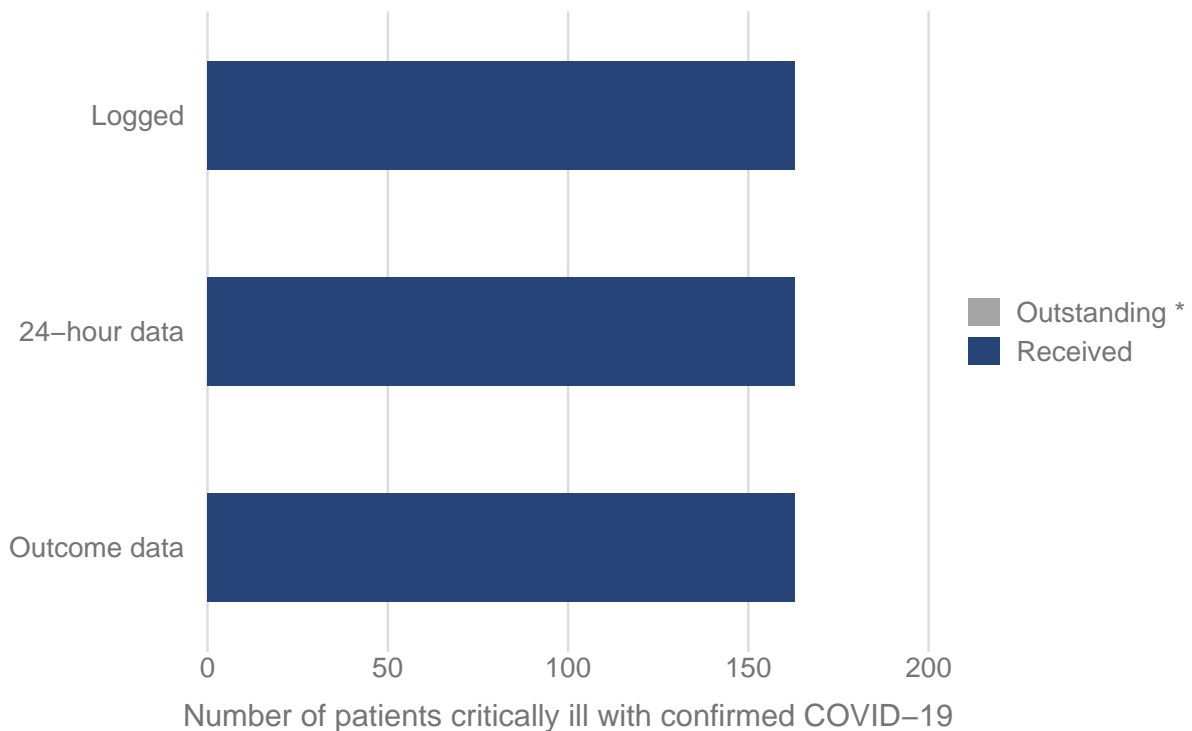
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\* Please see individual notes for Figures/Tables.

## Admissions to critical care

ICNARC have logged data for 173 admissions of 163 patients critically ill with confirmed COVID-19, either at or after admission to critical care, admitted from 1 January 2022 to 31 December 2022 in Northern Ireland. Of these, data covering the first 24 hours of critical care have been submitted to ICNARC for 163 patients (Figure 1). Of the 163 total patients, 163 have outcomes reported and 0 patients were last reported as still receiving critical care. These patients are compared with a cohort of 410 patients with confirmed COVID-19 admitted from 1 May 2021 to 31 December 2021.



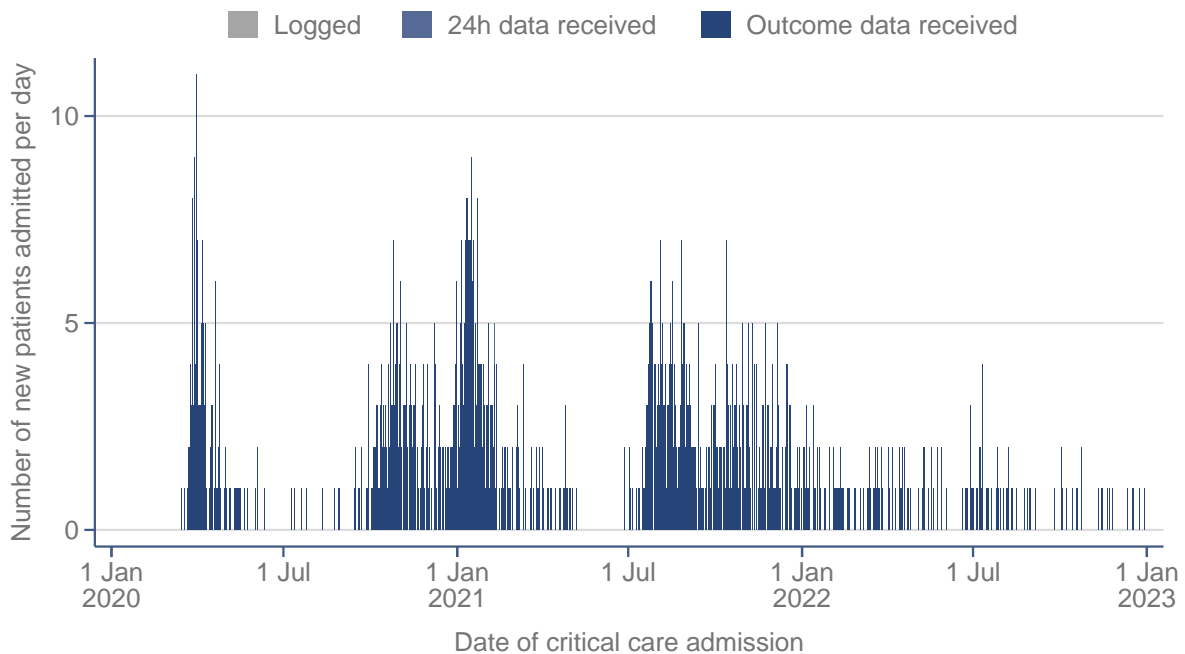
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### Figure 1. Numbers of patients with data included in this report and outstanding \*

Numbers of critically ill patients with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 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.

