

# ICNARC report on COVID-19 in critical care: England, Wales and Northern Ireland 11 December 2020

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This report presents analyses of data on patients critically ill with confirmed COVID-19, reported to ICNARC up to 4pm on 10 December 2020, from critical care units participating in the Case Mix Programme (the national clinical audit covering all NHS adult, general intensive care and combined intensive care/high dependency units in England, Wales and Northern Ireland, plus some additional specialist and non-NHS critical care units) and increasing numbers of surge/other areas providing critical care.

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

- admitted from 1 September 2020 to date; and
- admitted up to 31 August 2020.

Please note that adult critical care units in Scotland, paediatric intensive care units and neonatal intensive care units do not participate in the Case Mix Programme.

## 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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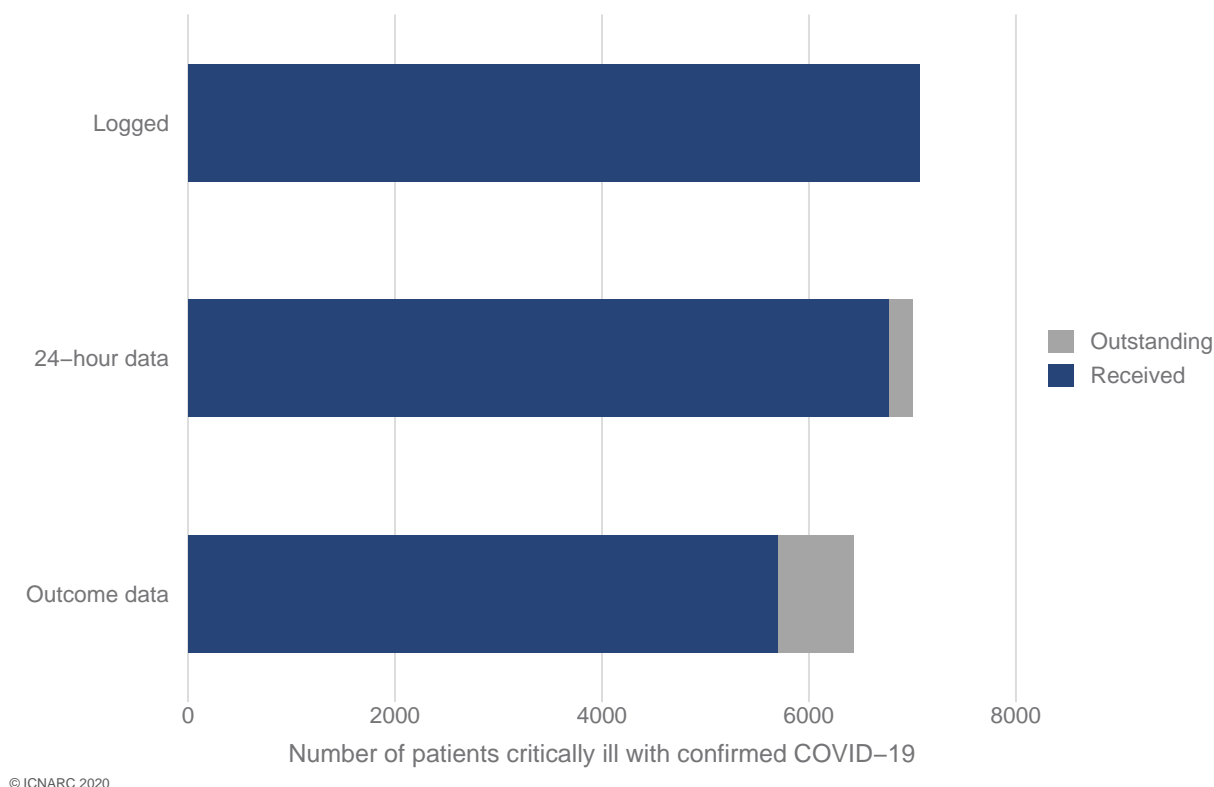
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\* Please see individual notes for Tables/Figures.

## Admissions to critical care – COVID-19

ICNARC have logged data for 8068 admissions of 7070 patients critically ill with confirmed COVID-19, either at or after the start of critical care, admitted from 1 September 2020 to date in England, Wales and Northern Ireland. Of these, data covering the first 24 hours of critical care have been submitted to ICNARC for 6770 patients (Figure 1). Of the 7070 total patients, 5694 have outcomes reported and 1376 patients were last reported as still receiving critical care. These patients are compared with a cohort of 10,933 patients with confirmed COVID-19 admitted up to 31 August 2020.

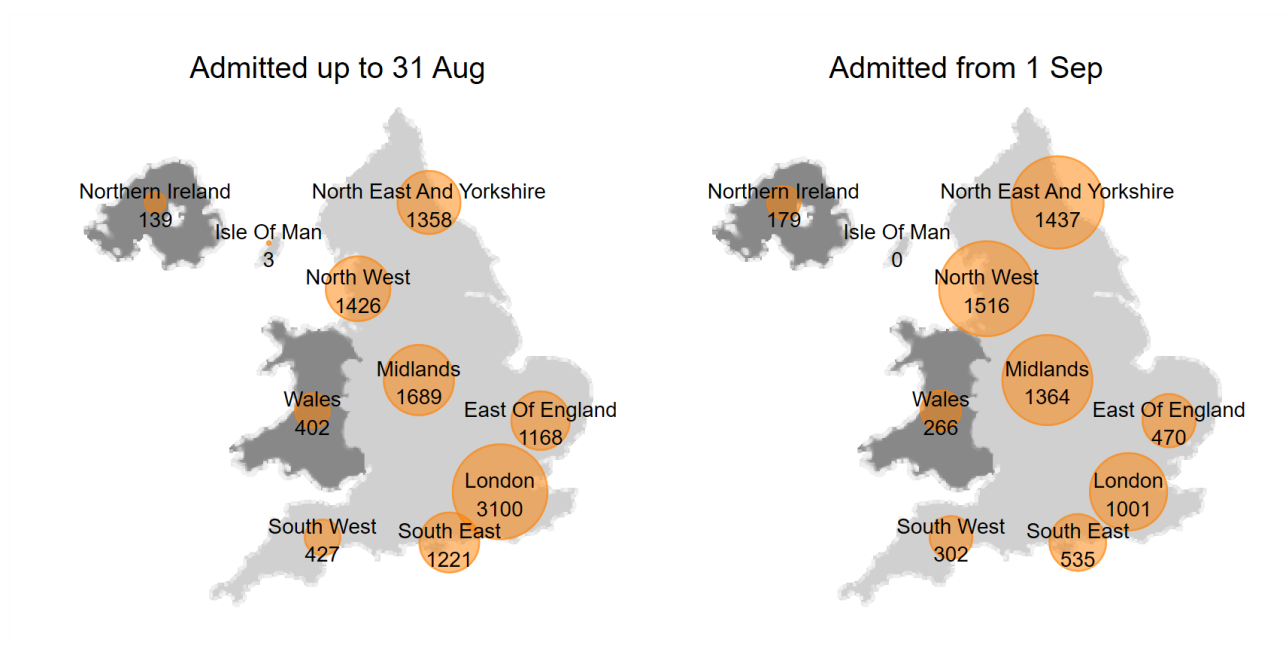


### Figure 1. Numbers of patients with data included in this report and outstanding \*

Numbers of critically ill patients with confirmed COVID-19 admitted from 1 September 2020 to date with data included in this report and outstanding.

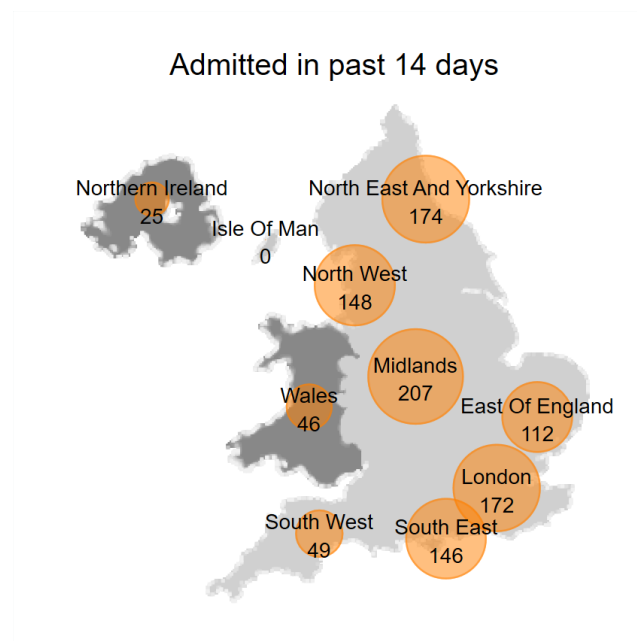
\* Please note that 24-hour data are considered outstanding when a case was logged at least 48 hours previously and outcome data are considered outstanding when 24-hour data have been received and at least 10 days have elapsed since the start of critical care.

Of the 7070 patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date, the largest numbers were admitted in the North West, North East And Yorkshire, and Midlands regions (Figure 2). Of the patients included in this week’s report, 1079 patients were admitted to critical care within the past 14 days (26 Nov 2020 to 09 Dec 2020). The geographical spread of these patients was similar to that for all patients admitted from 1 September 2020 to date, but with some reduction being seen in the North West and an increase in London and the South East (Figure 3).



**Figure 2. Geographical distribution**

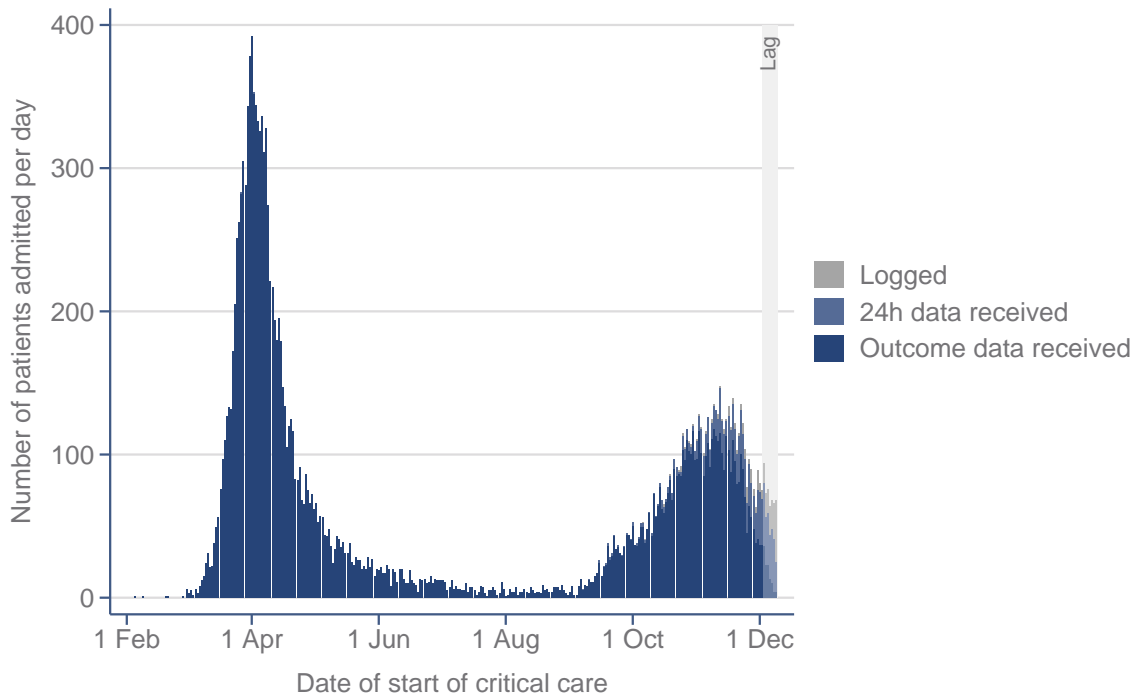
Geographical distribution of patients critically ill with confirmed COVID-19 by NHS region.



**Figure 3. Geographical distribution – past 14 days**

Geographical distribution of patients critically ill with confirmed COVID-19 admitted during the past 14 days by NHS region.

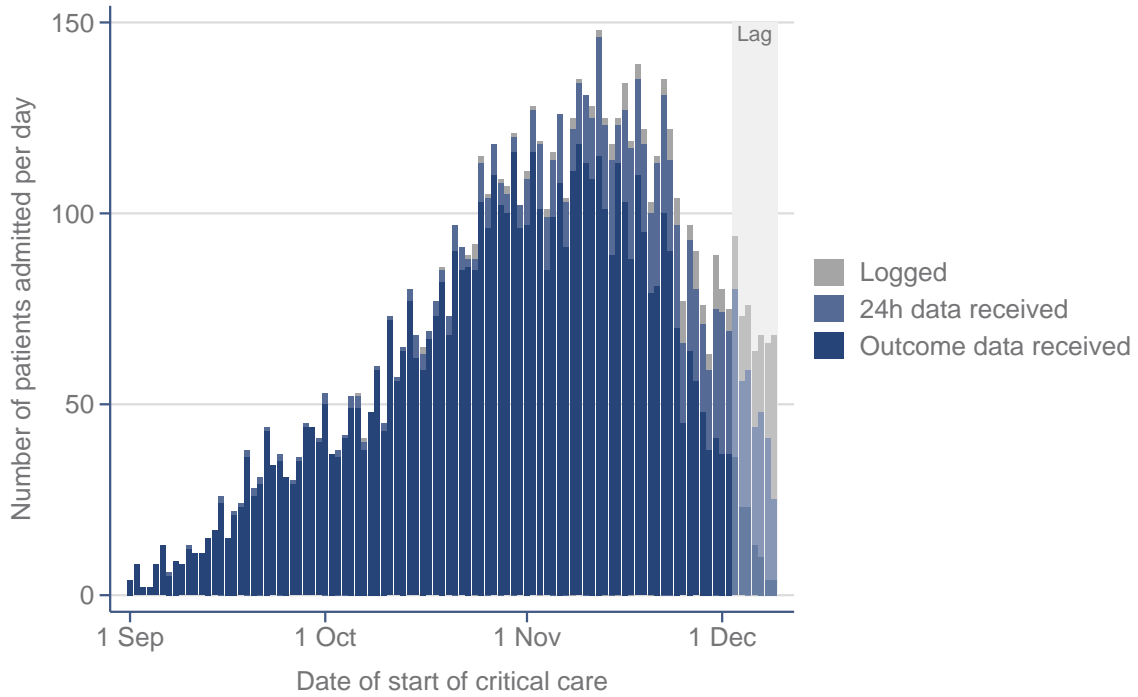
The numbers of new patients, inter-hospital critical care transfers, cumulative numbers of patients and numbers of patients in critical care by date are shown in Figures 4-13. Please note that these figures are affected by a variable lag time for submission of data.



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#### **Figure 4. Number of new patients by start of critical care**

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

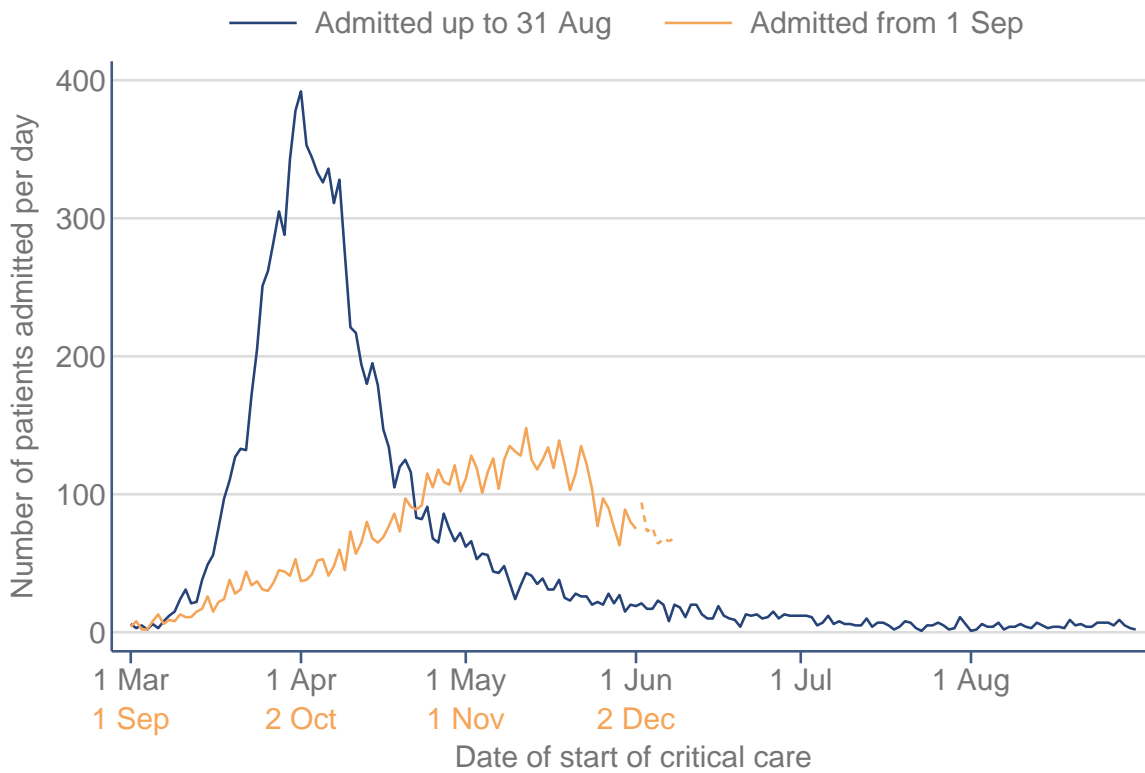


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**Figure 5. Number of new patients admitted from 1 September 2020 by date of start of critical care**

Number of new patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by date of start of critical care.



