icnarc intensive care national audit & research centre

25 years and counting...

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ICNARC report on COVID-19 in critical care:

England, Wales and Northern Ireland

5 March 2021

This report presents analyses of data on patients critically ill with confirmed COVID-19, reported to ICNARC up to 23:59 on 4 March 2021, 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 admission to 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

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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ICNARC have logged data for 29,055 admissions of 23,908 patients critically ill with confirmed COVID-19, either at or after admission to 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 23,584 patients (Figure 1). Of the 23,908 total patients, 21,832 have outcomes reported and 2076 patients were last reported as still receiving critical care. These patients are compared with a cohort of 10,929 patients with confirmed COVID-19 admitted up to 31 August 2020.

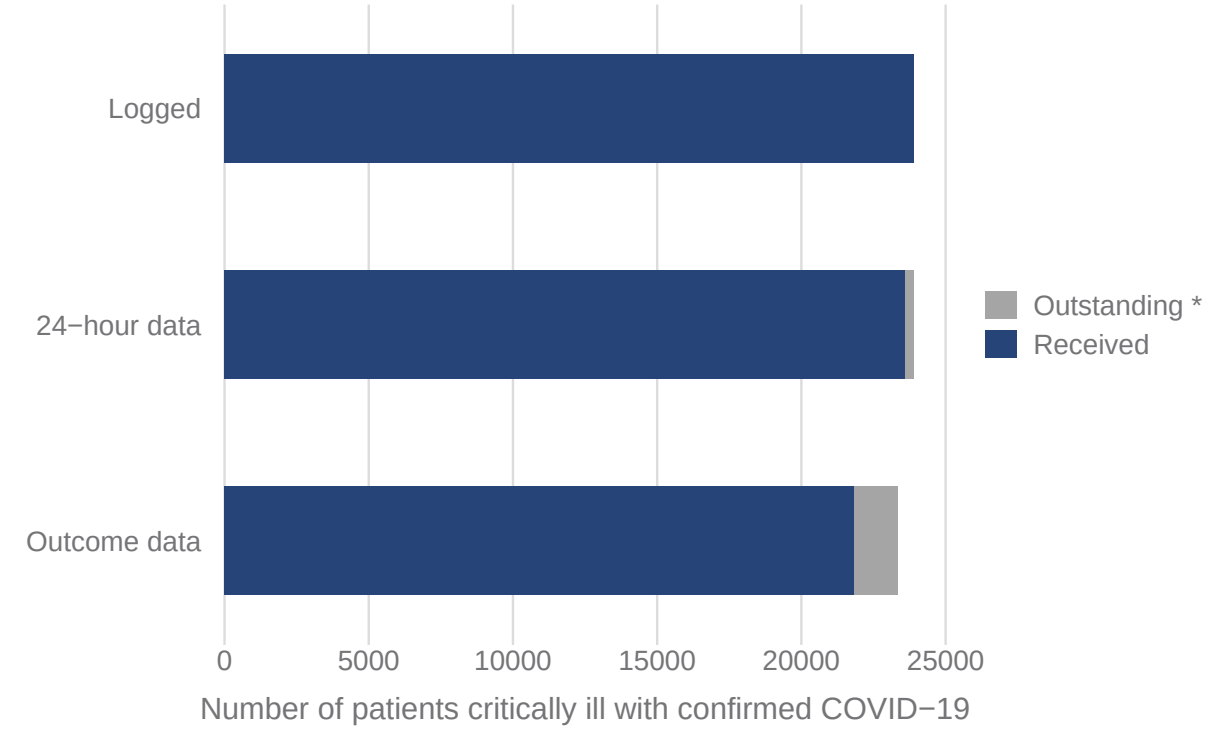


Figure 1. Numbers of patients with data included in this report and outstanding *

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 admission to critical care.

The geographical distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by NHS region is shown in Figure 2 and compared with those admitted up to 31 August 2020. Of the patients included in this week's report, 840 patients were admitted to critical care within the past 14 days (19 February 2021 to 4 March 2021). The geographical spread of these patients is shown in Figure 3.