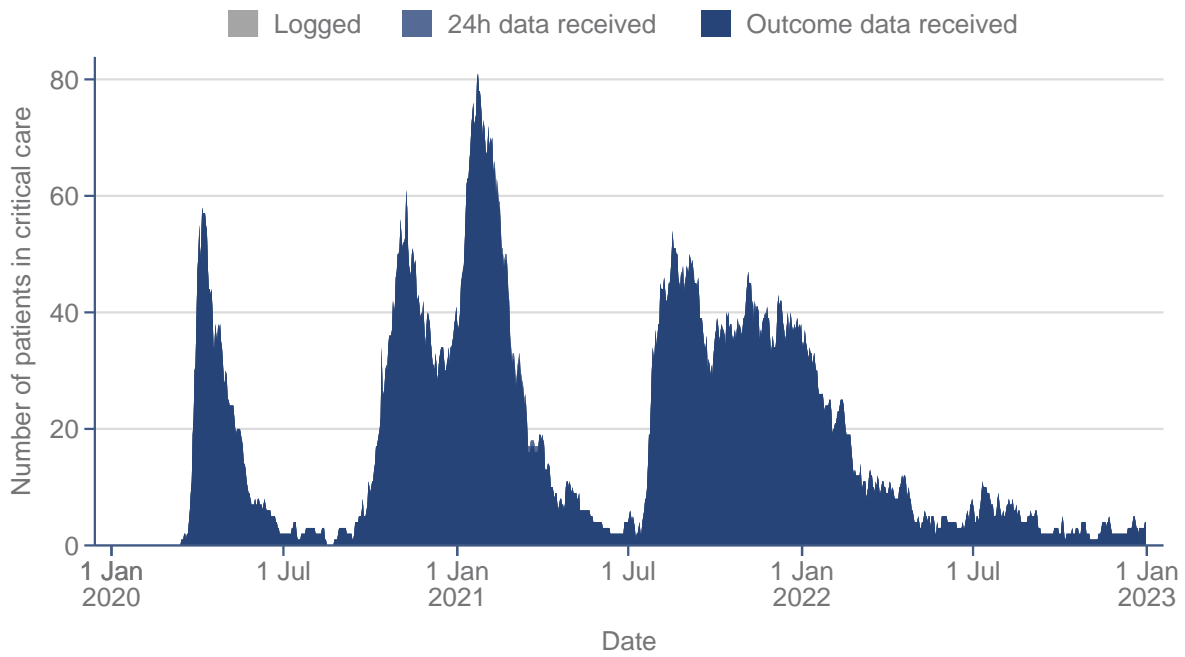
The numbers of new patients, cumulative numbers of patients and numbers of patients in critical care by date are shown in Figures 2-???. Please note that these figures are affected by a variable lag time for submission of data.



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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.



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**Figure 3. Number of patients in critical care \***

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

\* Please note logged cases are assumed to remain in critical care for the mean length of stay of other patients and patients whose outcome data have not been received are assumed to remain in critical care as of 31 December 2022.

## Patient characteristics

Characteristics of patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 are summarised in Tables 1-3 and compared with those admitted from 1 May 2021 to 31 December 2021.

**Table 1. Patient characteristics: demographics**

Demographics	Patients with confirmed COVID-19	
	Admitted 1 Jan 2022-31 Dec 2022 (N=163)	Admitted 1 May 2021-31 Dec 2021 (N=410)
Age at admission (years) [N=163]		
Mean (SD)	57.0 (16.9)	53.0 (14.9)
Median (IQR)	60 (46, 69)	53 (41, 65)
Sex, n (%) [N=163]		
Female	58 (35.6)	162 (39.5)
Male	105 (64.4)	248 (60.5)
Ethnicity, n (%) [N=162]		
White	159 (98.1)	396 (97.1)
Mixed	1 (0.6)	1 (0.2)
Asian	1 (0.6)	5 (1.2)
Black	0 (0.0)	1 (0.2)
Other	1 (0.6)	5 (1.2)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=159]		
1 (least deprived)	19 (11.9)	49 (12.1)
2	34 (21.4)	77 (19.1)
3	29 (18.2)	73 (18.1)
4	37 (23.3)	83 (20.5)
5 (most deprived)	40 (25.2)	122 (30.2)

\* Please see Definitions on page 25.

**Table 2. Patient characteristics: medical history**

Medical history	Patients with confirmed COVID-19	
	Admitted 1 Jan 2022-31 Dec 2022 (N=163)	Admitted 1 May 2021-31 Dec 2021 (N=410)
Dependency prior to admission to acute hospital, n (%) [N=163]		
Able to live without assistance in daily activities	131 (80.4)	369 (90.2)
Some assistance with daily activities	27 (16.6)	39 (9.5)
Total assistance with all daily activities	5 (3.1)	1 (0.2)
Very severe comorbidities *, n (%) [N=163]		
Cardiovascular	0 (0.0)	1 (0.2)
Respiratory	5 (3.1)	4 (1.0)
Renal	3 (1.8)	3 (0.7)
Liver	6 (3.7)	1 (0.2)
Metastatic disease	2 (1.2)	2 (0.5)
Haematological malignancy	8 (4.9)	5 (1.2)
Immunocompromised	16 (9.8)	18 (4.4)
Body mass index *, n (%) [N=163]		
<18.5	2 (1.2)	7 (1.7)
18.5-<25	73 (44.8)	61 (14.9)
25-<30	45 (27.6)	113 (27.6)
30-<40	35 (21.5)	169 (41.2)
≥40	8 (4.9)	60 (14.6)
CPR within previous 24h, n (%) [N=163]		
In the community	3 (1.8)	4 (1.0)
In hospital	7 (4.3)	4 (1.0)
Prior hospital length of stay [N=163]		
Mean (SD)	3.0 (6.1)	3.8 (10.0)
Median (IQR)	0 (0, 3)	2 (1, 5)
Currently or recently pregnant, n (% of females aged 16-49) [N=19]		
Currently pregnant	1 (5.3)	11 (14.5)
Recently pregnant (within 6 weeks)	0 (0.0)	11 (14.5)
Not known to be pregnant	18 (94.7)	54 (71.1)
COVID-19 reported as primary, rather than secondary, reason for admission to critical care †, n (%) [N=163]	50 (30.7)	381 (92.9)

\* Please see Definitions on page 25.