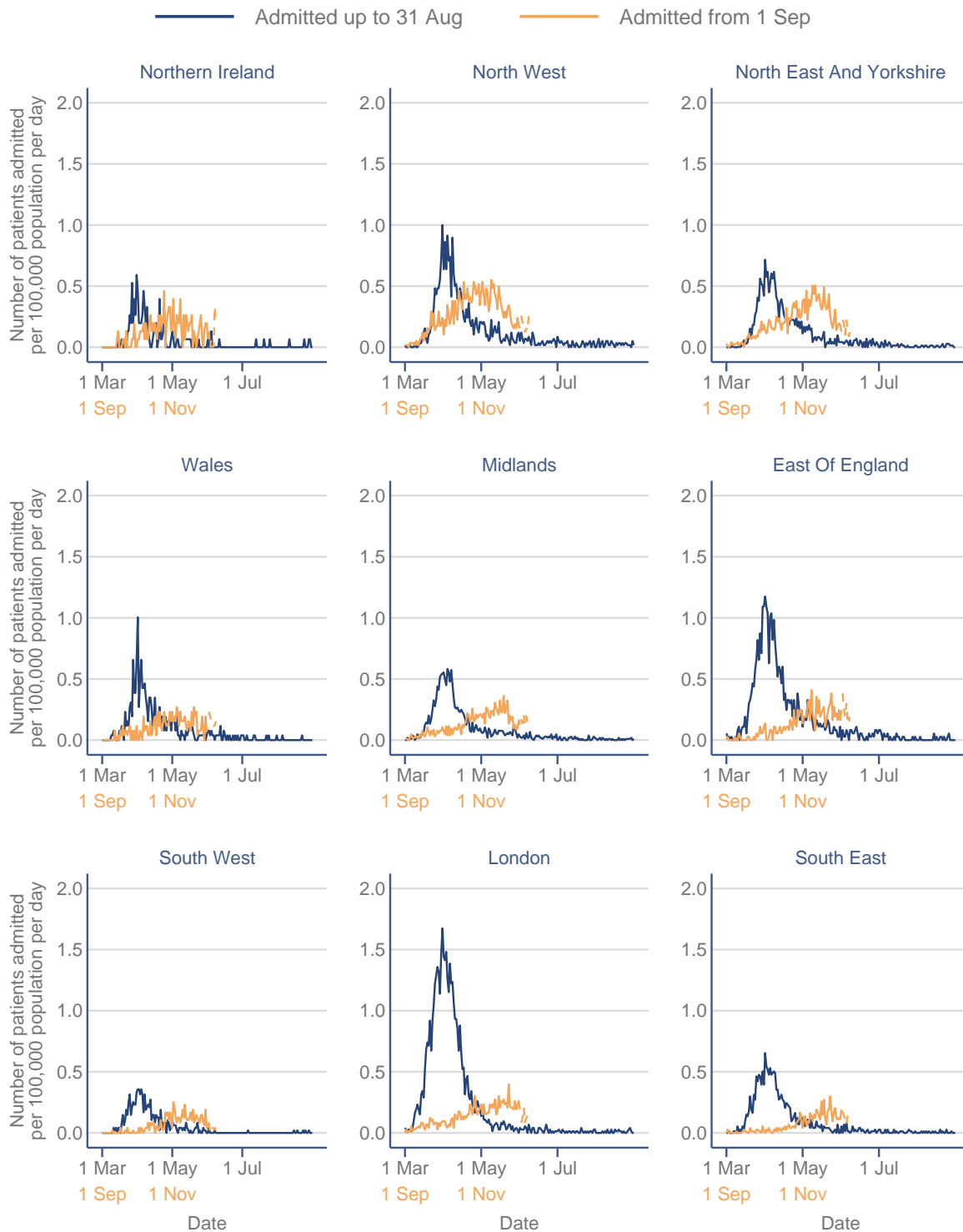


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**Figure 6. Number of new patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date \***

Comparison of the number of new patients critically ill with confirmed COVID-19 by date of start of critical care from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date.

\* Dashed line indicates lag in data submission.

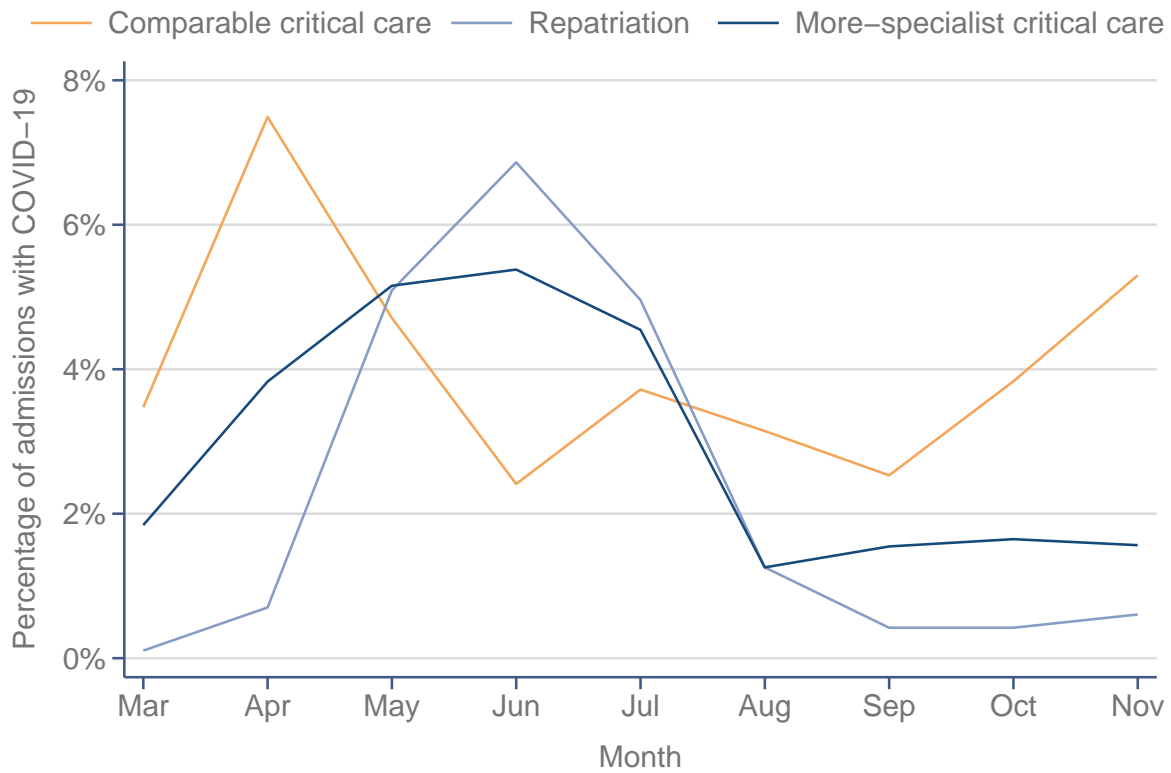


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**Figure 7. Number of new patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region \***

Number of new patients critically ill with confirmed COVID-19 by date of start of critical care from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region.

\* Dashed line indicates lag in data submission.

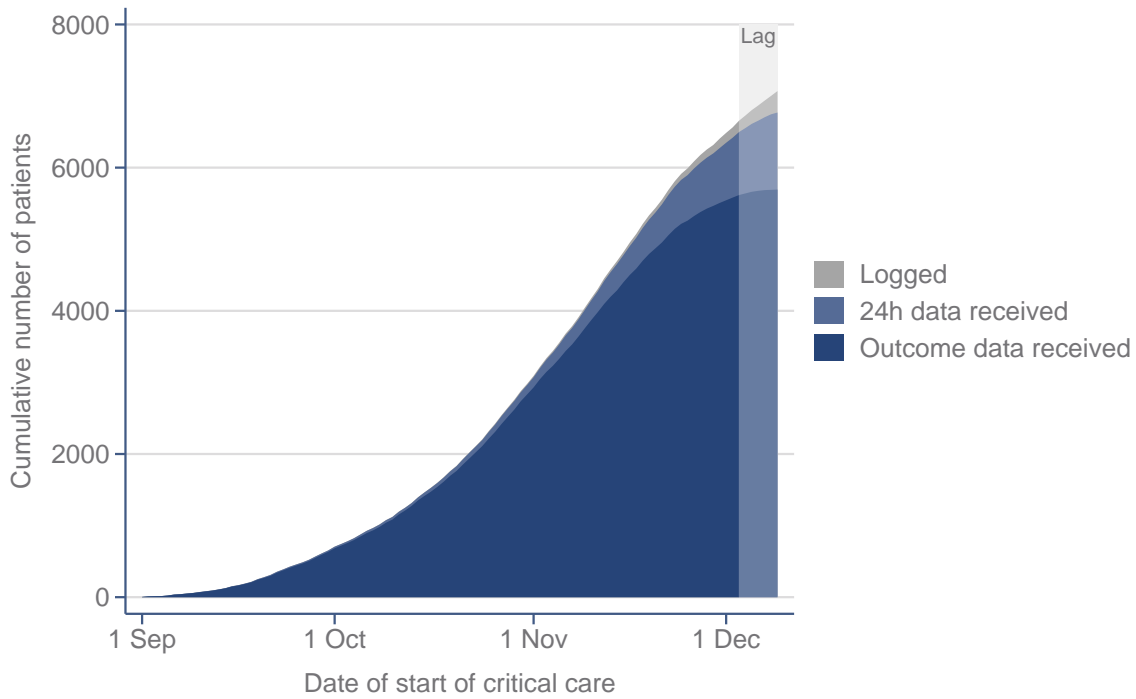


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### Figure 8. Inter-hospital critical care transfers

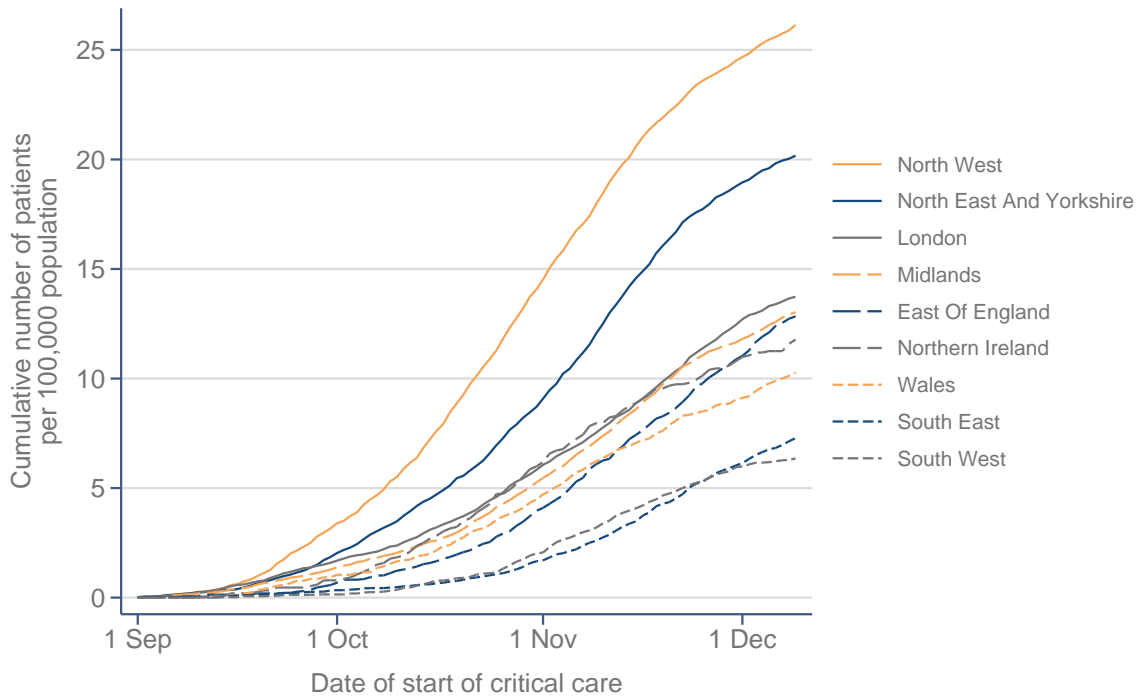
Percentage of critical care admissions that were transfers between critical care units in different hospitals by month of admission and reason for transfer\*.

\* Please see Definitions on page 59.



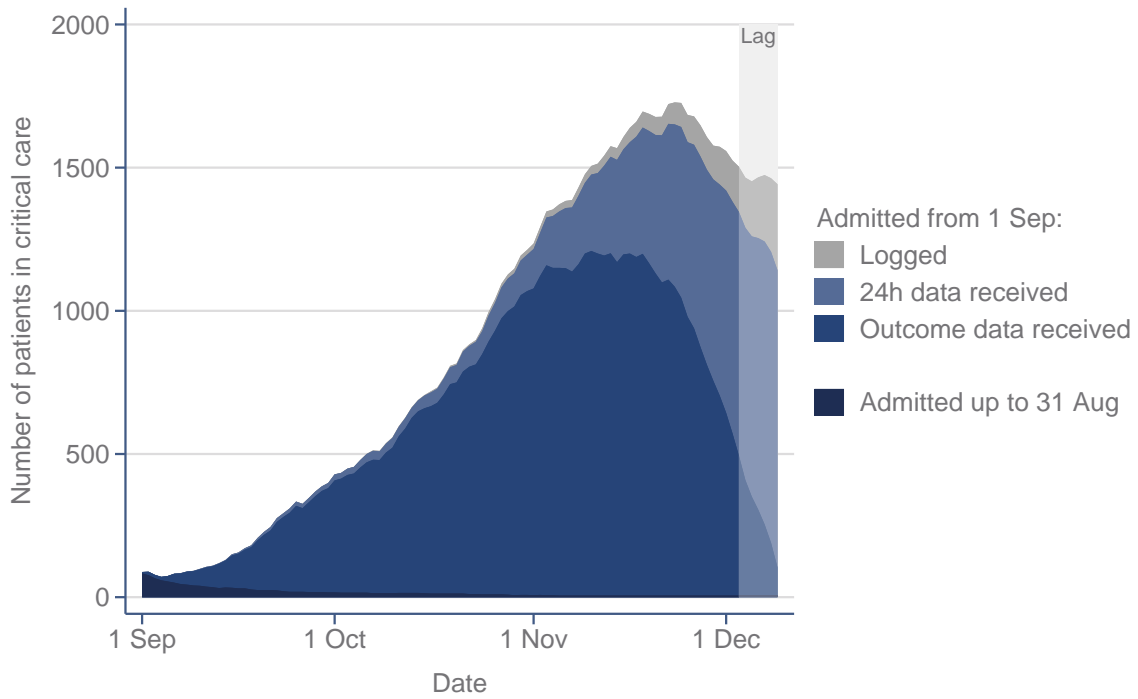
**Figure 9. Cumulative number of patients**

Cumulative number of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 by date of start of critical care.



**Figure 10. Cumulative number of patients per 100,000 adult population by region**

Cumulative number of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 per 100,000 adult population by region.

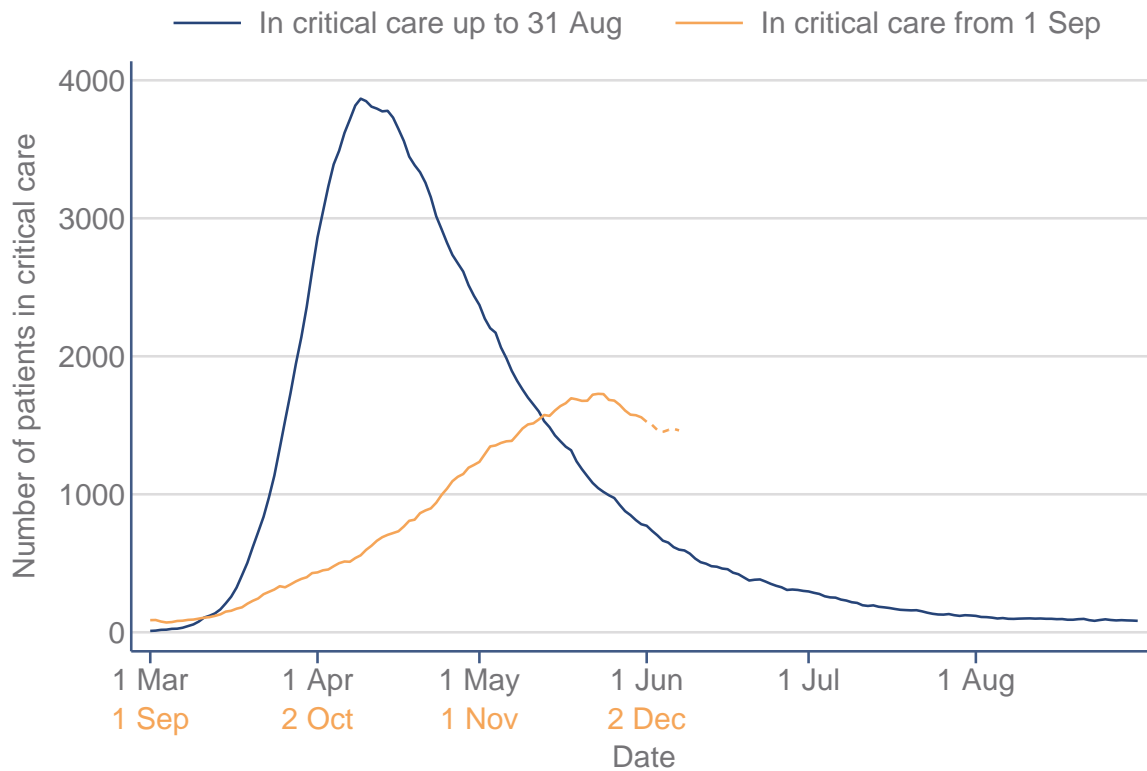


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### Figure 11. Number of patients in critical care \*

Number of patients with confirmed COVID-19 in critical care from 1 September 2020 by date.

\* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 10 December 2020.