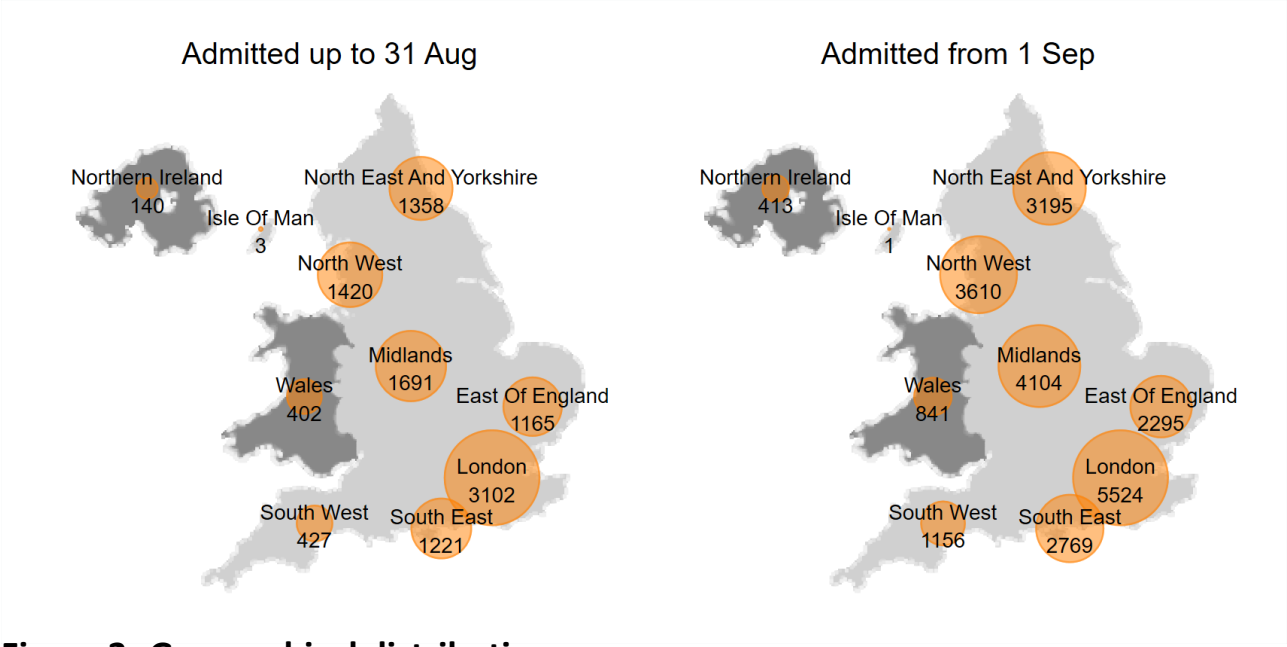


Figure 2. Geographical distribution

Geographical distribution of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date compared with those admitted up to 31 August 2020 by NHS region.

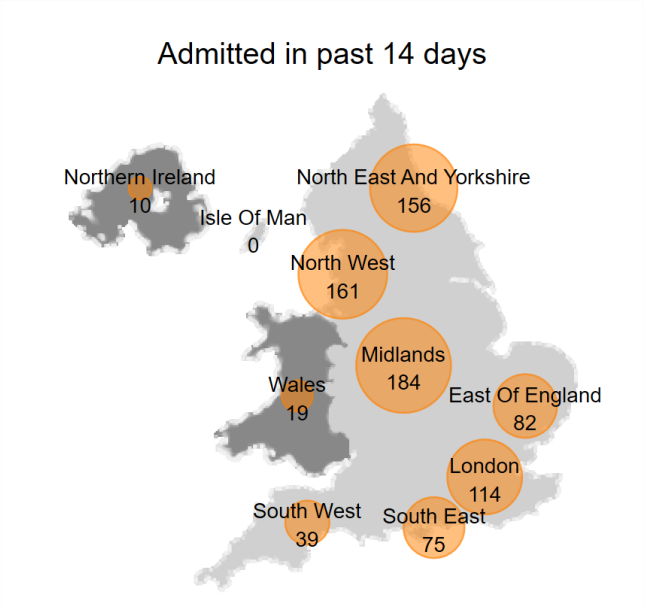


Figure 3. Geographical distribution – past 14 days

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

The numbers of new patients, cumulative numbers of patients and numbers of patients in critical care by date are shown in Figures 4-15. Please note that these figures are affected by a variable lag time for submission of data.