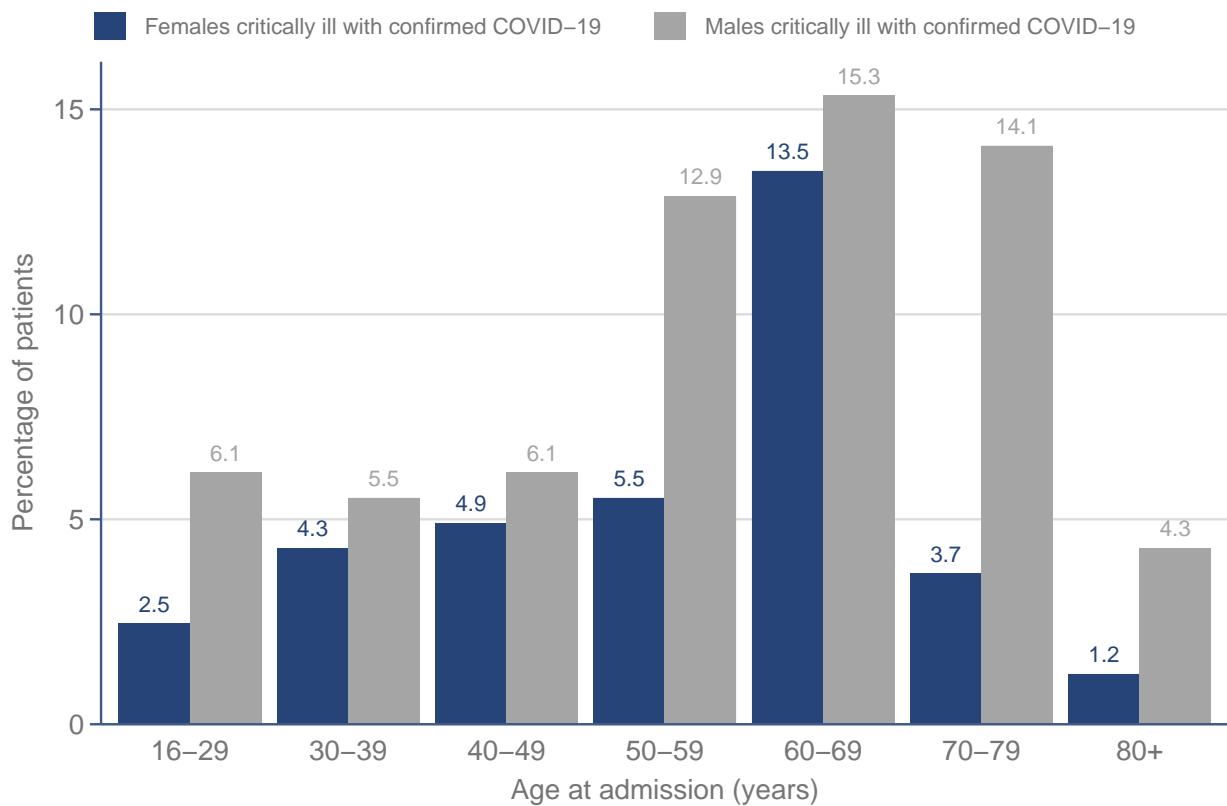
**Table 3. Patient characteristics: indicators of acute severity**

Indicators of acute severity	Patients with confirmed COVID-19 and 24h data received	
	Admitted 1 Jan 2022-31 Dec 2022 (N=163)	Admitted 1 May 2021-31 Dec 2021 (N=410)
Invasively ventilated within first 24h *, n (%) [N=162]	98 (60.5)	253 (61.9)
APACHE II Score [N=162]		
Mean (SD)	16.1 (6.7)	13.3 (4.8)
Median (IQR)	15 (11, 21)	13 (10, 16)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=160]	26.3 (15.4, 40.2)	12.5 (8.8, 18.9)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=160]		
< 13.3 kPa (< 100 mmHg)	34 (21.3)	222 (54.3)
13.3-26.6 kPa (100-200 mmHg)	47 (29.4)	151 (36.9)
≥ 26.7 kPa (≥ 200 mmHg)	79 (49.4)	36 (8.8)
FiO <sub>2</sub> †, median (IQR) [N=160]	0.35 (0.25, 0.55)	0.60 (0.45, 0.85)

\* Please see Definitions on page 25. 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 PaO<sub>2</sub> 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 31 December 2022 is presented in Figure 4.