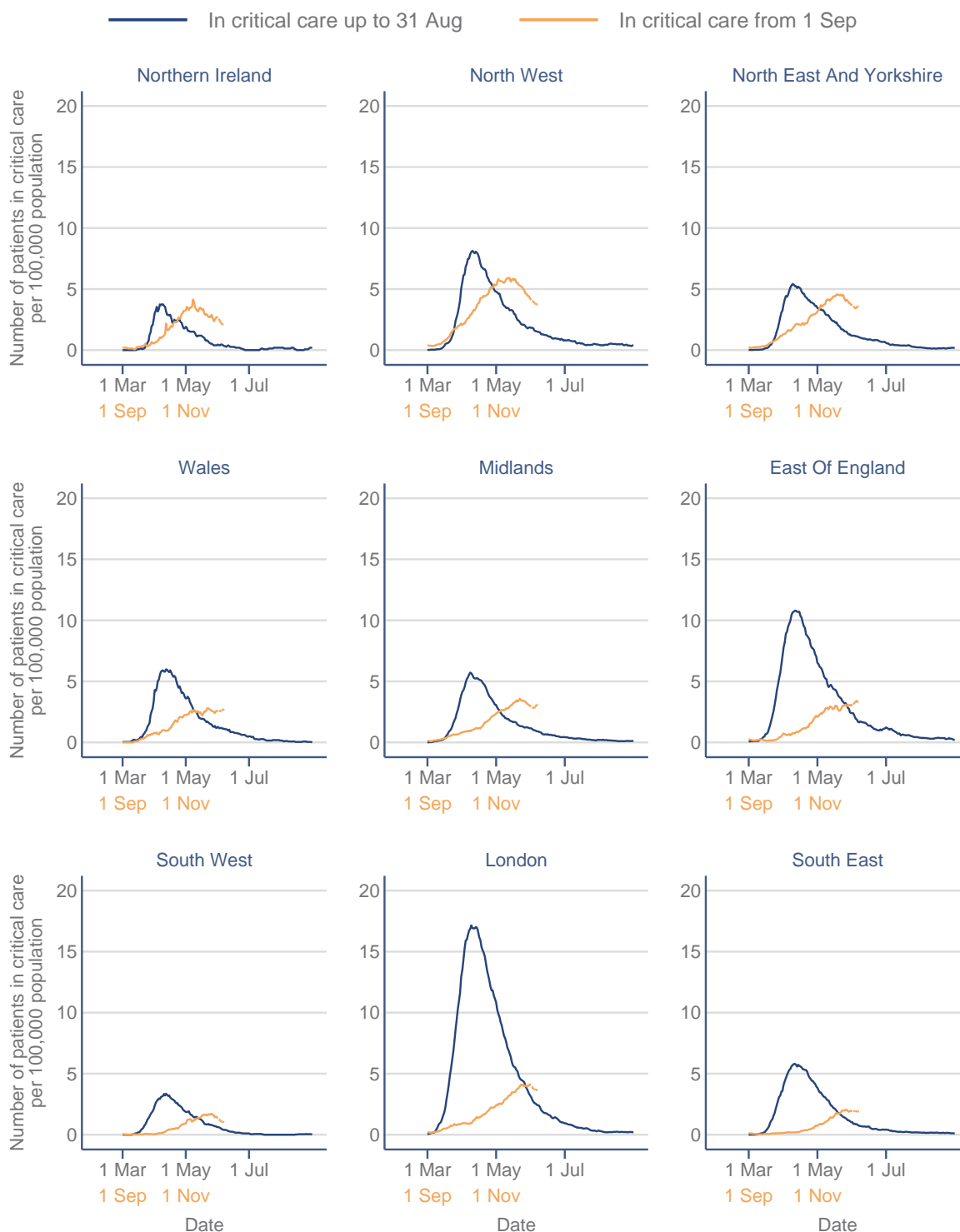


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**Figure 12. Number of patients in critical care \* from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date**

Number of patients with confirmed COVID-19 in critical care by date \* from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date.

\* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 10 December 2020. Dashed line indicates lag in data submission.



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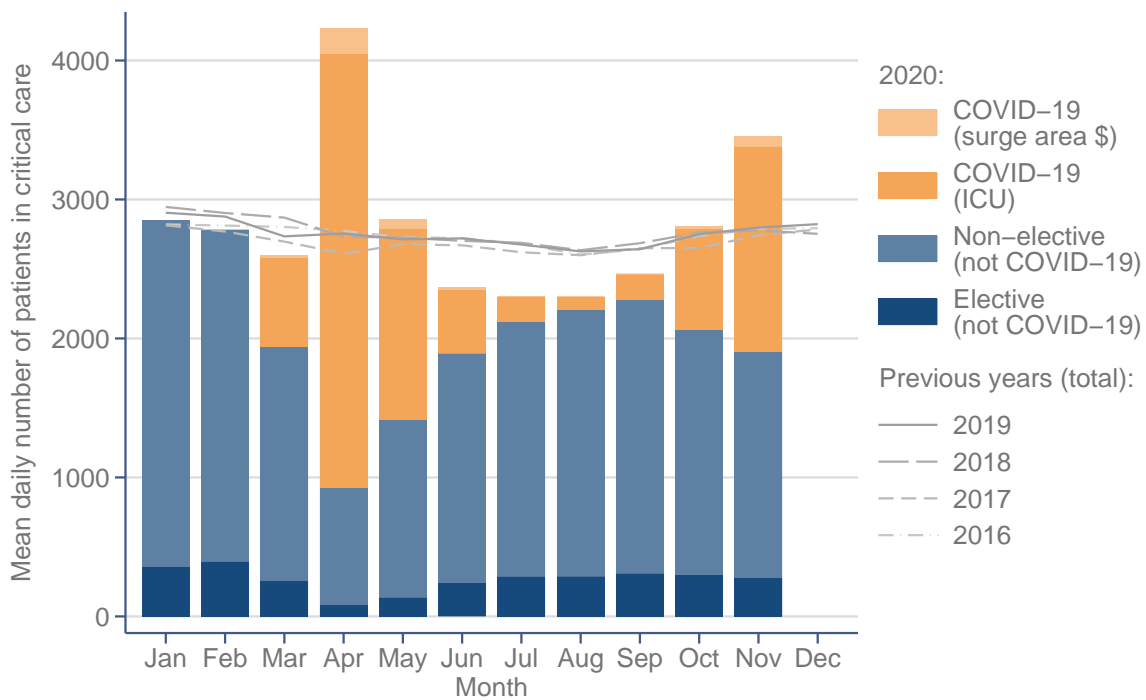
**Figure 13. Number of patients in critical care \* from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region**

Number of patients with confirmed COVID-19 in critical care by date \* from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region.

\* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 10 December 2020. dashed line indicates lag in data submission.

## Admissions to critical care – COVID-19 and non-COVID-19

Figure 14 shows the average daily number of patients in critical care for each month over the past five years. For 2020, this is broken down into the numbers of: elective admissions (not COVID-19) – those admitted directly following elective or scheduled surgery or for a planned medical procedure; non-elective admissions (not COVID-19); confirmed COVID-19 admitted to an ICU; and confirmed COVID-19 managed in a surge area outside of ICU.



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**Figure 14. Average daily number of patients in critical care by month, 2016-2020 \***

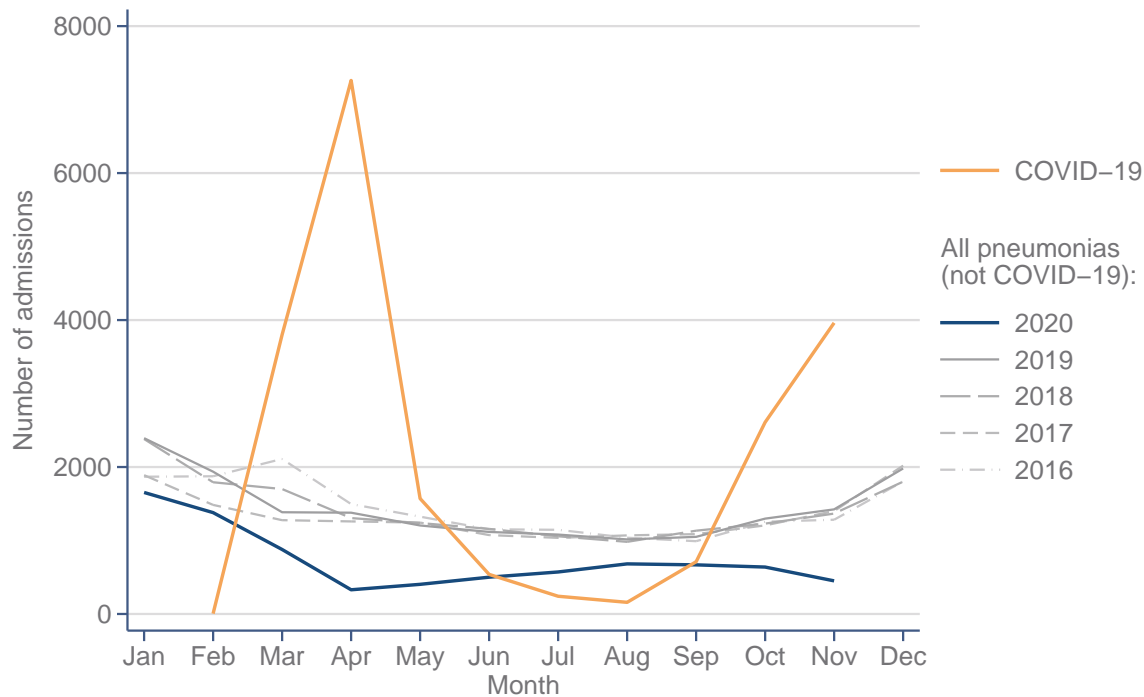
\* Please note that data for patients without COVID-19 are submitted by participating critical care units either monthly or quarterly. Values have been adjusted for coverage.

§ Not all surge patients are identifiable from ICU data and not all surge areas are covered.



## Admissions to critical care – pneumonia (not COVID-19)

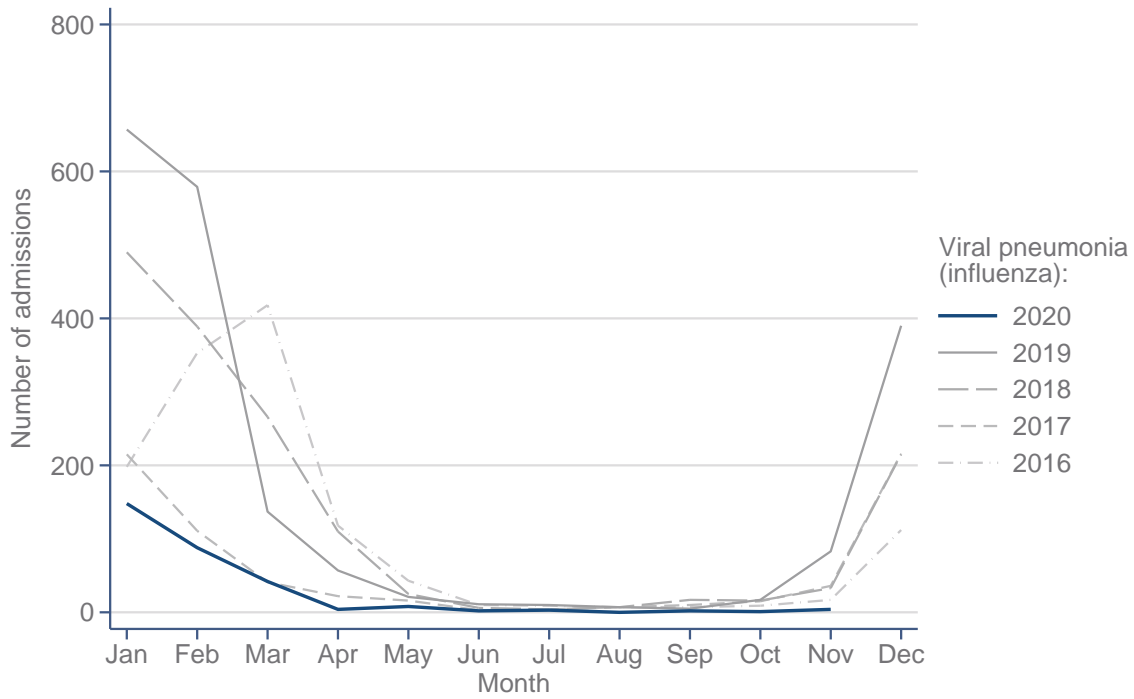
Figure 15 shows the total numbers of admissions to critical care over the past five years by month of admission reported as due to pneumonia (not COVID-19), compared with the numbers with confirmed COVID-19. Figure 16 shows the number of these pneumonia admissions that were specifically coded as due to influenza. Note that not all admissions due to influenza will be coded as viral pneumonia (influenza) as if the organism has not yet been identified, then these will likely be coded under pneumonia (no organism isolated).



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**Figure 15. Number of admissions with pneumonia (not COVID-19) by month, 2016-2020 \*, compared with confirmed COVID-19 during 2020**

\* Please note that data for patients without COVID-19 are submitted by participating critical care units either monthly or quarterly. Values have been adjusted for coverage.



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**Figure 16. Number of admissions with viral pneumonia (influenza) by month, 2016-2020 \***

\* Please note that data for patients without COVID-19 are submitted by participating critical care units either monthly or quarterly. Values have been adjusted for coverage.

## Patient characteristics

Characteristics of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date are summarised in Tables 1-3 and compared with patients admitted up to 31 August 2020.

**Table 1. Patient characteristics: demographics**

Demographics	Patients with confirmed COVID-19	
	Admitted from 1 Sep (N=7070)	Admitted up to 31 Aug (N=10,933)
Age at admission (years) [N=7061]		
Mean (SD)	60.9 (13.6)	58.8 (12.7)
Median (IQR)	62 (53, 71)	60 (51, 68)
Sex, n (%) [N=7061]		
Female	2222 (31.5)	3275 (30.0)
Male	4839 (68.5)	7652 (70.0)
Ethnicity, n (%) [N=6678]		
White	4994 (74.8)	6945 (66.0)
Mixed	71 (1.1)	191 (1.8)
Asian	1094 (16.4)	1679 (16.0)
Black	261 (3.9)	1006 (9.6)
Other	258 (3.9)	699 (6.6)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=6965]		
1 (least deprived)	822 (11.8)	1545 (14.3)
2	986 (14.2)	1737 (16.1)
3	1156 (16.6)	2082 (19.3)
4	1648 (23.7)	2613 (24.2)
5 (most deprived)	2353 (33.8)	2804 (26.0)
Urban/rural classification *, n (%) [N=6827]		
Major conurbation	3016 (44.2)	5217 (48.7)
Minor conurbation	389 (5.7)	337 (3.1)
City and town	2704 (39.6)	3991 (37.3)
Rural	717 (10.5)	1152 (10.8)

\* Please see Definitions on page 59.

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

Medical history	Patients with confirmed COVID-19	
	Admitted from 1 Sep (N=7070)	Admitted up to 31 Aug (N=10,933)
Dependency prior to admission to acute hospital, n (%) [N=6583]		
Able to live without assistance in daily activities	5746 (87.3)	9680 (89.4)
Some assistance with daily activities	816 (12.4)	1113 (10.3)
Total assistance with all daily activities	21 (0.3)	40 (0.4)
Very severe comorbidities *, n (%) [N=6669]		
Cardiovascular	53 (0.8)	68 (0.6)
Respiratory	75 (1.1)	122 (1.1)
Renal	134 (2.0)	187 (1.7)
Liver	45 (0.7)	51 (0.5)
Metastatic disease	52 (0.8)	59 (0.5)
Haematological malignancy	118 (1.8)	214 (2.0)
Immunocompromised	275 (4.1)	387 (3.6)
Body mass index *, n (%) [N=6368]		
<18.5	47 (0.7)	79 (0.8)
18.5-<25	1247 (19.6)	2643 (25.4)
25-<30	2134 (33.5)	3571 (34.4)
30-<40	2253 (35.4)	3268 (31.4)
≥40	687 (10.8)	831 (8.0)
CPR within previous 24h, n (%) [N=6800]		
In the community	48 (0.7)	50 (0.5)
In hospital	61 (0.9)	76 (0.7)
Prior hospital length of stay [N=7016]		
Mean (SD)	3.0 (7.4)	2.5 (6.2)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=512]		
Currently pregnant	41 (8.0)	29 (3.7)
Recently pregnant (within 6 weeks)	26 (5.1)	41 (5.2)
Not known to be pregnant	445 (86.9)	720 (91.1)

\* Please see Definitions on page 59.

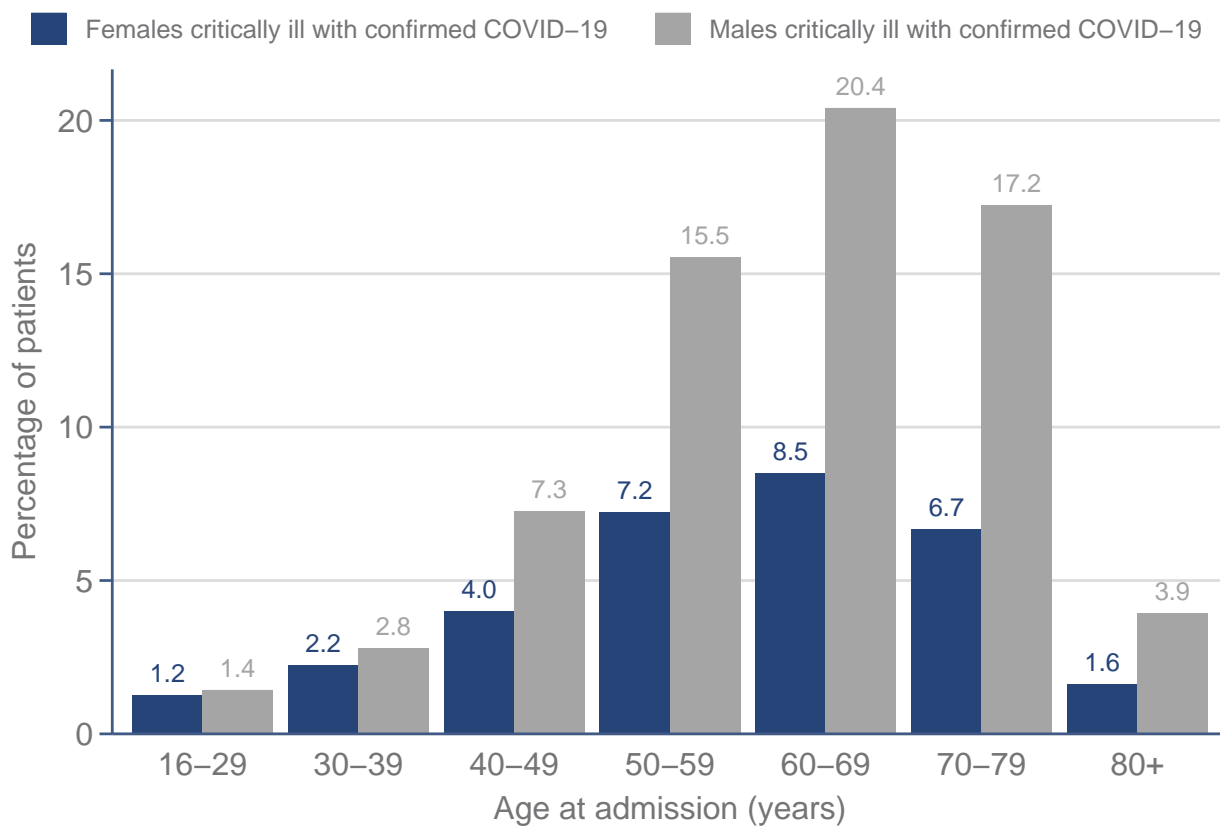
**Table 3. Patient characteristics: indicators of acute severity**

Indicators of acute severity	Patients with confirmed COVID-19 and 24h data received	
	Admitted from 1 Sep (N=6770)	Admitted up to 31 Aug (N=10,933)
Invasively ventilated within first 24h *, n (%) [N=6464]	1545 (23.9)	5865 (54.3)
APACHE II Score [N=6610]		
Mean (SD)	14.7 (5.3)	15.1 (5.3)
Median (IQR)	14 (11, 18)	15 (11, 18)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=6170]	13.5 (10.0, 18.9)	15.8 (11.3, 22.0)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=6170]		
< 13.3 kPa (< 100 mmHg)	3026 (49.0)	3808 (37.0)
13.3-26.6 kPa (100-200 mmHg)	2459 (39.9)	4934 (47.9)
≥ 26.7 kPa (≥ 200 mmHg)	685 (11.1)	1557 (15.1)

\* Please see Definitions on page 59. 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 is presented in Figure 17.