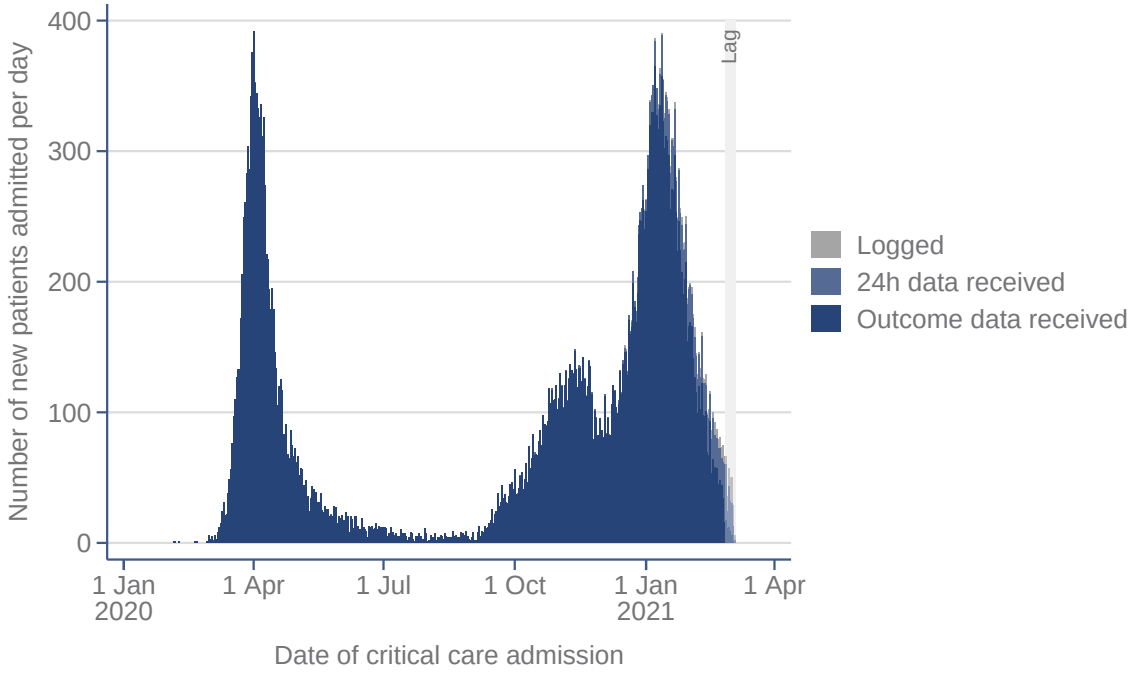


Figure 4. Number of new patients by date of admission to critical care

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

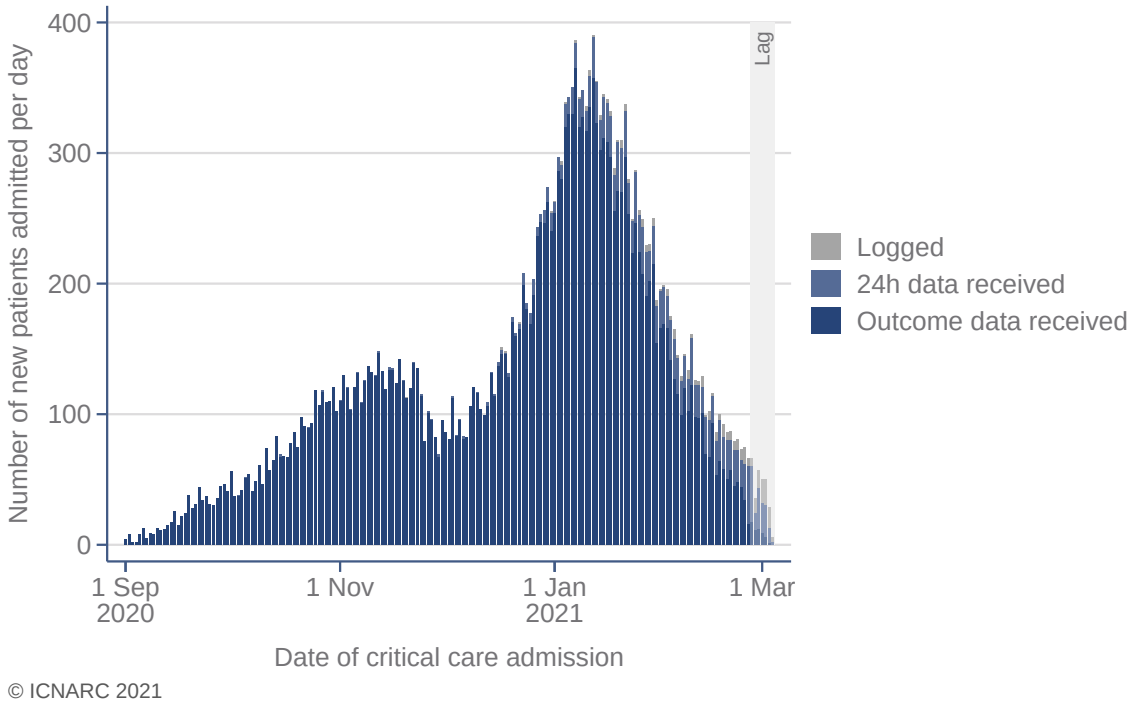


Figure 5. Number of new patients admitted from 1 September 2020 by date of admission to critical care