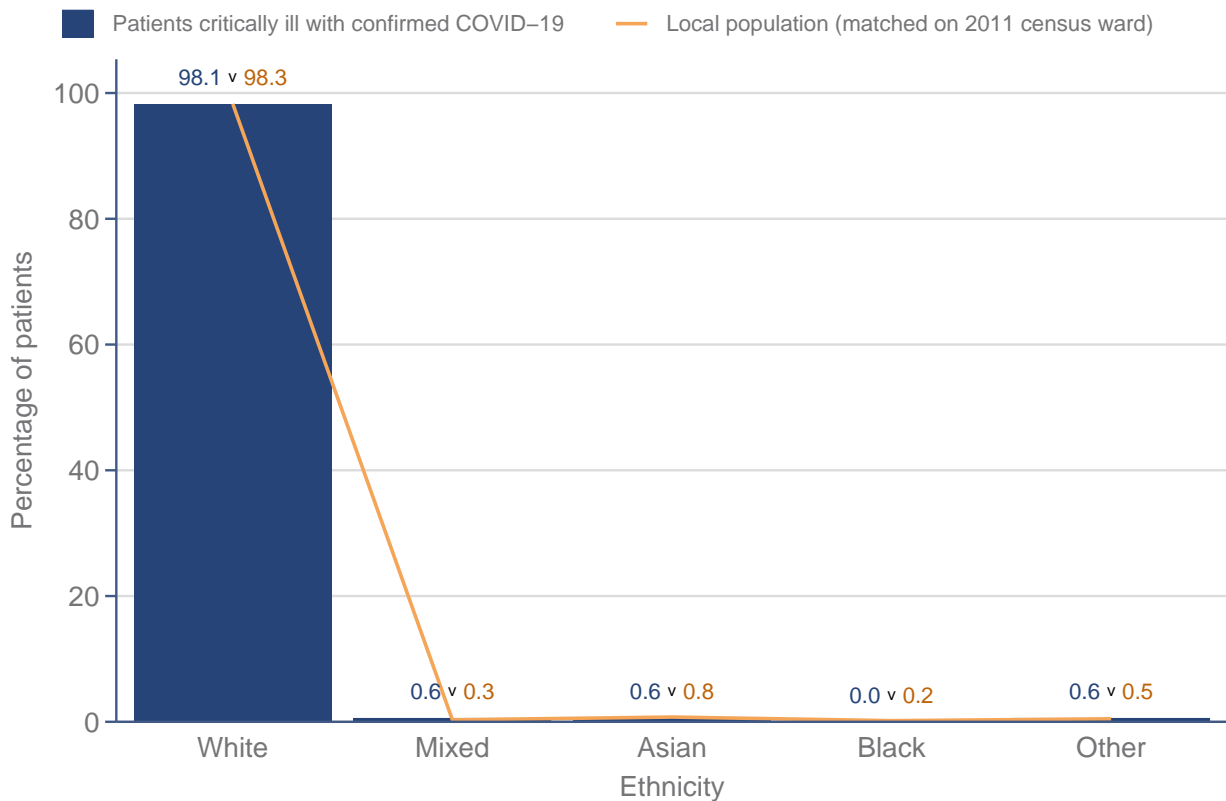


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#### Figure 4. Age and sex distribution

Age and sex distribution of patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022.

The distribution of ethnicity for patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022, compared with a local population matched on 2011 census ward for residence of patients critically ill with COVID-19, is presented in Figure 5.

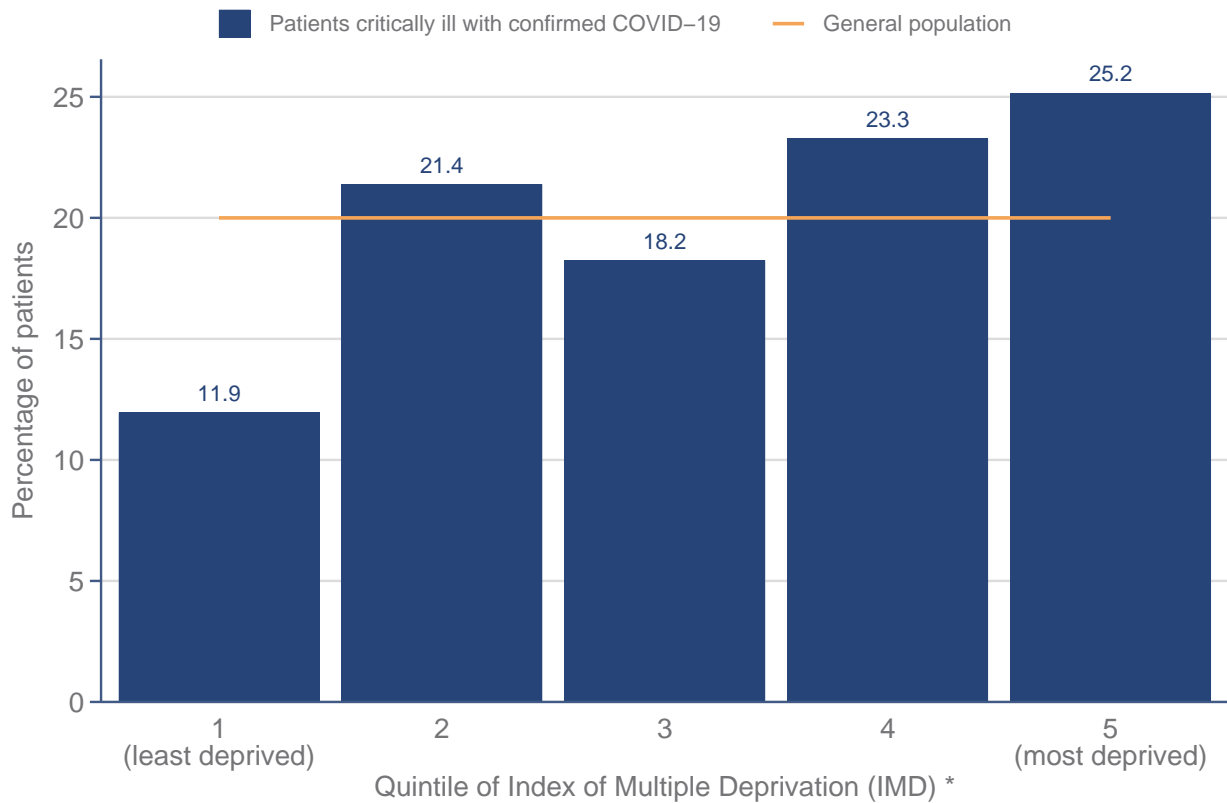


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### Figure 5. Ethnicity distribution compared with the local population

Ethnicity distribution of patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 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 January 2022 to 31 December 2022, compared with the general population, is presented in Figure 6.