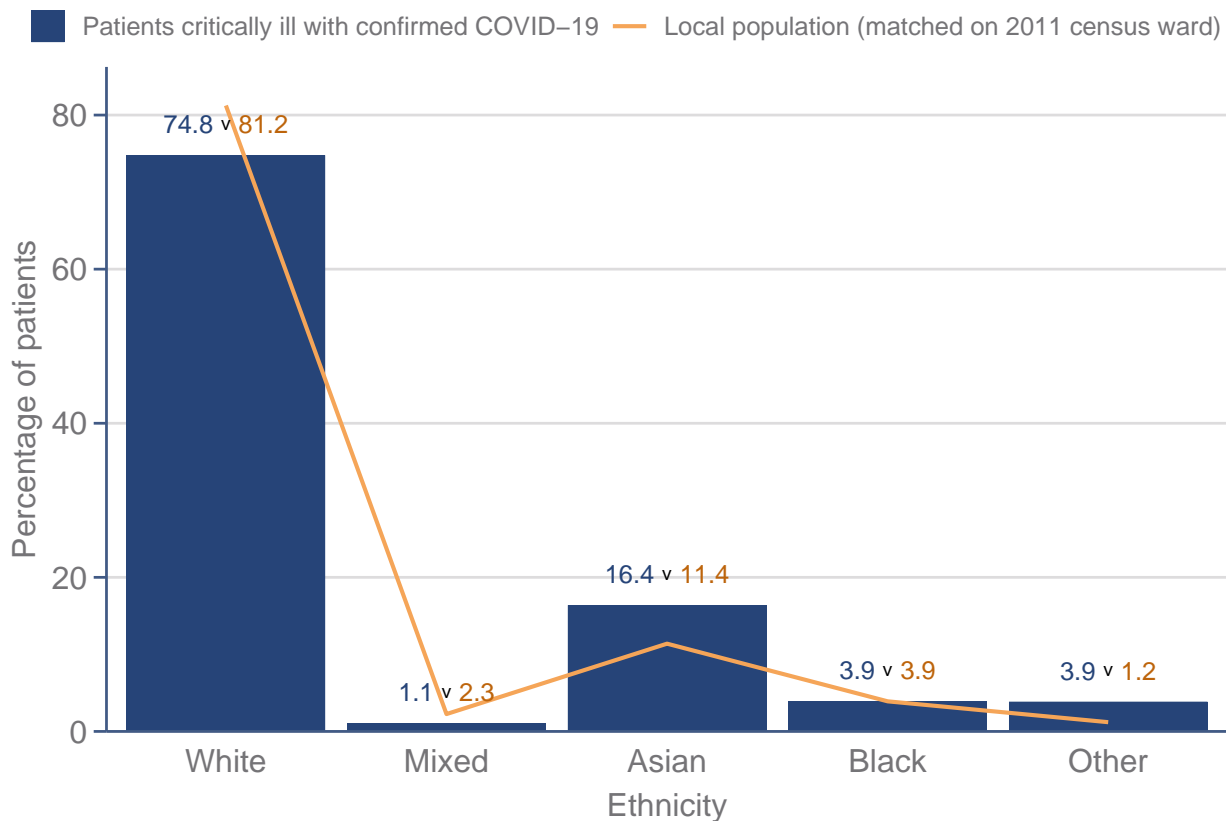


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### Figure 17. Age and sex distribution

Age and sex distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date.

The distribution of ethnicity, matched on 2011 census ward for location of patients critically ill with COVID-19, is presented in Figure 18.

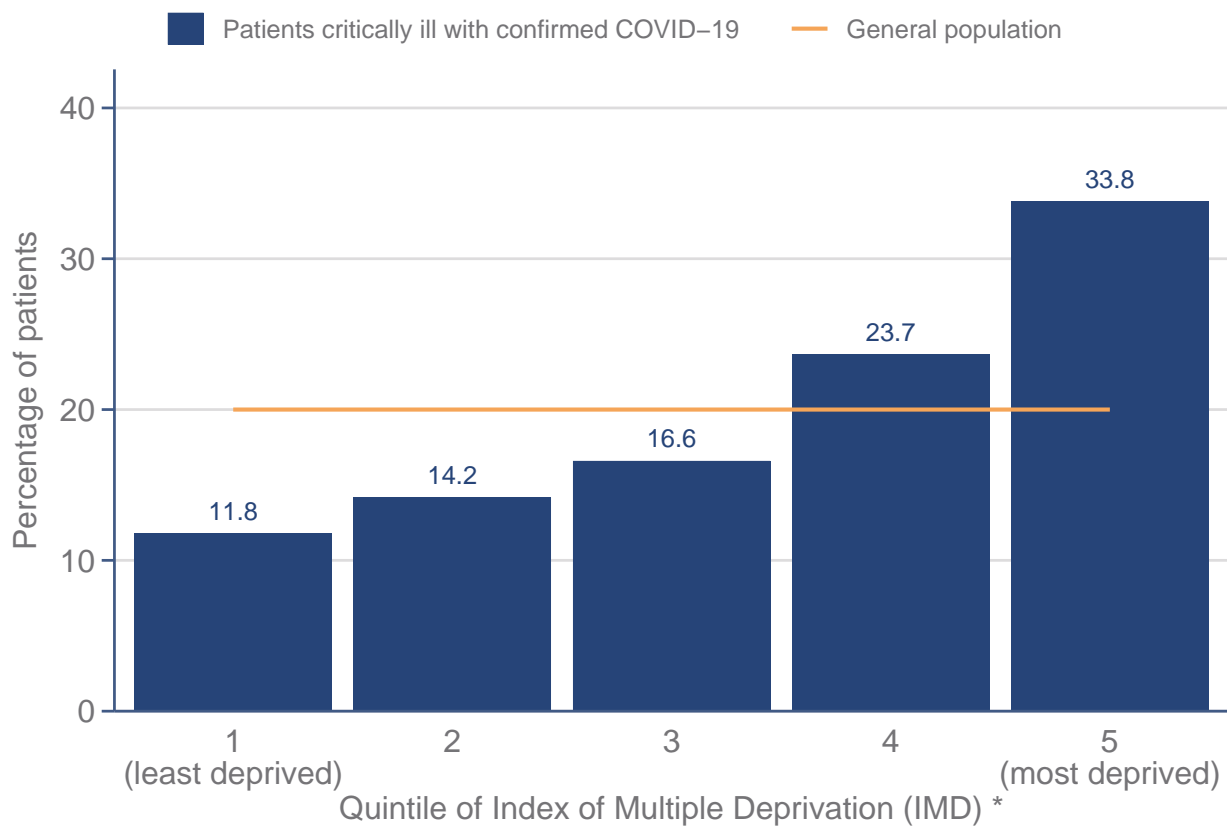


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### Figure 18. Ethnicity distribution compared with the local population

Ethnicity distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date compared with the local population (linked to 2011 census ward).

The distribution of Index of Multiple Deprivation (IMD) is presented in Figure 19.



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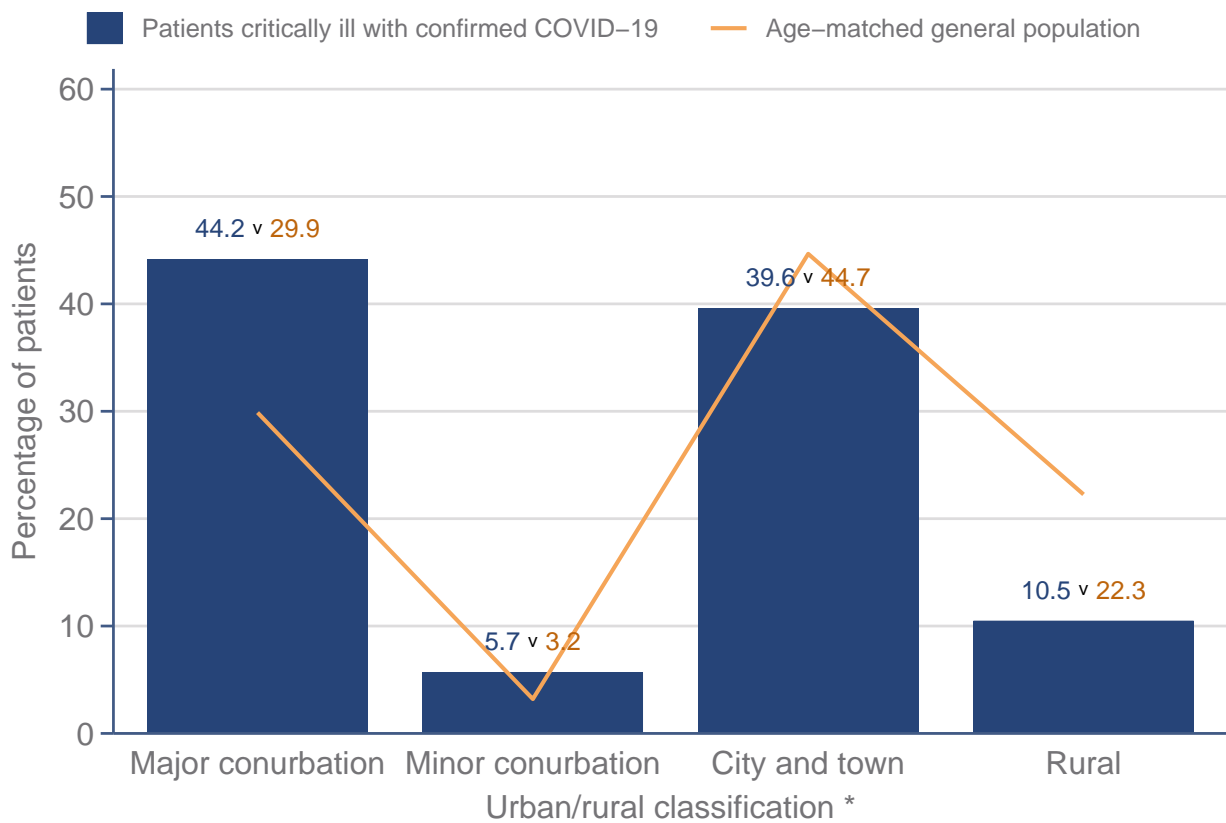
### Figure 19. Index of Multiple Deprivation \* distribution compared with the general population

Index of Multiple Deprivation (IMD) \* distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date compared with the general population.

\* Please see Definitions on page 59.



The distribution of patients by the urban/rural classification of their usual residence, compared with the age-matched general population (Office for National Statistics 2020), is presented in Figure 20.



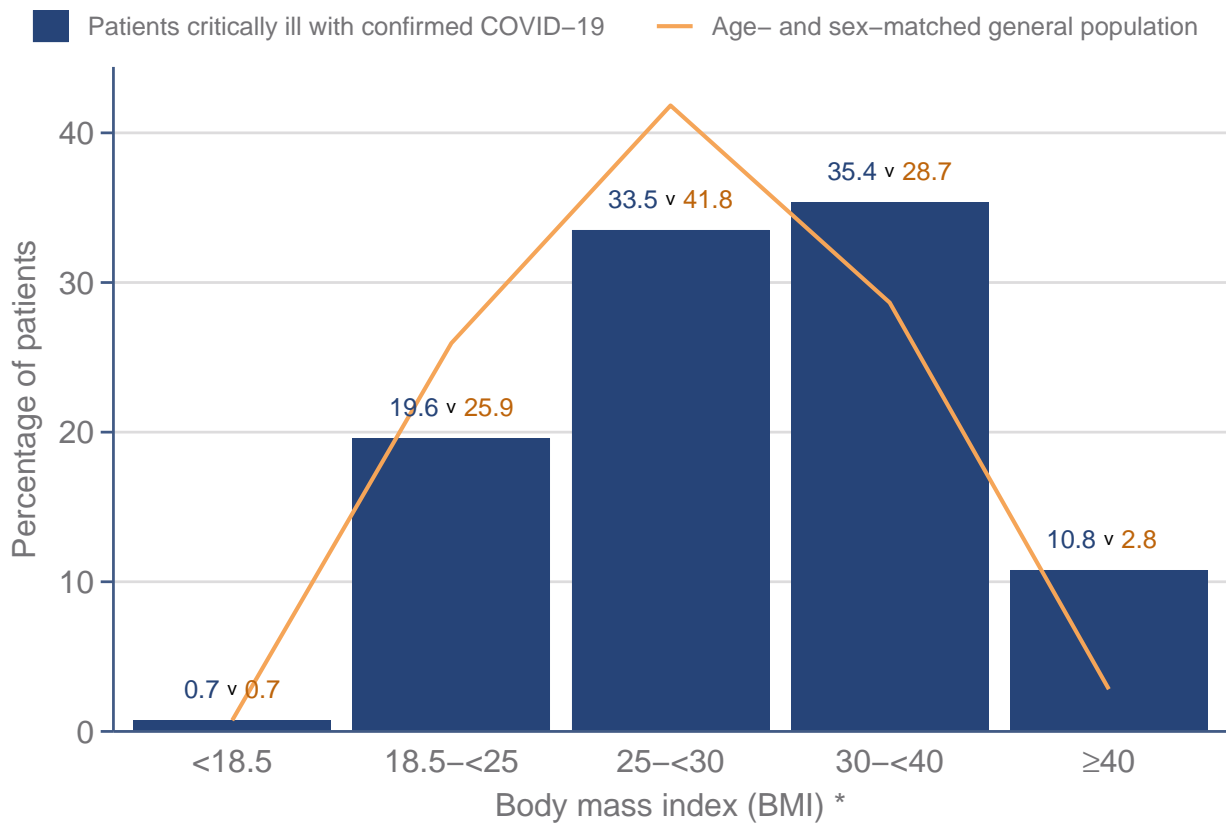
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**Figure 20. Urban/rural \* distribution compared with the age-matched general population**

Urban/rural \* distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date compared with the age-matched general population.

\* Please see Definitions on page 59.

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 21.



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**Figure 21. 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 September 2020 compared with the age- and sex-matched general population (Health Survey for England 2018).

\* Please see Definitions on page 59.

## 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 September 2020 to date are summarised in Tables 4-6 and compared with patients admitted up to 31 August 2020.

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

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Demographics	Admitted from 1 Sep (N=1545)	Admitted up to 31 Aug (N=5865)
Age at admission (years) [N=1544]		
Mean (SD)	60.4 (13.5)	58.5 (12.0)
Median (IQR)	63 (53, 70)	59 (51, 67)
Sex, n (%) [N=1543]		
Female	496 (32.1)	1608 (27.4)
Male	1047 (67.9)	4252 (72.6)
Ethnicity, n (%) [N=1473]		
White	1093 (74.2)	3464 (61.5)
Mixed	12 (0.8)	115 (2.0)
Asian	244 (16.6)	965 (17.1)
Black	61 (4.1)	650 (11.5)
Other	63 (4.3)	443 (7.9)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=1520]		
1 (least deprived)	177 (11.6)	786 (13.6)
2	196 (12.9)	925 (16.0)
3	260 (17.1)	1151 (19.9)
4	373 (24.5)	1486 (25.6)
5 (most deprived)	514 (33.8)	1447 (25.0)
Urban/rural classification *, n (%) [N=1438]		
Major conurbation	746 (51.9)	3125 (54.6)
Minor conurbation	60 (4.2)	119 (2.1)
City and town	496 (34.5)	1910 (33.4)
Rural	135 (9.4)	567 (9.9)

\* Please see Definitions on page 59.

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

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Medical history	Admitted from 1 Sep (N=1545)	Admitted up to 31 Aug (N=5865)
Dependency prior to admission to acute hospital, n (%) [N=1487]		
Able to live without assistance in daily activities	1300 (87.4)	5362 (92.3)
Some assistance with daily activities	186 (12.5)	438 (7.5)
Total assistance with all daily activities	1 (0.1)	10 (0.2)
Very severe comorbidities *, n (%) [N=1498]		
Cardiovascular	19 (1.3)	19 (0.3)
Respiratory	10 (0.7)	32 (0.6)
Renal	23 (1.5)	79 (1.4)
Liver	14 (0.9)	23 (0.4)
Metastatic disease	4 (0.3)	20 (0.3)
Haematological malignancy	25 (1.7)	75 (1.3)
Immunocompromised	60 (4.0)	162 (2.8)
Body mass index *, n (%) [N=1458]		
<18.5	14 (1.0)	30 (0.5)
18.5-<25	293 (20.1)	1415 (24.8)
25-<30	491 (33.7)	1980 (34.7)
30-<40	487 (33.4)	1850 (32.5)
≥40	173 (11.9)	424 (7.4)
CPR within previous 24h, n (%) [N=1523]		
In the community	34 (2.2)	39 (0.7)
In hospital	45 (3.0)	58 (1.0)
Prior hospital length of stay [N=1542]		
Mean (SD)	3.4 (5.9)	2.1 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=123]		
Currently pregnant	8 (6.5)	9 (2.4)
Recently pregnant (within 6 weeks)	10 (8.1)	22 (5.9)
Not known to be pregnant	105 (85.4)	344 (91.7)

\* Please see Definitions on page 59.