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

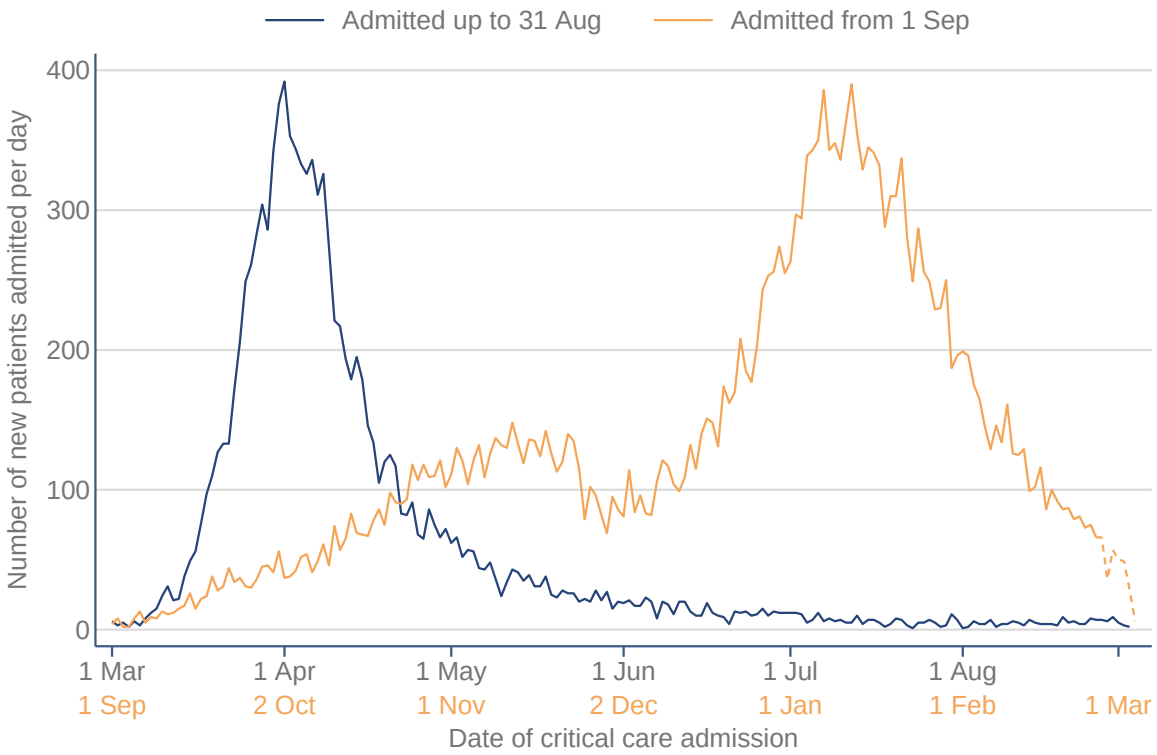


Figure 6. Number of new patients admitted from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date *

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

* Dashed line indicates lag in data submission.