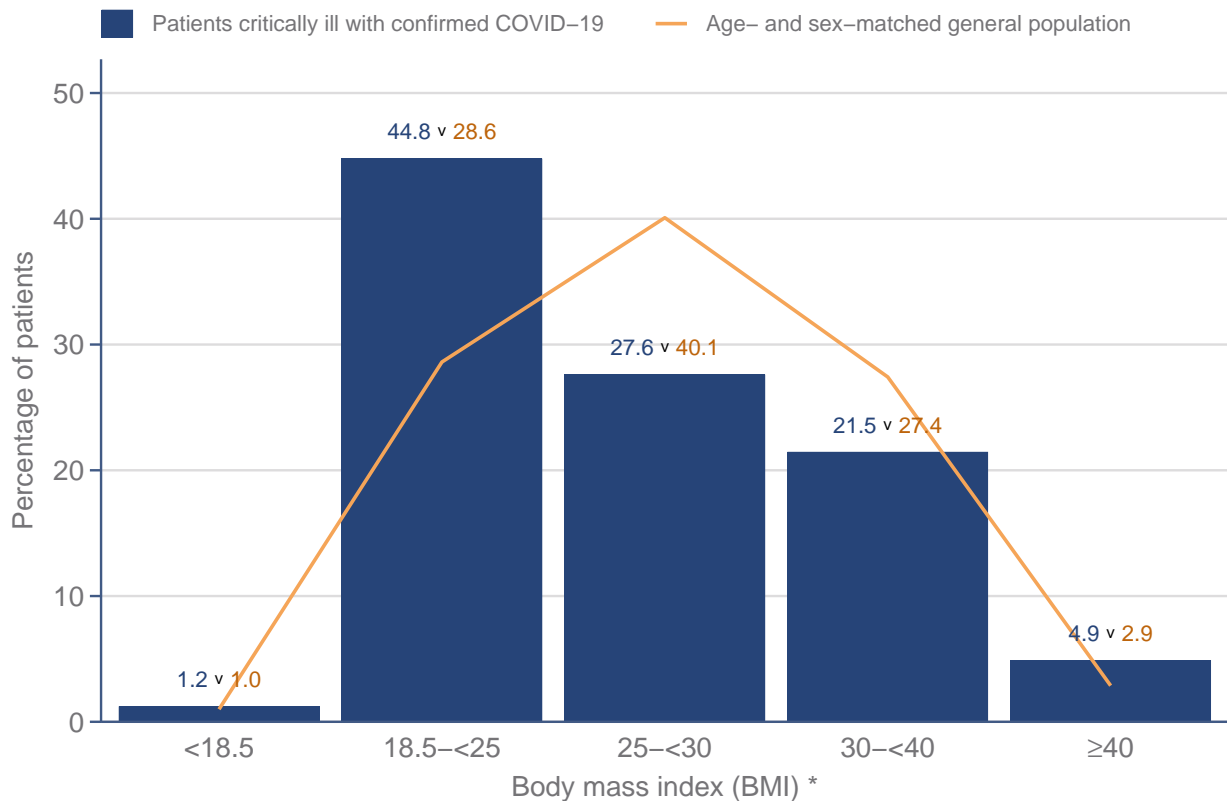
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**Figure 6. Index of Multiple Deprivation \* distribution compared with the general population**

Index of Multiple Deprivation (IMD) \* distribution of patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 compared with the general population.

\* Please see Definitions on page 25.

The distribution of body mass index (BMI) for patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022, compared with an age- and sex-matched population (from the Health Survey for England 2018), is presented in Figure 7.



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**Figure 7. 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 January 2022 compared with the age- and sex-matched general population (Health Survey for England 2018).

\* Please see Definitions on page 25.

## 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 January 2022 to 31 December 2022 are summarised in Tables 4-6 and compared with those admitted from 1 May 2021 to 31 December 2021.

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

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Demographics	Admitted 1 Jan 2022-31 Dec 2022 (N=98)	Admitted 1 May 2021-31 Dec 2021 (N=253)
Age at admission (years) [N=98]		
Mean (SD)	57.9 (15.9)	54.5 (14.8)
Median (IQR)	61 (47, 69)	56 (44, 66)
Sex, n (%) [N=98]		
Female	34 (34.7)	95 (37.5)
Male	64 (65.3)	158 (62.5)
Ethnicity, n (%) [N=97]		
White	95 (97.9)	242 (96.0)
Mixed	1 (1.0)	0 (0.0)
Asian	0 (0.0)	4 (1.6)
Black	0 (0.0)	1 (0.4)
Other	1 (1.0)	5 (2.0)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=96]		
1 (least deprived)	10 (10.4)	31 (12.4)
2	24 (25.0)	51 (20.3)
3	12 (12.5)	39 (15.5)
4	22 (22.9)	50 (19.9)
5 (most deprived)	28 (29.2)	80 (31.9)

\* Please see Definitions on page 25.

**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 Jan 2022-31 Dec 2022 (N=98)	Admitted 1 May 2021-31 Dec 2021 (N=253)
Dependency prior to admission to acute hospital, n (%) [N=98]		
Able to live without assistance in daily activities	83 (84.7)	225 (88.9)
Some assistance with daily activities	12 (12.2)	27 (10.7)
Total assistance with all daily activities	3 (3.1)	1 (0.4)
Very severe comorbidities *, n (%) [N=98]		
Cardiovascular	0 (0.0)	1 (0.4)
Respiratory	2 (2.0)	1 (0.4)
Renal	2 (2.0)	2 (0.8)
Liver	2 (2.0)	1 (0.4)
Metastatic disease	2 (2.0)	1 (0.4)
Haematological malignancy	4 (4.1)	5 (2.0)
Immunocompromised	9 (9.2)	14 (5.5)
Body mass index *, n (%) [N=98]		
<18.5	1 (1.0)	5 (2.0)
18.5-<25	41 (41.8)	35 (13.8)
25-<30	30 (30.6)	77 (30.4)
30-<40	22 (22.4)	104 (41.1)
≥40	4 (4.1)	32 (12.6)
CPR within previous 24h, n (%) [N=98]		
In the community	3 (3.1)	4 (1.6)
In hospital	6 (6.1)	4 (1.6)
Prior hospital length of stay [N=98]		
Mean (SD)	2.6 (4.9)	3.8 (11.8)
Median (IQR)	0 (0, 3)	2 (1, 5)
Currently or recently pregnant, n (% of females aged 16-49) [N=6]		
Currently pregnant	0 (0.0)	1 (2.7)
Recently pregnant (within 6 weeks)	0 (0.0)	6 (16.2)
Not known to be pregnant	6 (100.0)	30 (81.1)
COVID-19 reported as primary, rather than secondary, reason for admission to critical care †, n (%) [N=98]	28 (28.6)	236 (93.3)

\* Please see Definitions on page 25.