**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 from 1 Sep (N=1545)	Admitted up to 31 Aug (N=5865)
APACHE II Score [N=1544]		
Mean (SD)	17.0 (5.6)	15.6 (5.2)
Median (IQR)	16 (13, 20)	15 (12, 19)
<hr/>		
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=1540]	12.5 (8.6, 19.1)	15.5 (10.8, 21.5)
<hr/>		
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=1540]		
< 13.3 kPa (< 100 mmHg)	834 (54.2)	2280 (39.0)
13.3-26.6 kPa (100-200 mmHg)	499 (32.4)	2783 (47.6)
≥ 26.7 kPa (≥ 200 mmHg)	207 (13.4)	782 (13.4)

\* Please see Definitions on page 59. 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.

## Patient characteristics – advanced respiratory support

Characteristics of patients critically ill with confirmed COVID-19 that received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to date are summarised in Tables 7-9 and compared with patients admitted up to 31 August 2020.

**Table 7. Patient characteristics: demographics (any advanced respiratory support and known outcomes)**

Patients with confirmed COVID-19 and advanced respiratory support *		
Demographics	Admitted from 1 Sep (N=2384)	Admitted up to 31 Aug (N=7876)
Age at admission (years) [N=2383]		
Mean (SD)	61.7 (13.0)	58.6 (11.9)
Median (IQR)	64 (54, 72)	60 (51, 67)
Sex, n (%) [N=2383]		
Female	702 (29.5)	2205 (28.0)
Male	1681 (70.5)	5666 (72.0)
Ethnicity, n (%) [N=2283]		
White	1703 (74.6)	4750 (62.7)
Mixed	16 (0.7)	148 (2.0)
Asian	401 (17.6)	1297 (17.1)
Black	82 (3.6)	822 (10.8)
Other	81 (3.5)	564 (7.4)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=2359]		
1 (least deprived)	279 (11.8)	1063 (13.7)
2	310 (13.1)	1229 (15.8)
3	380 (16.1)	1552 (19.9)
4	548 (23.2)	1941 (24.9)
5 (most deprived)	842 (35.7)	1996 (25.7)
Urban/rural classification *, n (%) [N=2273]		
Major conurbation	1093 (48.1)	4018 (52.2)
Minor conurbation	123 (5.4)	205 (2.7)
City and town	834 (36.7)	2674 (34.7)
Rural	222 (9.8)	802 (10.4)

\* Please see Definitions on page 59.

**Table 8. Patient characteristics: medical history (any advanced respiratory support and known outcomes)**

Patients with confirmed COVID-19 and advanced respiratory support *		
Medical history	Admitted from 1 Sep (N=2384)	Admitted up to 31 Aug (N=7876)
Dependency prior to admission to acute hospital, n (%) [N=2309]		
Able to live without assistance in daily activities	2054 (89.0)	7180 (92.0)
Some assistance with daily activities	253 (11.0)	612 (7.8)
Total assistance with all daily activities	2 (0.1)	11 (0.1)
Very severe comorbidities *, n (%) [N=2321]		
Cardiovascular	20 (0.9)	25 (0.3)
Respiratory	19 (0.8)	47 (0.6)
Renal	38 (1.6)	94 (1.2)
Liver	22 (0.9)	31 (0.4)
Metastatic disease	9 (0.4)	24 (0.3)
Haematological malignancy	46 (2.0)	128 (1.6)
Immunocompromised	114 (4.9)	234 (3.0)
Body mass index *, n (%) [N=2247]		
<18.5	15 (0.7)	41 (0.5)
18.5-<25	468 (20.8)	1888 (24.9)
25-<30	746 (33.2)	2634 (34.7)
30-<40	783 (34.8)	2466 (32.5)
≥40	235 (10.5)	567 (7.5)
CPR within previous 24h, n (%) [N=2355]		
In the community	36 (1.5)	45 (0.6)
In hospital	49 (2.1)	70 (0.9)
Prior hospital length of stay [N=2378]		
Mean (SD)	3.2 (7.2)	2.2 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=160]		
Currently pregnant	13 (8.1)	15 (2.9)
Recently pregnant (within 6 weeks)	12 (7.5)	27 (5.2)
Not known to be pregnant	135 (84.4)	481 (92.0)

\* Please see Definitions on page 59.

**Table 9. Patient characteristics: indicators of acute severity (any advanced respiratory support and known outcomes)**

Patients with confirmed COVID-19 and advanced respiratory support *		
Indicators of acute severity	Admitted from 1 Sep (N=2384)	Admitted up to 31 Aug (N=7876)
APACHE II Score [N=2344]		
Mean (SD)	16.1 (5.4)	15.4 (5.1)
Median (IQR)	15 (13, 19)	15 (12, 18)
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=2273]		
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=2273]		
< 13.3 kPa (< 100 mmHg)	1323 (58.2)	3101 (40.3)
13.3-26.6 kPa (100-200 mmHg)	714 (31.4)	3625 (47.2)
≥ 26.7 kPa (≥ 200 mmHg)	236 (10.4)	962 (12.5)

\* Please see Definitions on page 59. 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.



## Patient characteristics – basic respiratory support only

Characteristics of patients critically ill with confirmed COVID-19 that received basic respiratory support only during their critical care stay admitted from 1 September 2020 to date are summarised in Tables 10-12 and compared with patients admitted up to 31 August 2020.

**Table 10. Patient characteristics: demographics (basic respiratory support only and known outcomes)**

Patients with confirmed COVID-19 and basic respiratory support only *		
Demographics	Admitted from 1 Sep (N=3028)	Admitted up to 31 Aug (N=2789)
Age at admission (years) [N=3028]		
Mean (SD)	60.7 (14.4)	59.4 (14.3)
Median (IQR)	62 (52, 72)	60 (50, 70)
Sex, n (%) [N=3027]		
Female	990 (32.7)	958 (34.4)
Male	2037 (67.3)	1830 (65.6)
Ethnicity, n (%) [N=2901]		
White	2209 (76.1)	2016 (74.9)
Mixed	30 (1.0)	41 (1.5)
Asian	444 (15.3)	351 (13.0)
Black	110 (3.8)	164 (6.1)
Other	108 (3.7)	118 (4.4)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=2987]		
1 (least deprived)	349 (11.7)	440 (16.1)
2	452 (15.1)	464 (16.9)
3	487 (16.3)	488 (17.8)
4	681 (22.8)	602 (22.0)
5 (most deprived)	1018 (34.1)	747 (27.3)
Urban/rural classification *, n (%) [N=2975]		
Major conurbation	1241 (41.7)	1046 (38.1)
Minor conurbation	189 (6.4)	128 (4.7)
City and town	1229 (41.3)	1241 (45.2)
Rural	316 (10.6)	324 (11.8)

\* Please see Definitions on page 59.

**Table 11. Patient characteristics: medical history (basic respiratory support only and known outcomes)**

Patients with confirmed COVID-19 and basic respiratory support only *		
Medical history	Admitted from 1 Sep (N=3028)	Admitted up to 31 Aug (N=2789)
Dependency prior to admission to acute hospital, n (%) [N=2953]		
Able to live without assistance in daily activities	2527 (85.6)	2294 (83.0)
Some assistance with daily activities	413 (14.0)	446 (16.1)
Total assistance with all daily activities	13 (0.4)	24 (0.9)
Very severe comorbidities *, n (%) [N=2974]		
Cardiovascular	27 (0.9)	39 (1.4)
Respiratory	47 (1.6)	72 (2.6)
Renal	51 (1.7)	76 (2.7)
Liver	11 (0.4)	17 (0.6)
Metastatic disease	33 (1.1)	26 (0.9)
Haematological malignancy	52 (1.7)	78 (2.8)
Immunocompromised	118 (4.0)	137 (5.0)
Body mass index *, n (%) [N=2836]		
<18.5	24 (0.8)	28 (1.1)
18.5-<25	524 (18.5)	666 (26.3)
25-<30	957 (33.7)	857 (33.8)
30-<40	1011 (35.6)	736 (29.0)
≥40	320 (11.3)	249 (9.8)
CPR within previous 24h, n (%) [N=3001]		
In the community	5 (0.2)	5 (0.2)
In hospital	1 (0.0)	3 (0.1)
Prior hospital length of stay [N=3018]		
Mean (SD)	2.7 (8.2)	3.0 (7.3)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=236]		
Currently pregnant	19 (8.1)	11 (4.6)
Recently pregnant (within 6 weeks)	8 (3.4)	11 (4.6)
Not known to be pregnant	209 (88.6)	217 (90.8)

\* Please see Definitions on page 59.

**Table 12. Patient characteristics: indicators of acute severity (basic respiratory support only and known outcomes)**

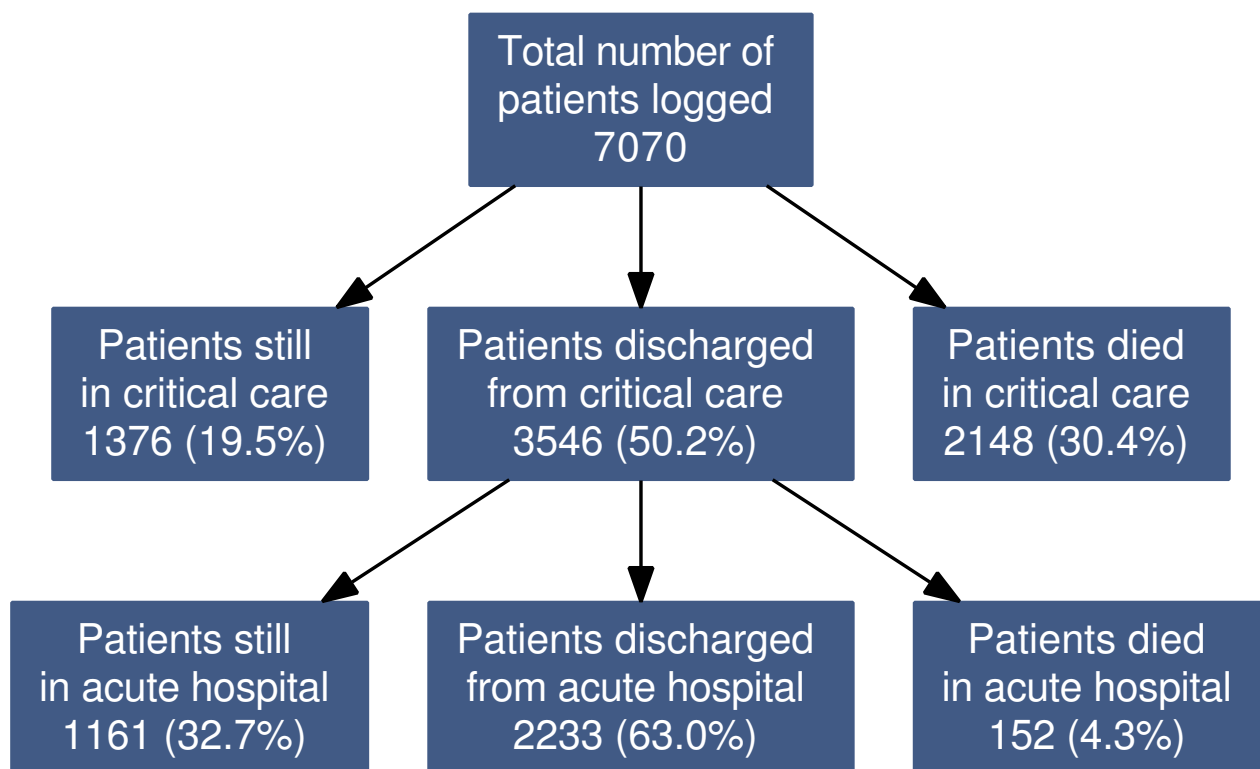
Patients with confirmed COVID-19 and basic respiratory support only *		
Indicators of acute severity	Admitted from 1 Sep (N=3028)	Admitted up to 31 Aug (N=2789)
APACHE II Score [N=2966]		
Mean (SD)	13.7 (5.1)	14.2 (5.5)
Median (IQR)	13 (10, 16)	14 (10, 17)
<hr/>		
PaO <sub>2</sub> /FiO <sub>2</sub> ratio † (kPa), median (IQR) [N=2730]	14.6 (11.2, 19.6)	17.5 (12.5, 24.0)
<hr/>		
PaO <sub>2</sub> /FiO <sub>2</sub> ratio †, n (%) [N=2730]		
< 13.3 kPa (< 100 mmHg)	1106 (40.5)	701 (29.1)
13.3-26.6 kPa (100-200 mmHg)	1366 (50.0)	1272 (52.8)
≥ 26.7 kPa (≥ 200 mmHg)	258 (9.5)	437 (18.1)

\* Please see Definitions on page 59. 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.

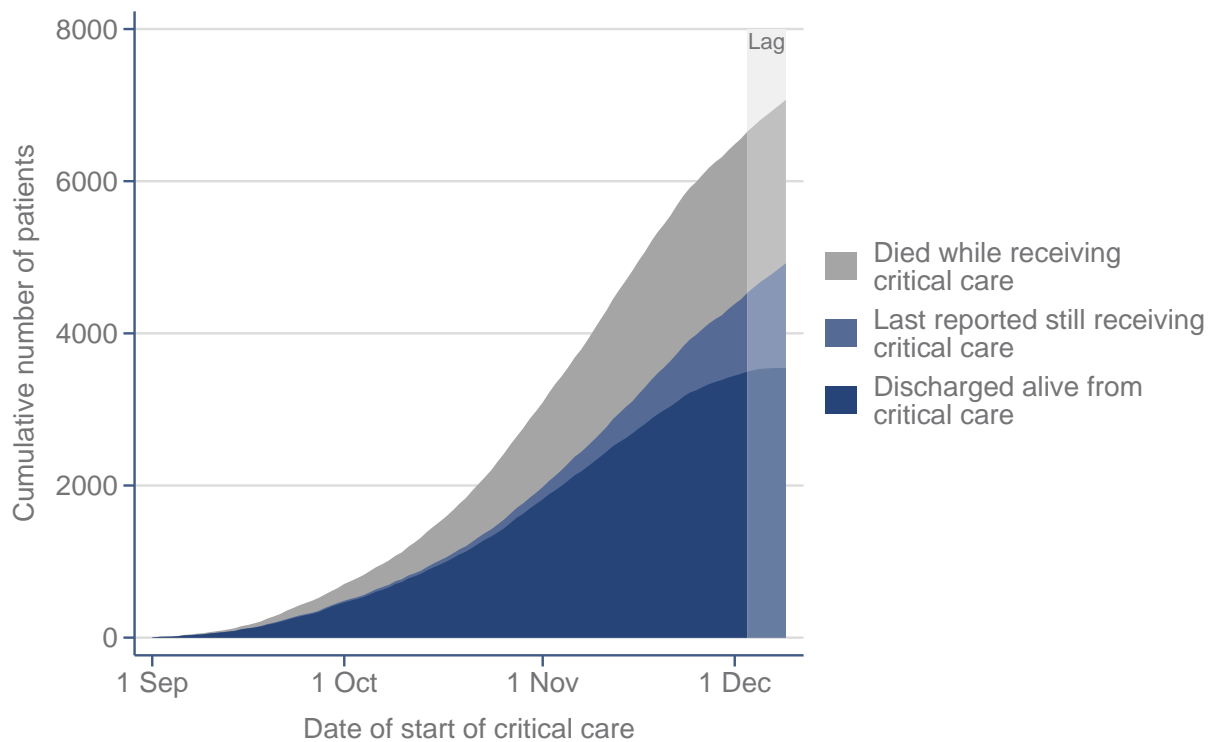
## Outcomes, duration of critical care and organ support

Critical care outcomes have been received for 5694 (of 7070) patients. Of these, 2148 have died and 3546 have been discharged from critical care (Figures 22 and 23). The remaining 1376 were last reported to still be receiving critical care.



**Figure 22. Critical care and acute hospital outcomes**

Critical care and acute hospital outcomes for patients admitted from 1 September 2020 to date.



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### Figure 23. Cumulative outcomes \*

Cumulative outcomes for patients admitted from 1 September 2020 to date 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 10 December 2020.

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 13 and compared with patients admitted up to 31 August 2020.

**Table 13. Critical care outcome, duration of critical care and organ support**

Patients with confirmed COVID-19 and outcome received		
Critical care outcome	Admitted from 1 Sep (N=7070)	Admitted up to 31 Aug (N=10,933)
Outcome at end of critical care, n (%)		
Discharged	3546 (50.2)	6620 (60.6)
Died	2148 (30.4)	4311 (39.4)
Still receiving critical care	1376 (19.5)	2 (0.0)
<b>Duration of critical care</b>	<b>(N=5686)</b>	<b>(N=10,925)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	6 (3, 10)	12 (5, 28)
Non-survivors	10 (5, 16)	9 (5, 16)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=5634)</b>	<b>(N=10,929)</b>
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	2384 (42.3)	7876 (72.1)
Basic respiratory support only	3028 (53.7)	2789 (25.5)
No respiratory support	222 (3.9)	264 (2.4)
Advanced cardiovascular support	1011 (17.9)	3365 (30.8)
Basic cardiovascular support only	4319 (76.7)	7102 (65.0)
No cardiovascular support	304 (5.4)	462 (4.2)
Renal support	763 (13.5)	2925 (26.8)
Liver support	36 (0.6)	114 (1.0)
Neurological support	331 (5.9)	993 (9.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	9 (4, 15)	14 (7, 24)
Total (advanced + basic) respiratory support	7 (4, 13)	11 (5, 22)
Advanced cardiovascular support	2 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	7 (4, 13)	11 (5, 22)
Renal support	4 (2, 8)	8 (3, 15)

Please note that the results for patients admitted from 1 September 2020 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 59.