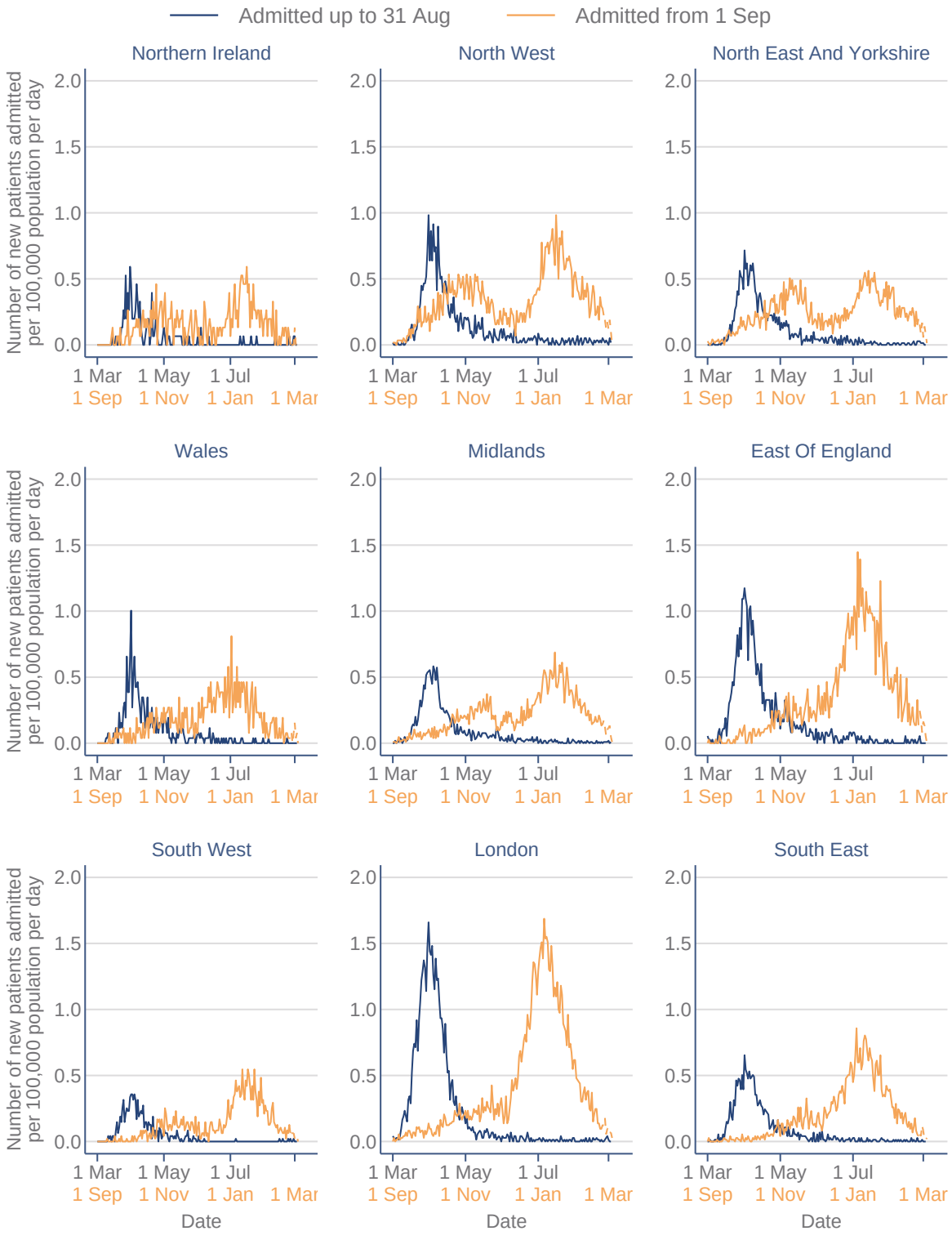


Figure 7. Number of new patients admitted from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region *

Number of new patients critically ill with confirmed COVID-19 by date of admission to 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.