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

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Indicators of acute severity	Admitted 1 Jan 2022-31 Dec 2022 (N=98)	Admitted 1 May 2021-31 Dec 2021 (N=253)
APACHE II Score [N=98]		
Mean (SD)	16.1 (7.4)	13.8 (5.1)
Median (IQR)	15 (10, 21)	13 (10, 16)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=98]	24.3 (13.0, 34.3)	14.4 (9.9, 19.8)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=98]		
< 13.3 kPa (< 100 mmHg)	25 (25.5)	111 (44.0)
13.3-26.6 kPa (100-200 mmHg)	29 (29.6)	123 (48.8)
≥ 26.7 kPa (≥ 200 mmHg)	44 (44.9)	18 (7.1)
FiO <sub>2</sub> †, median (IQR) [N=98]	0.40 (0.30, 0.65)	0.55 (0.40, 0.80)

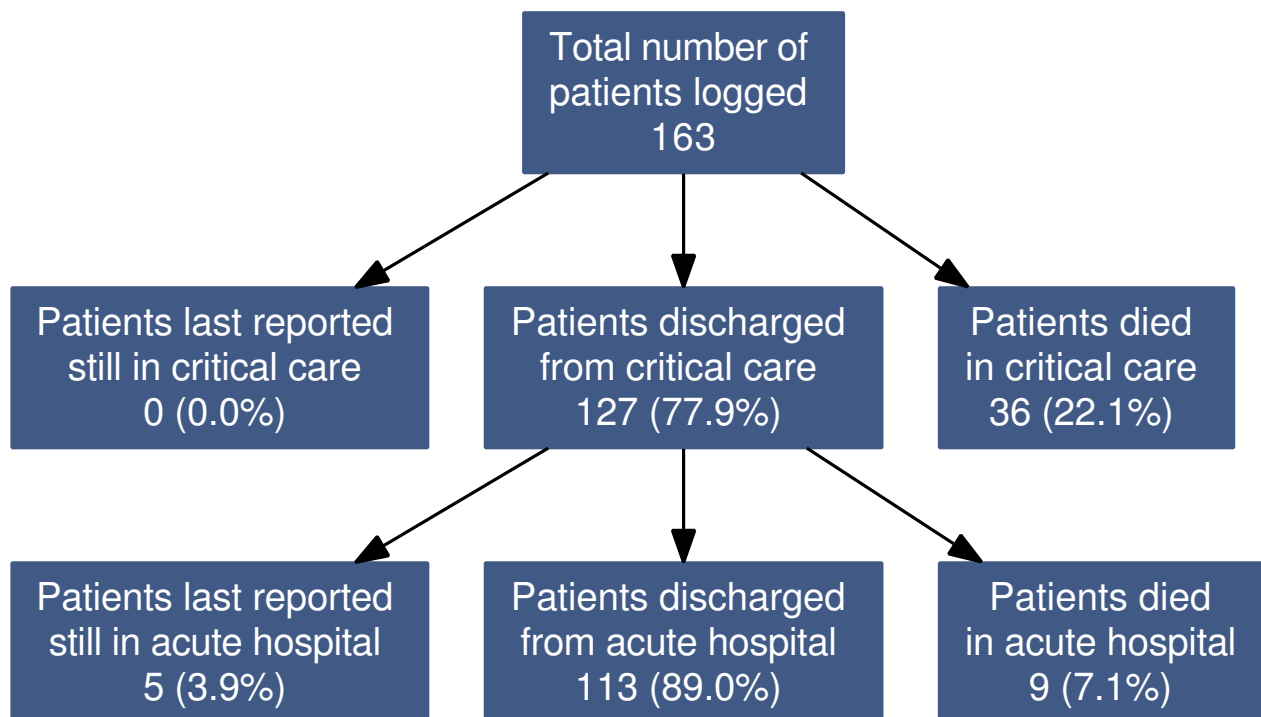
\* Please see Definitions on page 25. Indicators of acute severity are based on data from the first 24 hours of critical care.

† Derived from the arterial blood gas with the lowest PaO<sub>2</sub> during the first 24 hours of critical care.



## Outcomes, duration of critical care and organ support

Critical care outcomes have been received for 163 (of 163) patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022. Of these, 36 have died and 127 have been discharged from critical care (Figures 8). The remaining 0 were last reported to still be receiving critical care.



### Figure 8. Critical care and acute hospital outcomes

Critical care and acute hospital outcomes for patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022.

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 for whom outcomes have been received are summarised in Table 7 and compared with those admitted from 1 May 2021 to 31 December 2021.

**Table 7. Critical care outcome, duration of critical care and organ support**

Critical care outcome	Patients with confirmed COVID-19 and outcome received	
	Admitted 1 Jan 2022-31 Dec 2022 (N=163)	Admitted 1 May 2021-31 Dec 2021 (N=410)
Outcome at end of critical care, n (%)		
Discharged	127 (77.9)	280 (68.3)
Died	36 (22.1)	130 (31.7)
Last reported still in critical care	0 (0.0)	0 (0.0)
<b>Duration of critical care</b>	<b>(N=163)</b>	<b>(N=410)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	7 (4, 13)	10 (6, 18.5)
Non-survivors	5.5 (1, 13)	12 (7, 19)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=163)</b>	<b>(N=410)</b>
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	113 (69.3)	312 (76.1)
Basic respiratory support only	38 (23.3)	93 (22.7)
No respiratory support	12 (7.4)	5 (1.2)
Advanced cardiovascular support	37 (22.7)	91 (22.2)
Basic cardiovascular support only	124 (76.1)	318 (77.6)
No cardiovascular support	2 (1.2)	1 (0.2)
Renal support	34 (20.9)	55 (13.4)
Liver support	3 (1.8)	9 (2.2)
Neurological support	11 (6.7)	8 (2.0)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	6 (3, 12)	11 (6, 21)
Total (advanced + basic) respiratory support	5 (3, 13)	11 (7, 19)
Advanced cardiovascular support	2 (2, 3)	2 (1, 4)
Total (advanced + basic) cardiovascular support	7 (3, 13)	11 (7, 19)
Renal support	6 (2, 8)	5 (3, 14)