† 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).

## Outcomes, duration of critical care and organ support – invasively ventilated first 24 hours

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Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 and receiving invasive ventilation during the first 24 hours in critical care admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 14 and compared with patients admitted up to 31 August 2020.

**Table 14. Critical care outcome, duration of critical care and organ support (invasively ventilated first 24 hours)**

Patients with confirmed COVID-19 invasively ventilated first 24 hours *		
Critical care outcome	Admitted from 1 Sep (N=1545)	Admitted up to 31 Aug (N=5865)
Outcome at end of critical care, n (%)		
Discharged	507 (32.8)	3130 (53.4)
Died	694 (44.9)	2734 (46.6)
Still receiving critical care	344 (22.3)	1 (0.0)
<b>Duration of critical care</b>	<b>(N=1200)</b>	<b>(N=5861)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	11 (6, 19)	22 (12, 35)
Non-survivors	10 (4, 16)	10 (5, 17)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=1184)</b>	<b>(N=5863)</b>
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	473 (39.9)	2392 (40.8)
Basic cardiovascular support only	710 (60.0)	3458 (59.0)
No cardiovascular support	1 (0.1)	13 (0.2)
Renal support	314 (26.5)	2120 (36.2)
Liver support	19 (1.6)	80 (1.4)
Neurological support	184 (15.5)	716 (12.2)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	9 (4, 16)	14 (7, 24)
Total (advanced + basic) respiratory support	11 (6, 17)	15 (8, 26)
Advanced cardiovascular support	2 (1, 4)	3 (2, 6)
Total (advanced + basic) cardiovascular support	11 (6, 17)	15 (8, 26)
Renal support	5 (2, 10)	8 (4, 16)

Please note that the results for patients admitted from 1 September 2020 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 59.

† 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).



## Outcomes, duration of critical care and organ support – advanced respiratory support

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Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 that received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 15 and compared with patients admitted up to 31 August 2020.

**Table 15. Critical care outcome, duration of critical care and organ support (any advanced respiratory support and known outcomes)**

Patients with confirmed COVID-19 and advanced respiratory support *		
Critical care outcome	Admitted from 1 Sep (N=3398 ‡)	Admitted up to 31 Aug (N=7876)
Outcome at end of critical care, n (%)		
Discharged	835 (24.6)	4121 (52.3)
Died	1549 (45.6)	3755 (47.7)
Still receiving critical care ‡	1014 (29.8)	0 (0.0)
<b>Duration of critical care</b>	<b>(N=2382)</b>	<b>(N=7871)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	13 (7, 23)	23 (12, 37)
Non-survivors	13 (7, 18)	10 (6, 17)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=2384)</b>	<b>(N=7876)</b>
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	945 (39.6)	3295 (41.8)
Basic cardiovascular support only	1436 (60.2)	4564 (57.9)
No cardiovascular support	3 (0.1)	17 (0.2)
Renal support	654 (27.4)	2776 (35.2)
Liver support	32 (1.3)	110 (1.4)
Neurological support	306 (12.8)	967 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	9 (4, 15)	14 (7, 24)
Total (advanced + basic) respiratory support	13 (8, 20)	16 (8, 27)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	13 (8, 19)	16 (9, 27)
Renal support	4 (2, 9)	8 (4, 16)

Please note that the results for patients admitted from 1 September 2020 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 59.

† 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).

‡ Numbers of patients still receiving critical care estimated based on observed, incomplete organ support data received.

## Outcomes, duration of critical care and organ support – basic respiratory support only

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Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 that received basic respiratory support only during their critical care stay admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 16 and compared with patients admitted up to 31 August 2020.

**Table 16. Critical care outcome, duration of critical care and organ support (basic respiratory support only and known outcomes)**

Patients with confirmed COVID-19 and basic respiratory support only *		
Critical care outcome	Admitted from 1 Sep (N=3449 ‡)	Admitted up to 31 Aug (N=2789)
Outcome at end of critical care, n (%)		
Discharged	2471 (71.6)	2249 (80.6)
Died	557 (16.1)	540 (19.4)
Still receiving critical care ‡	421 (12.2)	0 (0.0)
<b>Duration of critical care</b>	<b>(N=3023)</b>	<b>(N=2788)</b>
Duration of critical care (days) †, median (IQR)		
Survivors	5 (3, 8)	4 (2, 7)
Non-survivors	5 (3, 9)	4 (2, 7)
<b>Organ support (Critical Care Minimum Dataset) *</b>	<b>(N=3028)</b>	<b>(N=2789)</b>
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	56 (1.8)	53 (1.9)
Basic cardiovascular support only	2743 (90.6)	2325 (83.4)
No cardiovascular support	229 (7.6)	411 (14.7)
Renal support	89 (2.9)	114 (4.1)
Liver support	2 (0.1)	3 (0.1)
Neurological support	22 (0.7)	22 (0.8)
Duration of organ support (calendar days), median (IQR)		
Total (advanced + basic) respiratory support	5 (3, 8)	4 (3, 7)
Advanced cardiovascular support	2 (1, 2)	2 (1, 3)
Total (advanced + basic) cardiovascular support	5 (4, 8)	5 (3, 7)
Renal support	3 (2, 6)	3 (2, 5)

Please note that the results for patients admitted from 1 September 2020 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.

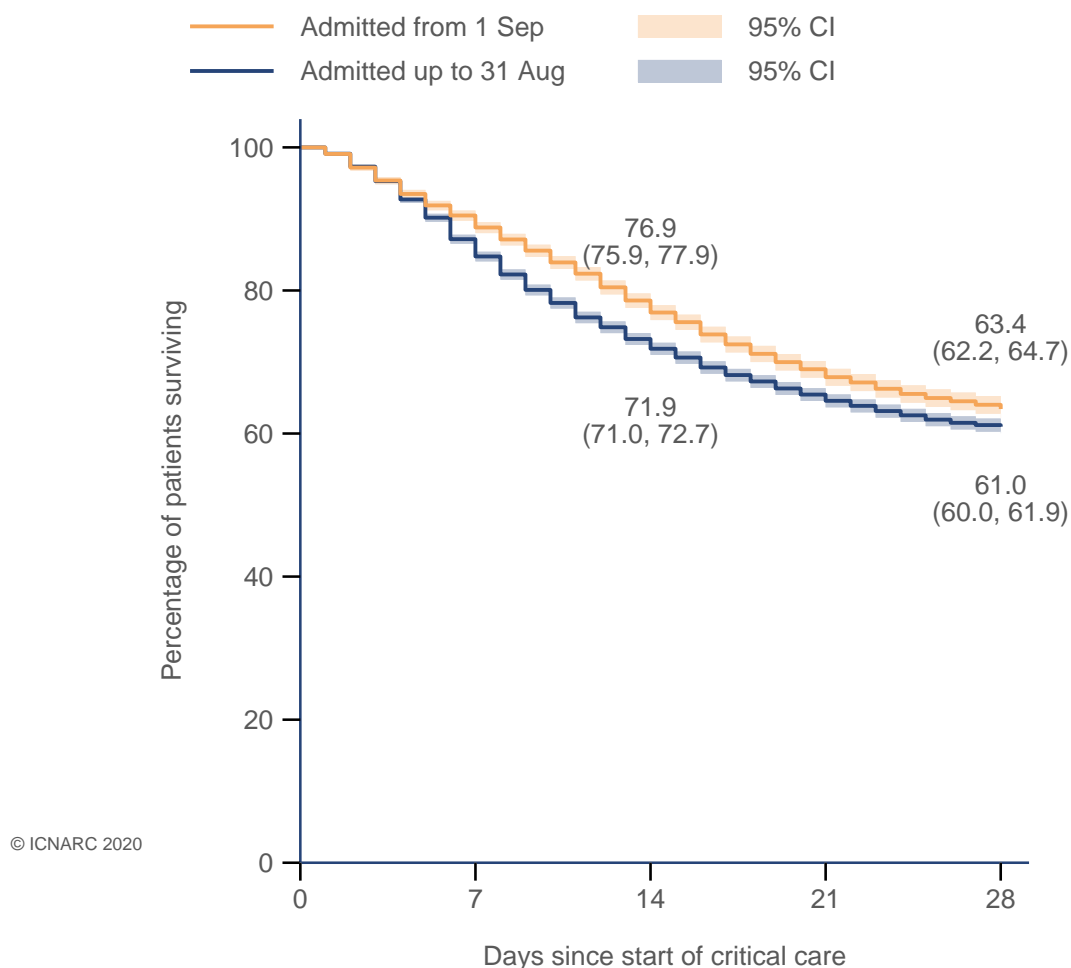
\* Please see Definitions on page 59.

† 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).

‡ Numbers of patients still receiving critical care estimated based on observed, incomplete organ support data received.

## 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 September 2020 to date is shown in Figure 24 and compared with patients admitted up to 31 August 2020.



### Admitted from 1 Sep

At risk	6769	5689	4517	3476	2710
Died (in hospital)	0	745	1478	1983	2196
Censored	0	335	774	1310	1863

### Admitted up to 31 Aug

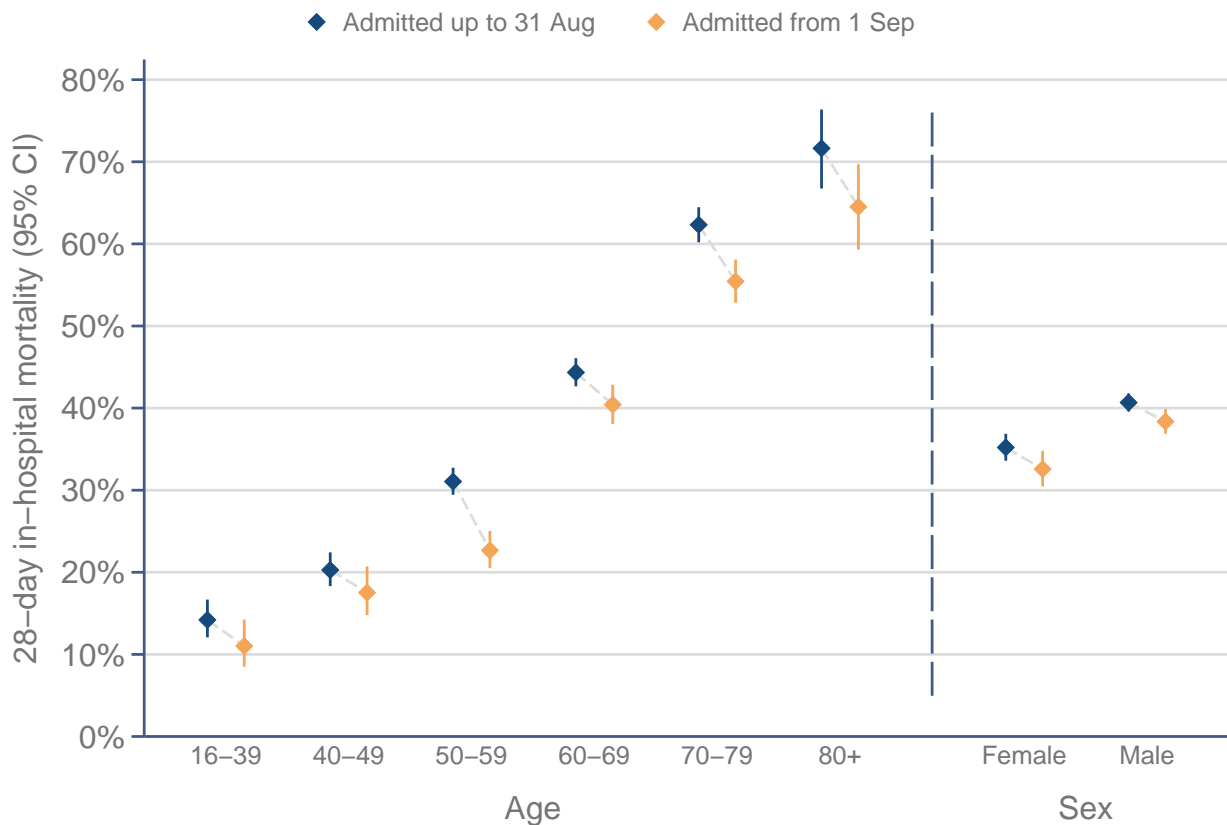
At risk	10933	9265	7854	7057	6660
Died (in hospital)	0	1667	3077	3873	4268
Censored	0	1	2	3	5

### Figure 24. In-hospital survival to 28 days following admission to critical care

Kaplan-Meier survival analysis. 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).

## 28-day in-hospital outcome - by patient characteristics

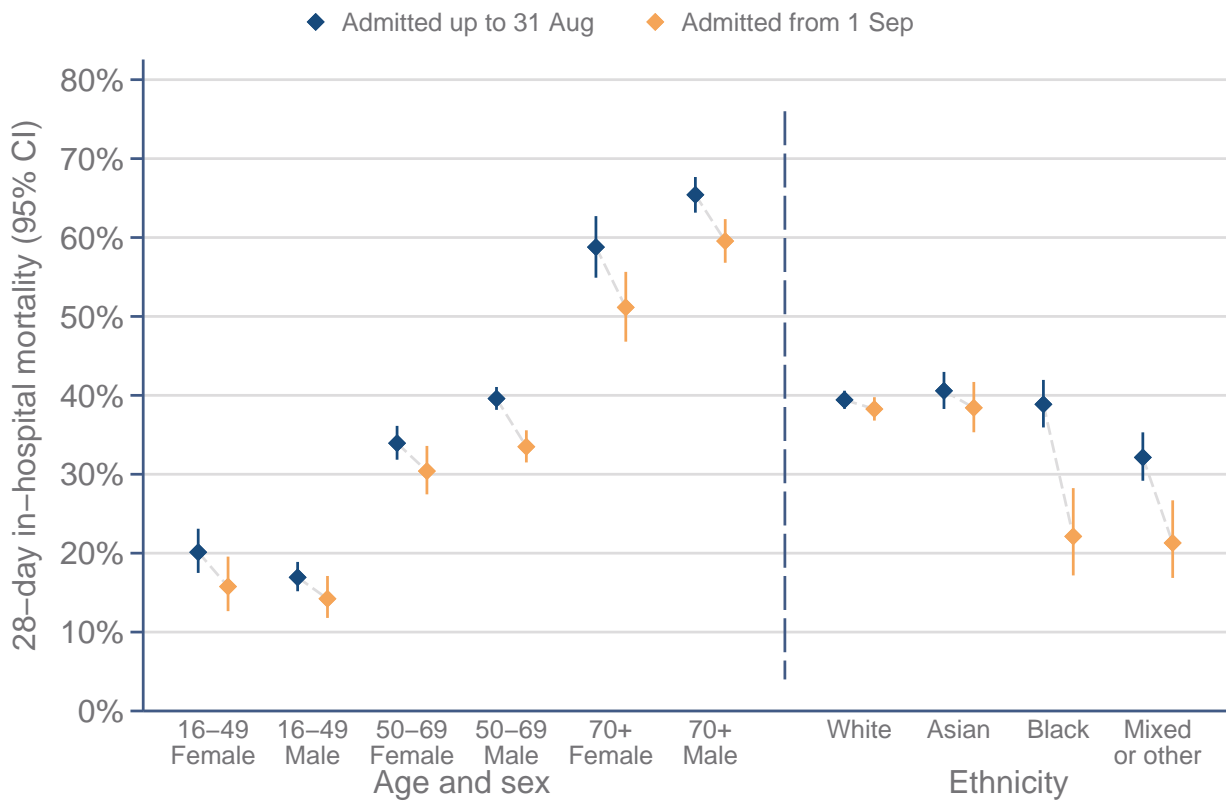
28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by patient characteristics (demographics, medical history and indicators of acute severity) is presented in Figures 25-28 and compared with patients admitted up to 31 August 2020.



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### Figure 25. 28-day in-hospital mortality by patient characteristics (demographics)

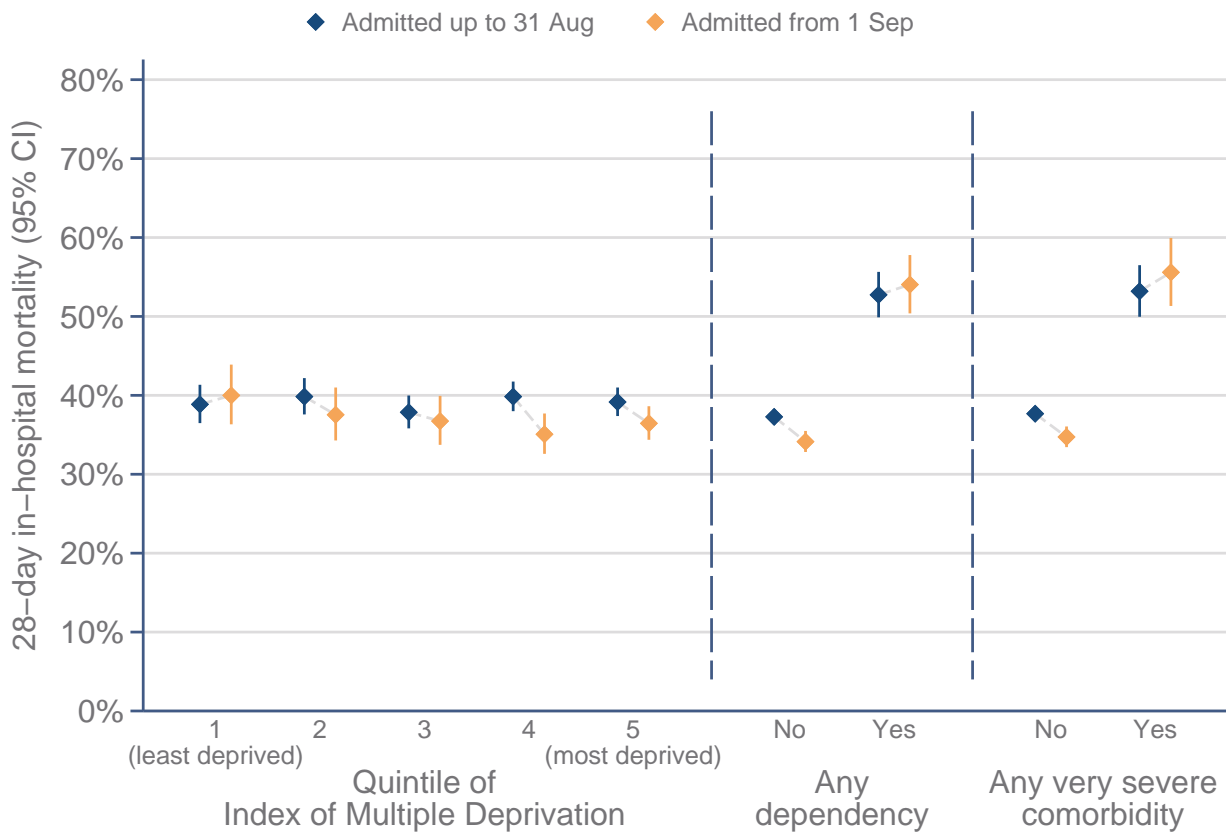
Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. Patients last reported to be still receiving critical care censored on the most recent date of data submission by the treating unit. Patients discharged from acute hospital within 28 days assumed to survive to 28 days. Please note that these estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).



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**Figure 26. 28-day in-hospital mortality by patient characteristics (demographics continued)**

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).

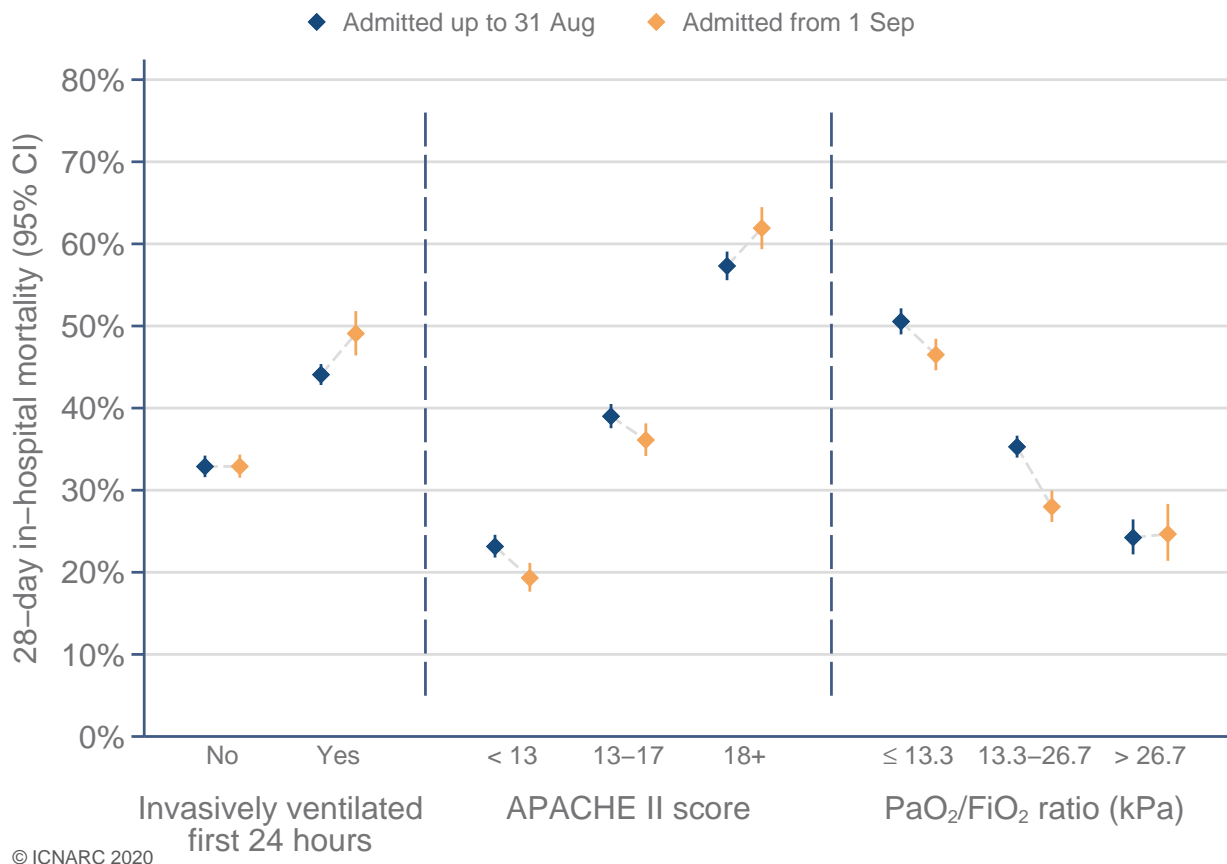


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**Figure 27. 28-day in-hospital mortality by patient characteristics (demographics and medical history)**

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).





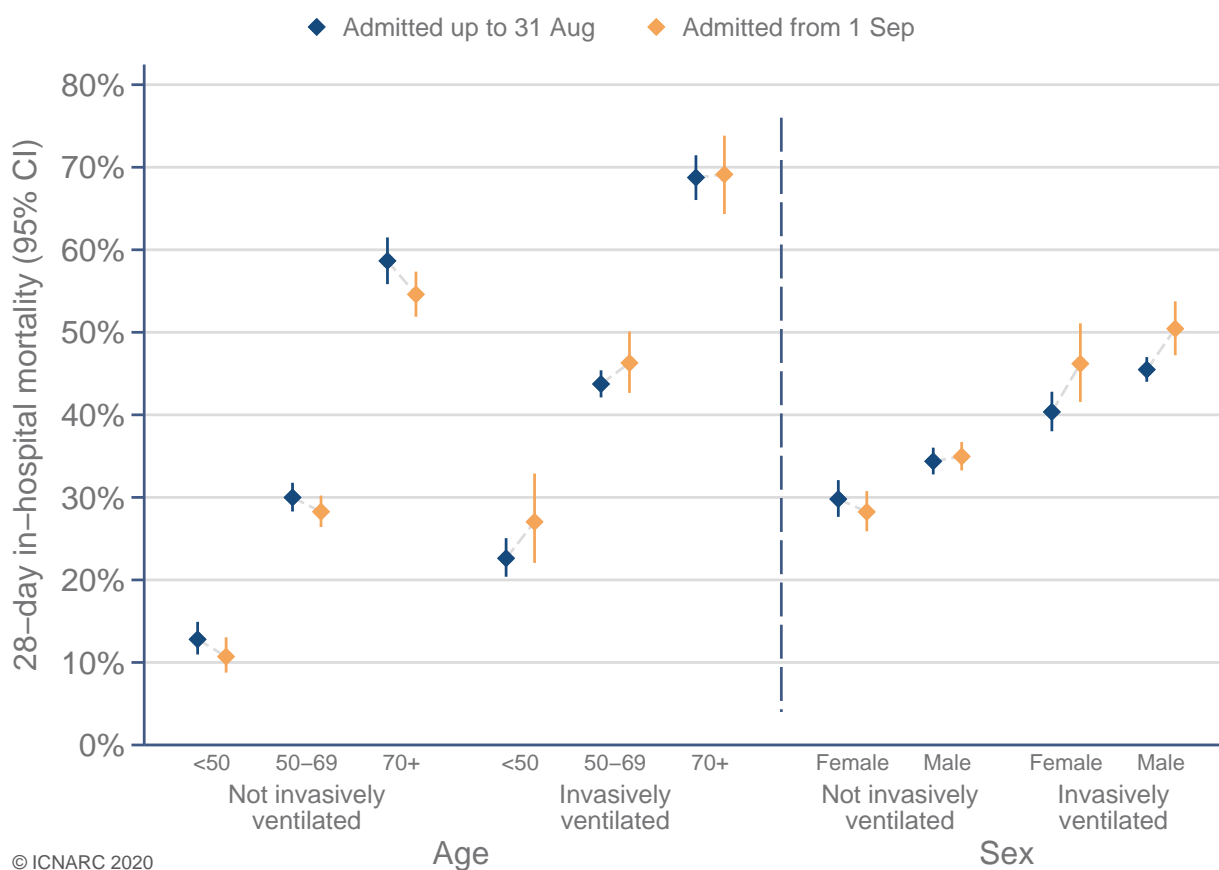
**Figure 28. 28-day in-hospital mortality by patient characteristics (indicators of acute severity \*)**

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).

\* Please see Definitions on page 59. Indicators of acute severity are based on data from the first 24 hours of critical care.

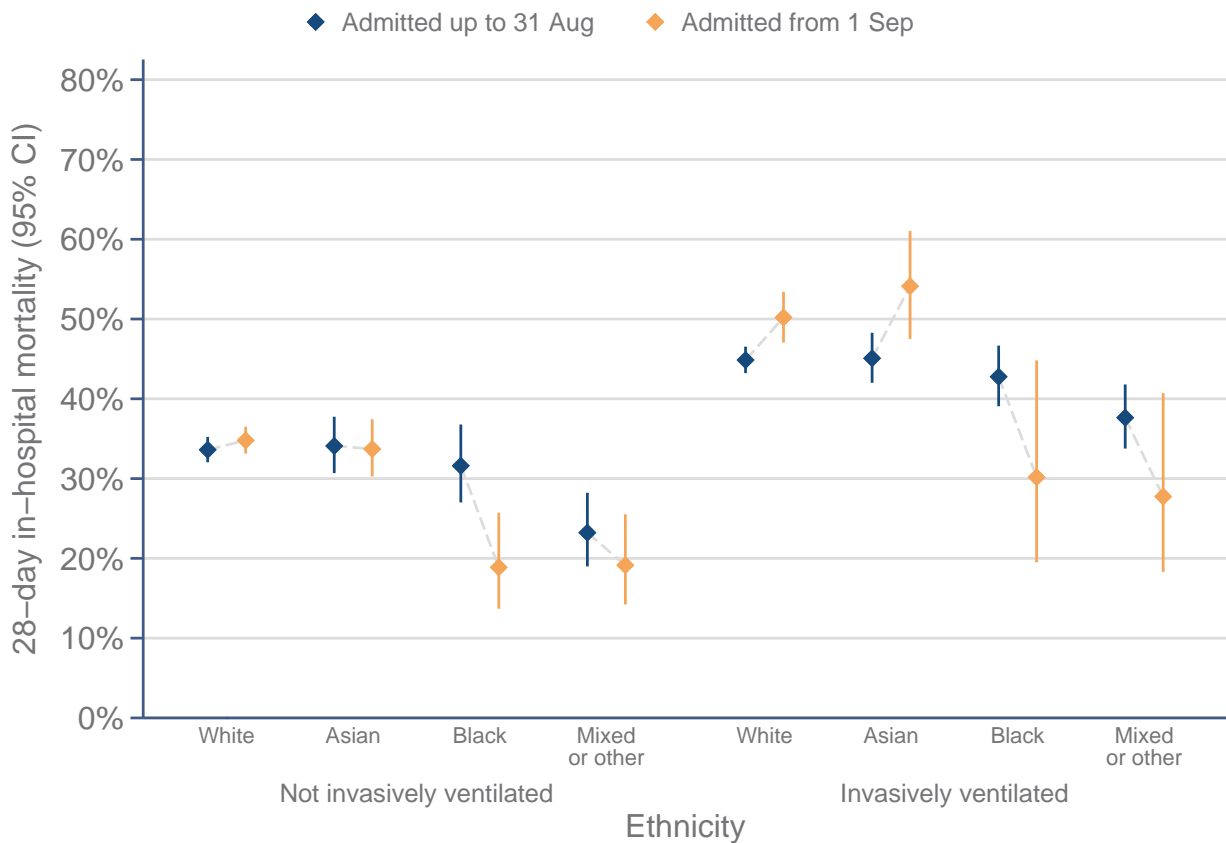
## 28-day in-hospital outcome - by patient characteristics and invasive ventilation first 24 hours

28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by patient characteristics (demographics and indicators of acute severity) separately for those invasively ventilated and not invasively ventilated during the first 24 hours of critical care is presented in Figures 29-31 and compared with patients admitted up to 31 August 2020.



**Figure 29. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics)**

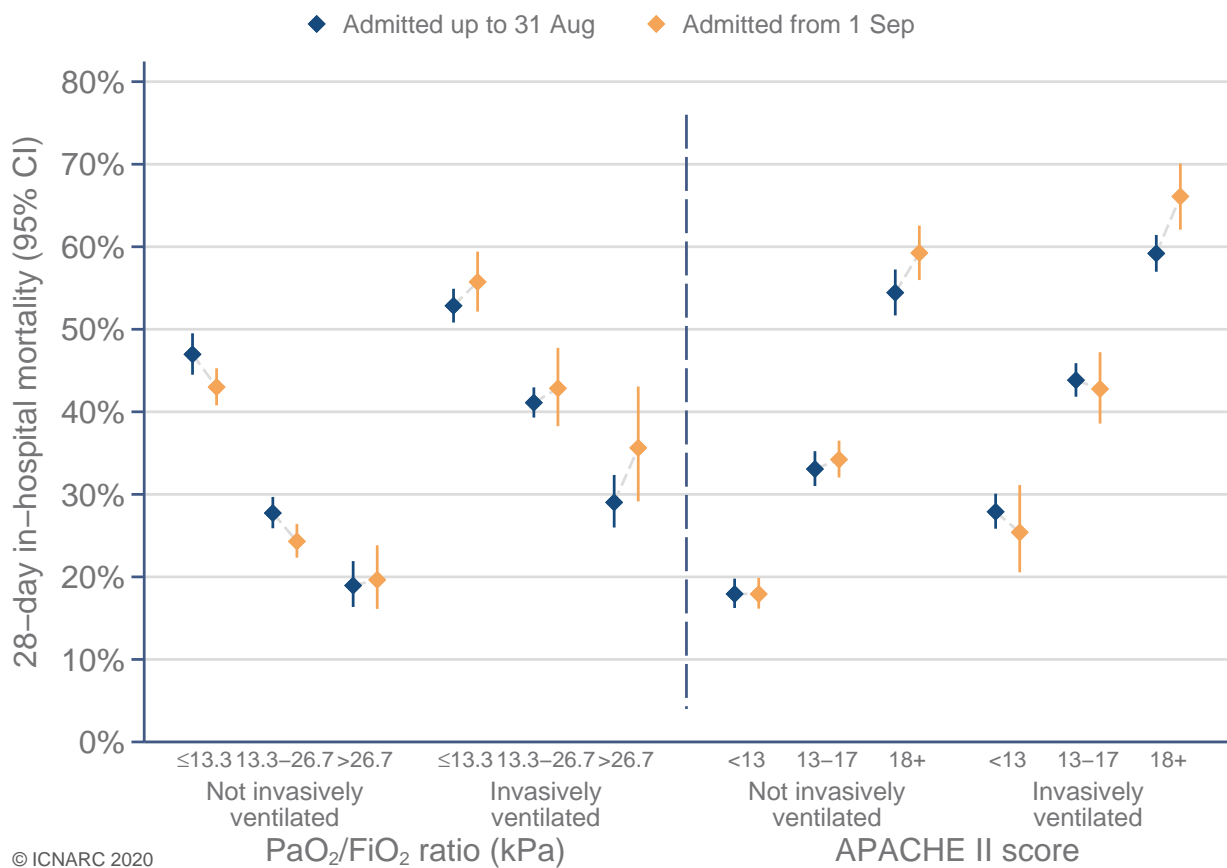
Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. Patients last reported to be still receiving critical care censored on the most recent date of data submission by the treating unit. Patients discharged from acute hospital within 28 days assumed to survive to 28 days. Please note that these estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).



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**Figure 30. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics continued)**

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).



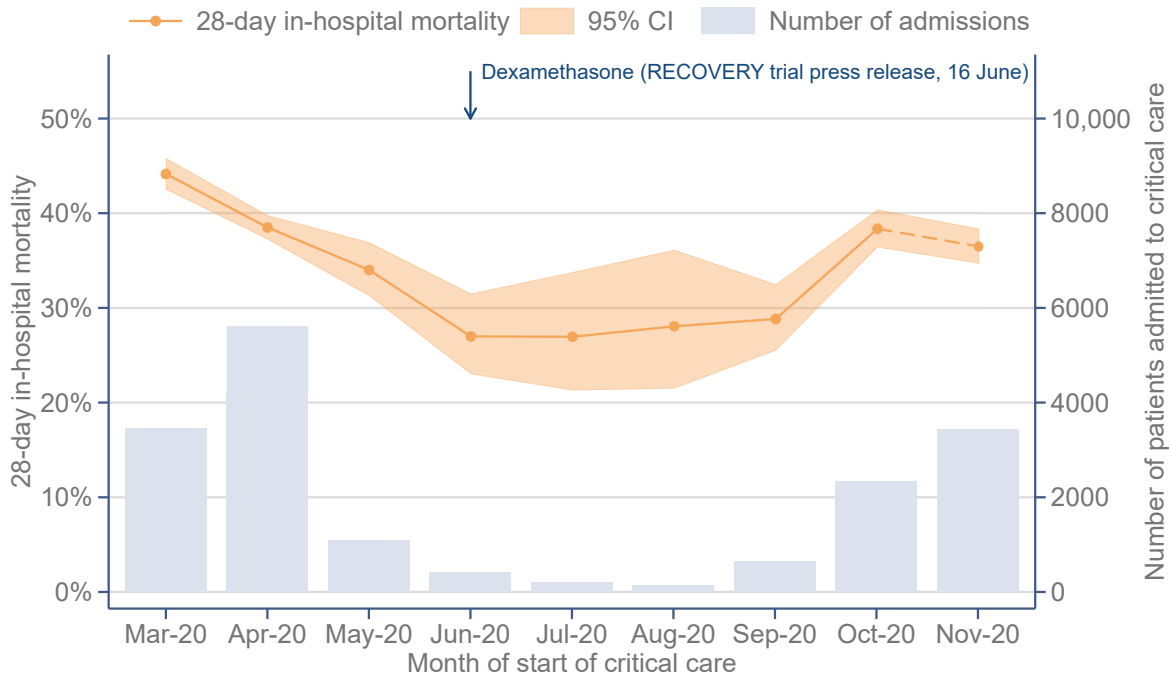
**Figure 31. 28-day in-hospital mortality by patient characteristics and invasive ventilation (acute severity)**

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for differences in other patient characteristics (see Tables 1-3).

\* Please see Definitions on page 59. Indicators of acute severity are based on data from the first 24 hours of critical care.