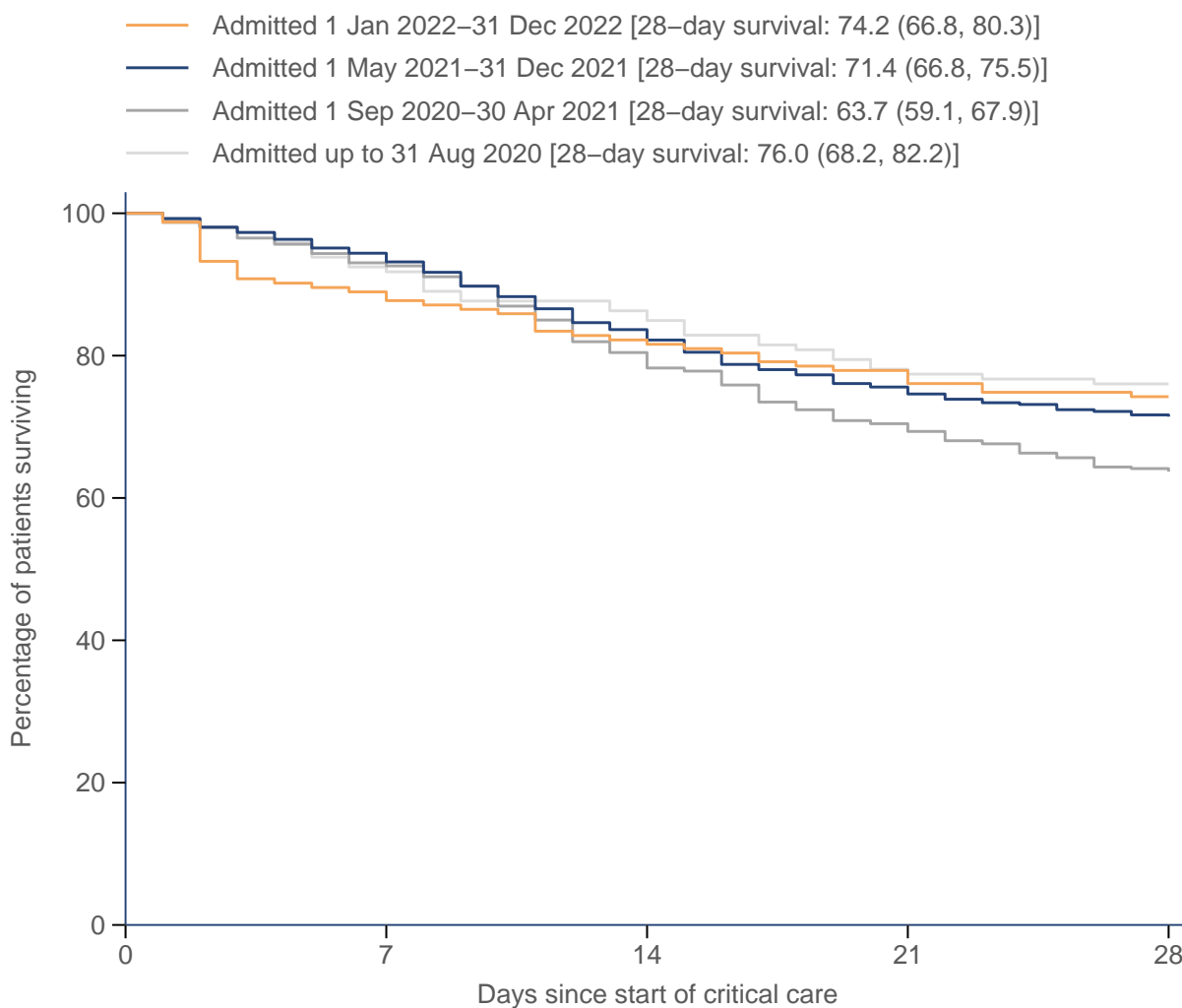
Please note that the results for patients admitted from 1 January 2022 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

\* Please see Definitions on page 25.

† Duration of critical care is the total over all critical care admissions for the the same patient and excludes any time spent outside critical care areas (e.g. prior to any readmissions).

## 28-day in-hospital outcome - overall

A Kaplan-Meier plot of in-hospital survival to 28 days following admission to critical care for patients critically ill with confirmed COVID-19 admitted from 1 January 2022 to 31 December 2022 is shown in Figure 9 and compared with those admitted 1 May 2021 to 31 December 2021, from 1 September 2020 to 30 April 2021, and up to 31 August 2020.



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### Figure 9. In-hospital survival to 28 days following admission to critical care

Kaplan-Meier survival analysis for patients critically ill with confirmed COVID-19. Patients last reported to be still receiving critical care censored on the most recent date of data submission by the treating unit. Patients discharged from acute hospital within 28 days assumed to survive to 28 days. Please note that these survival curves are not adjusted for differences in patient characteristics (see Tables 1-3).

## COVID-19 as primary versus secondary reason for admission

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Patient characteristics, critical care outcome, duration of critical care and organ support for patients admitted from 1 January 2022 to 31 December 2022 with COVID-19 reported as primary reason for admission to critical care are reported in tables 8 to 11 and compared with patients with COVID-19 as the secondary reason for admission to critical care.

**Table 8. Patient characteristics: demographics for patients by primary reason for admission**

Demographics	Patients with confirmed COVID-19	
	COVID-19 as primary reason for admission (N=50)	COVID-19 as secondary reason for admission (N=113)
Age at admission (years) [N=50]		
Mean (SD)	61.2 (14.2)	55.1 (17.7)
Median (IQR)	64 (54, 69)	57 (41, 69)
Sex, n (%) [N=50]		
Female	17 (34.0)	41 (36.3)
Male	33 (66.0)	72 (63.7)
Ethnicity, n (%) [N=50]		
White	49 (98.0)	110 (98.2)
Mixed	0 (0.0)	1 (0.9)
Asian	0 (0.0)	1 (0.9)
Black	0 (0.0)	0 (0.0)
Other	1 (2.0)	0 (0.0)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=48]		
1 (least deprived)	9 (18.8)	10 (9.0)
2	11 (22.9)	23 (20.7)
3	11 (22.9)	18 (16.2)
4	6 (12.5)	31 (27.9)
5 (most deprived)	11 (22.9)	29 (26.1)

\* Please see Definitions on page 25.