## Monthly trends – COVID-19

Figure 32 shows the monthly number of new patients critically ill with confirmed COVID-19 from March 2020 until the last complete month and the corresponding 28-day in-hospital mortality, indicating the month on which information became available identifying steroids (Dexamethasone) as an effective treatment for critically ill patients. Figures 33-35 show monthly variation in patient characteristics relating to ventilation and timing of critical care compared with the change in mortality.

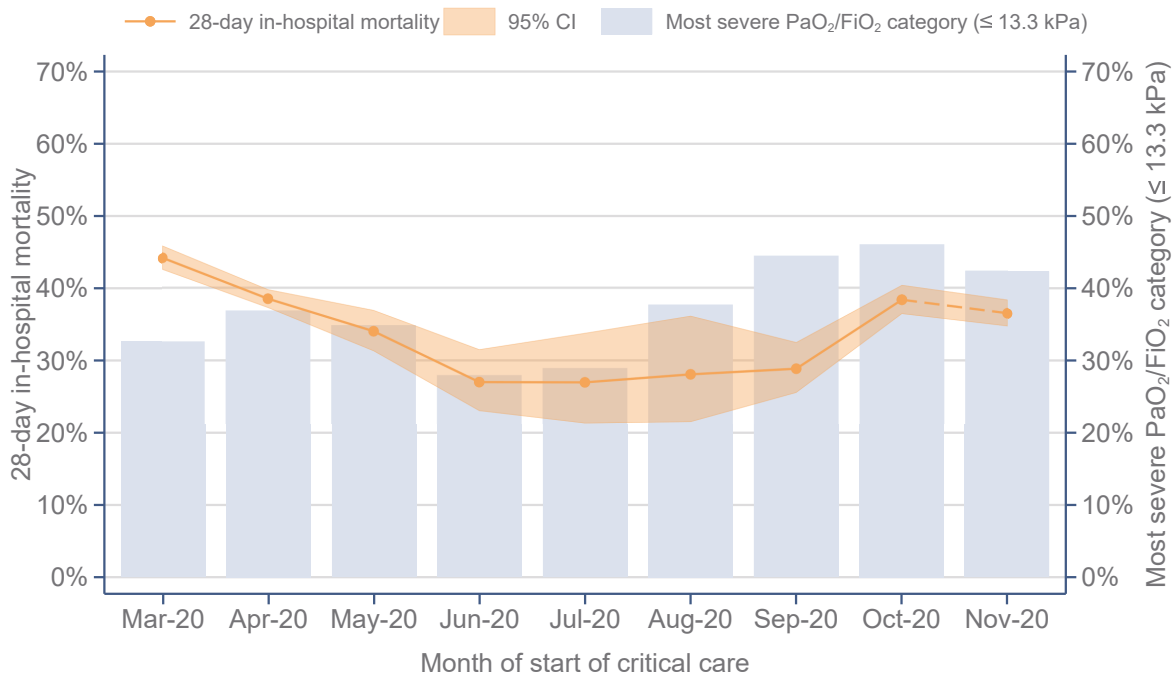


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### Figure 32. Number of admissions and 28-day in-hospital mortality by month

Number of admissions and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of start of critical care.

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for changes in patient characteristics (see Tables 1-3).

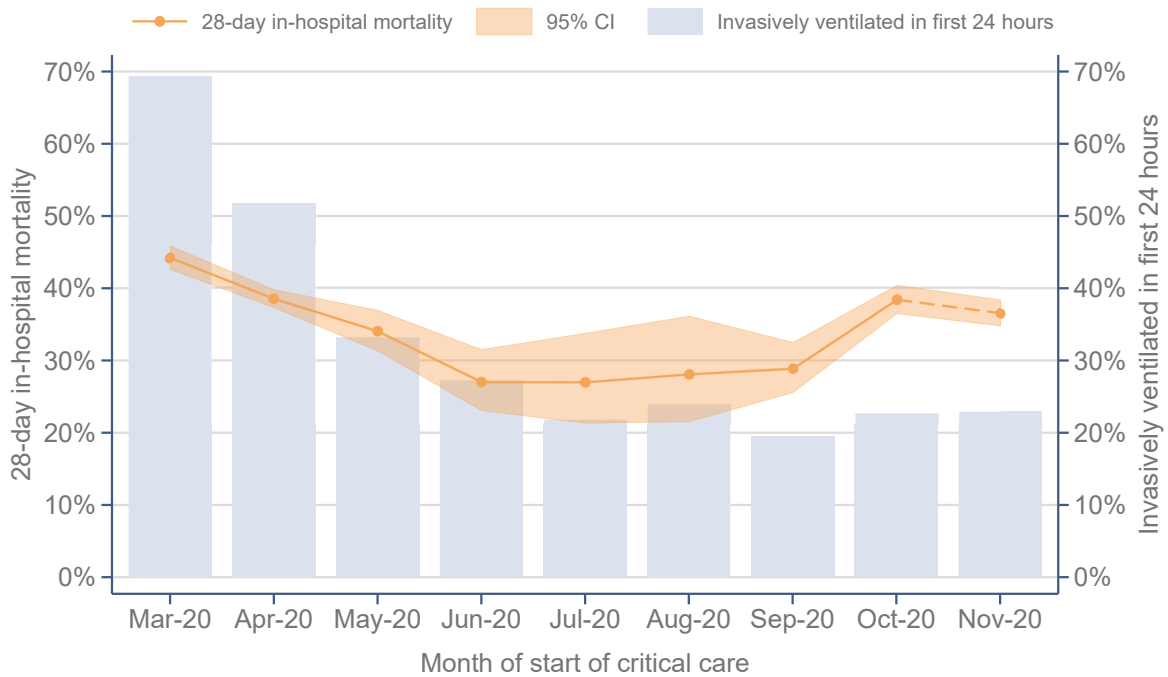


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### Figure 33. PaO<sub>2</sub>/FiO<sub>2</sub> and 28-day in-hospital mortality by month

Percentage of patients in most severe PaO<sub>2</sub>/FiO<sub>2</sub> category (≤ 13.3 kPa) and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of start of critical care.

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for changes in patient characteristics (see Tables 1-3).

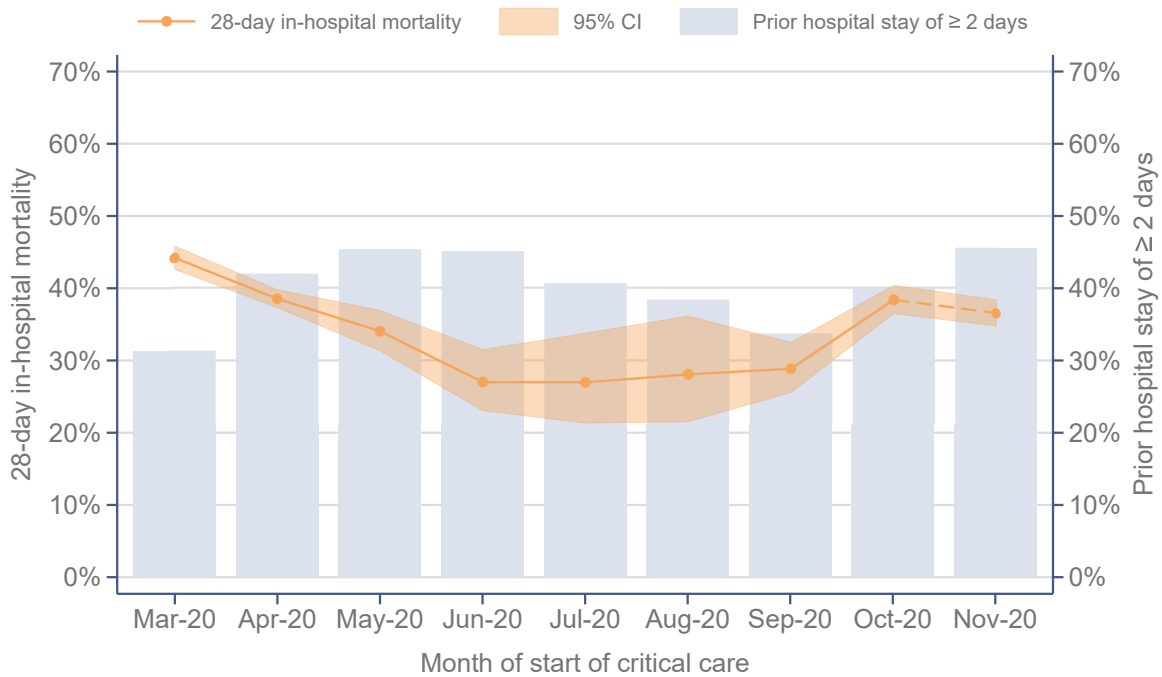


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**Figure 34. Invasive ventilation first 24 hours and 28-day in-hospital mortality by month**

Percentage of patients receiving invasive ventilation during the first 24 hours in critical care and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of start of critical care.

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for changes in patient characteristics (see Tables 1-3).



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**Figure 35. Prior hospital length of stay and 28-day in-hospital mortality by month**

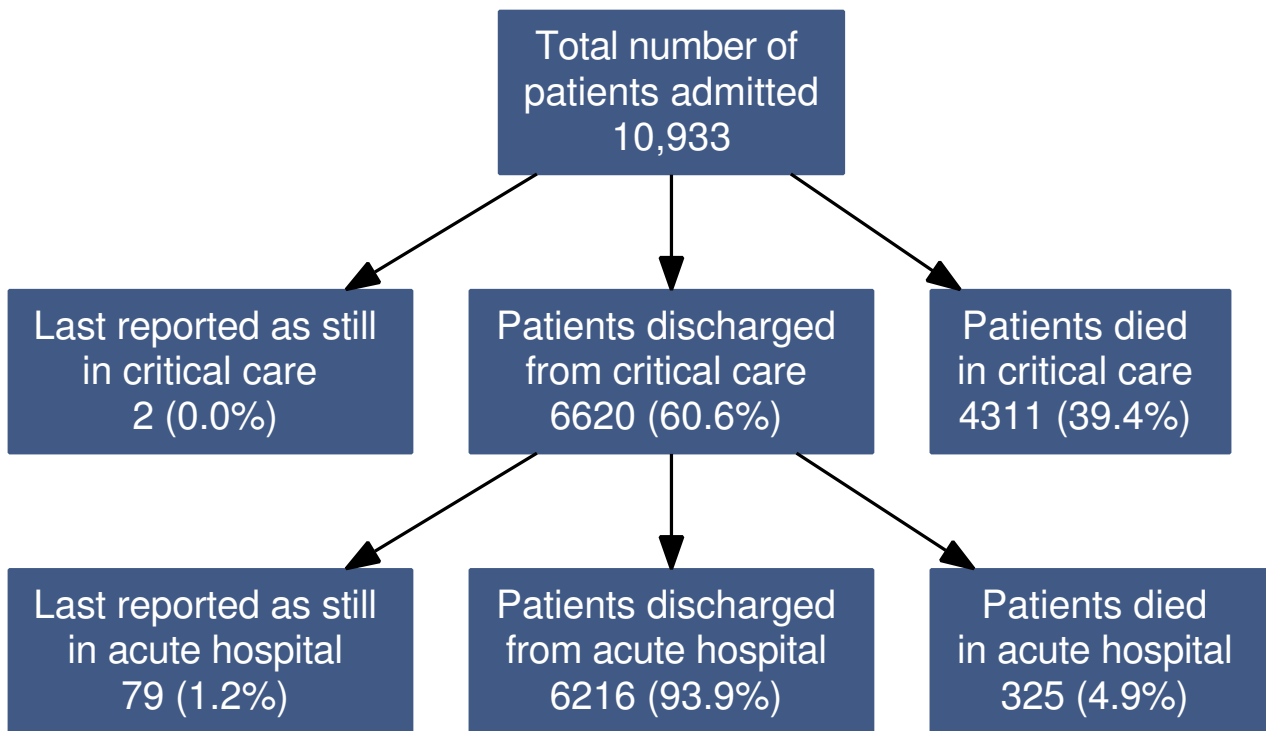
Percentage of patients with a hospital stay of 2 or more days before admission to critical care and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of start of critical care.

Estimates of 28-day in-hospital mortality based on Kaplan-Meier survival analysis. 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 estimates are not adjusted for changes in patient characteristics (see Tables 1-3).



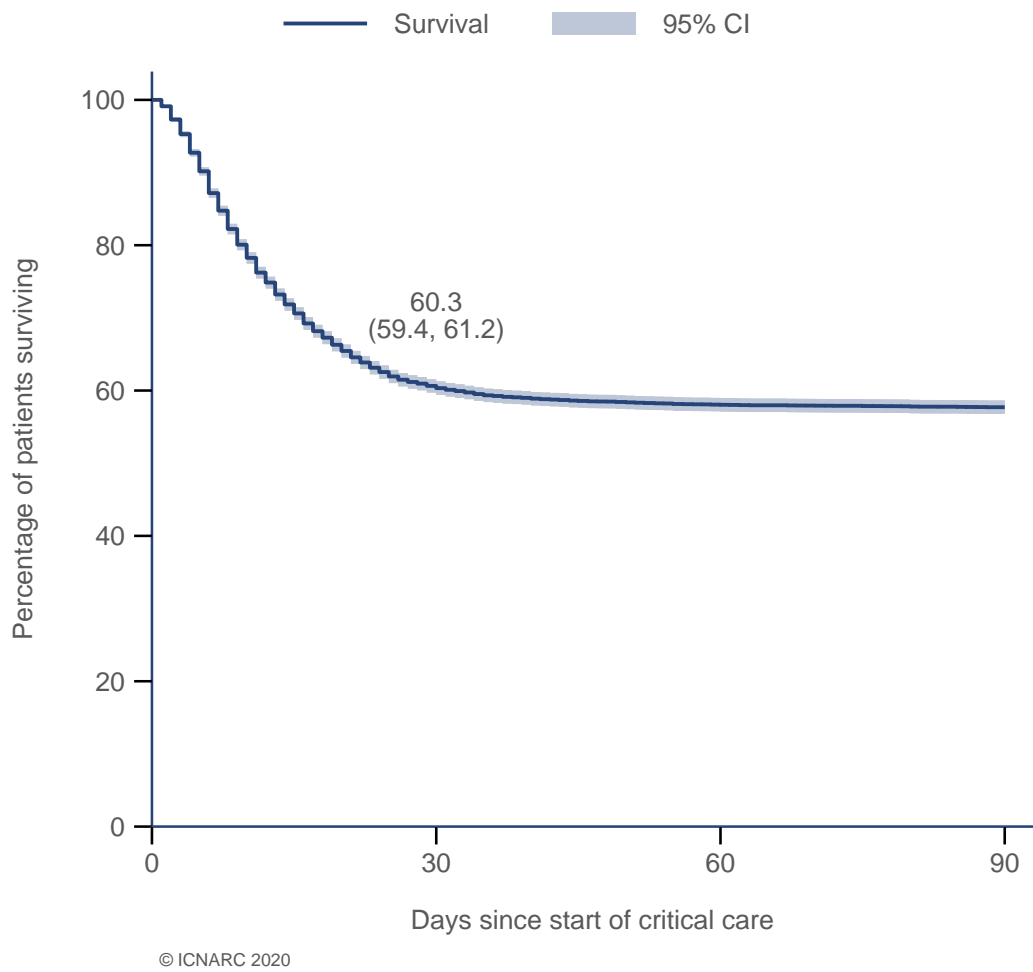
## Additional analyses for patients admitted up to 31 August 2020

Updated outcomes up to discharge from acute hospital for patients critically ill with confirmed COVID-19 admitted up to 31 August 2020 are shown in Figure 36.



**Figure 36. Critical care and acute hospital outcomes for patients admitted up to 31 August 2020**

A Kaplan-Meier plot of in-hospital survival to 90 days following admission to critical care for patients critically ill with confirmed COVID-19 admitted up to 31 August 2020 is shown in Figure 37.



At risk	10933	6592	6315	6271
Died (in hospital)	0	4336	4586	4622
Censored	0	5	32	40

**Figure 37. In-hospital survival to 90 days following admission to critical care for patients admitted up to 31 August 2020**

## Definitions

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**Reason for transfer** between critical care units is categorised as:

- Comparable critical care: transfer for similar care as provided in the transferring critical care unit
- Repatriation: returning a patient to their original unit, hospital or area
- More-specialist critical care: transfer for specialist critical care not available in the transferring critical care unit

**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

**Urban/rural classification** is based on the patient's usual residential postcode (assigned at the level of Output Area) and categorised according to 2011 census categories as:

- Urban: the majority of the population lives within settlements with a population of more than 10,000 people, subcategorised according to dwelling densities for every 100m x 100m square and the density in squares at varying distances around each square as either Major conurbation, Minor conurbation, or City or town
- Rural: the majority of the population lives within settlements with a population of less than 10,000 people (combining the categories Town and fringe, Village, and Hamlet or isolated dwellings)

**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.

**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

## 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; 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* 2020; 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*, in press.

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, Channon KM, Tan PS, Harrison DA, Rowan K, Aveyard P, Pavord ID, Watkinson PJ. Risk of severe COVID-19 disease with ACE inhibitors and angiotensin receptor blockers: cohort study including 8.3 million people. *Heart* 2020; doi:[10.1136/heartjnl-2020-317393](https://doi.org/10.1136/heartjnl-2020-317393)
- Mathur R, Rentsch CT, Morton C, Hulme WJ, Schultze A, MacKenna B, Eggo RM, Bhaskaran K, Wong AYS, Williamson EJ, Forbes H, Wing K, McDonald HI, Bates C, Bacon S, Walker AJ, Evans D, Inglesby P, Mehrkar A, Curtis HJ, DeVito NJ, Croker R, Drysdale H, Cockburn J, Parry J, Hester F, Harper S, Douglas IJ, Tomlinson L, Evans S, Grieve R, Harrison D, Rowan K, Khunti K, Chaturvedi N, Smeeth L, Goldacre B. Ethnic differences in COVID-19 infection, hospitalisation, and mortality: an OpenSAFELY analysis of 17 million adults in England. *medRxiv* 2020; doi:[10.1101/2020.09.22.20198754](https://doi.org/10.1101/2020.09.22.20198754)

## Acknowledgement

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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.”