For patients with COVID-19 reported as secondary reason for admission, COVID-19 may or may not have contributed to the reason for admission.

**Table 9. Patient characteristics: medical history for patients by primary reason for admission**

Medical history	Patients with confirmed COVID-19	
	COVID-19 as primary reason for admission (N=50)	COVID-19 as secondary reason for admission (N=113)
Dependency prior to admission to acute hospital, n (%) [N=50]		
Able to live without assistance in daily activities	40 (80.0)	91 (80.5)
Some assistance with daily activities	7 (14.0)	20 (17.7)
Total assistance with all daily activities	3 (6.0)	2 (1.8)
Very severe comorbidities *, n (%) [N=50]		
Cardiovascular	0 (0.0)	0 (0.0)
Respiratory	1 (2.0)	4 (3.5)
Renal	0 (0.0)	3 (2.7)
Liver	0 (0.0)	6 (5.3)
Metastatic disease	1 (2.0)	1 (0.9)
Haematological malignancy	3 (6.0)	5 (4.4)
Immunocompromised	4 (8.0)	12 (10.6)
Body mass index *, n (%) [N=50]		
<18.5	0 (0.0)	2 (1.8)
18.5-<25	17 (34.0)	56 (49.6)
25-<30	15 (30.0)	30 (26.5)
30-<40	13 (26.0)	22 (19.5)
≥40	5 (10.0)	3 (2.7)
CPR within previous 24h, n (%) [N=50]		
In the community	0 (0.0)	3 (2.7)
In hospital	1 (2.0)	6 (5.3)
Prior hospital length of stay [N=50]		
Mean (SD)	3.8 (5.2)	2.6 (6.5)
Median (IQR)	2 (1, 6)	0 (0, 1)
Currently or recently pregnant, n (% of females aged 16-49) [N=4]		
Currently pregnant	1 (25.0)	0 (0.0)
Recently pregnant (within 6 weeks)	0 (0.0)	0 (0.0)
Not known to be pregnant	3 (75.0)	15 (100.0)

\* Please see Definitions on page 25.

For patients with COVID-19 reported as secondary reason for admission, COVID-19 may or may not have contributed to the reason for admission.

**Table 10. Patient characteristics: indicators of acute severity for patients by primary reason for admission**

Indicators of acute severity	Patients with confirmed COVID-19	
	COVID-19 as primary reason for admission (N=50)	COVID-19 as secondary reason for admission (N=113)
Invasively ventilated within first 24h *, n (%) [N=49]	28 (57.1)	70 (61.9)
APACHE II Score [N=49]		
Mean (SD)	16.4 (5.5)	16.0 (7.2)
Median (IQR)	16 (13, 20)	15 (11, 21)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=49]	15.5 (7.5, 22.5)	31.0 (21.0, 44.3)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=49]		
< 13.3 kPa (< 100 mmHg)	21 (42.9)	13 (11.7)
13.3-26.6 kPa (100-200 mmHg)	17 (34.7)	30 (27.0)
≥ 26.7 kPa (≥ 200 mmHg)	11 (22.4)	68 (61.3)
FiO <sub>2</sub> †, median (IQR) [N=49]	0.55 (0.40, 0.98)	0.30 (0.24, 0.40)

\* Please see Definitions on page 25.

† Derived from the arterial blood gas with the lowest PaO<sub>2</sub> during the first 24 hours of critical care.

For patients with COVID-19 reported as secondary reason for admission, COVID-19 may or may not have contributed to the reason for admission.

**Table 11. Critical care outcome, duration of critical care and organ support for patients by primary reason for admission**

Critical care outcome	Patients with confirmed COVID-19	
	COVID-19 as primary reason for admission (N=50)	COVID-19 as secondary reason for admission (N=113)
Outcome at end of critical care, n (%)		
Discharged	37 (74.0)	90 (79.6)
Died	13 (26.0)	23 (20.4)
Last reported still in critical care	0 (0.0)	0 (0.0)
<b>Duration of critical care</b>	<b>(N=50)</b>	<b>(N=113)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	10 (7, 23)	6 (3, 11)
Non-survivors	14 (10, 22)	2 (1, 6)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=50)</b>	<b>(N=113)</b>
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	35 (70.0)	78 (69.0)
Basic respiratory support only	13 (26.0)	25 (22.1)
No respiratory support	2 (4.0)	10 (8.8)
Advanced cardiovascular support	10 (20.0)	27 (23.9)
Basic cardiovascular support only	39 (78.0)	85 (75.2)
No cardiovascular support	1 (2.0)	1 (0.9)
Liver support	1 (2.0)	2 (1.8)
Neurological support	0 (0.0)	11 (9.7)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	13 (9, 26)	4 (2, 9)
Advanced cardiovascular support	4 (3, 6)	2 (2, 3)
Total (advanced + basic) cardiovascular support	12 (7, 24)	5.5 (2, 10)
Renal support	6.5 (3, 10)	5 (2, 7)

\* Please see Definitions on page 25.

† Duration of critical care is the total over all critical care admissions for the the same patient and excludes any time spent outside critical care areas (e.g. prior to any readmissions).

For patients with COVID-19 reported as secondary reason for admission, COVID-19 may or may not have contributed to the reason for admission. Please note that the results for patients admitted from 1 January 2022 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.



## Definitions

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**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

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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; 50:e548-56. 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. *Lancet Rheumatol* 2022; 4:e490-506. doi:[10.1016/S2665-9913\(22\)00098-4](https://doi.org/10.1016/S2665-9913(22)00098-4)

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