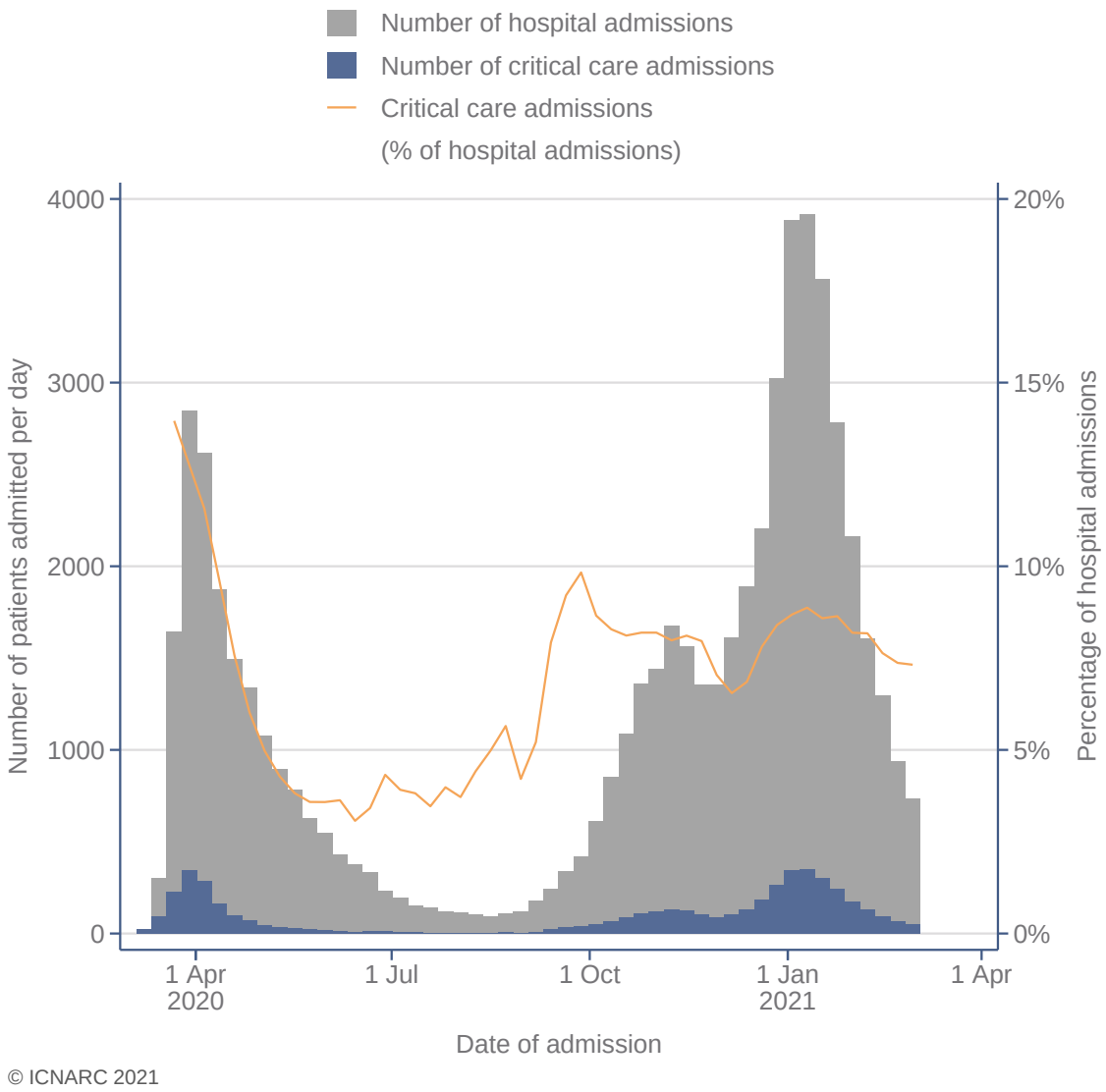


Figure 8. Number of new patients admitted to critical care compared with hospital admissions

Comparison of the number of new patients critically ill with confirmed COVID-19 by date of admission to critical care versus the total number of hospital admissions (source: https://coronavirus.data.gov.uk/details/healthcare).

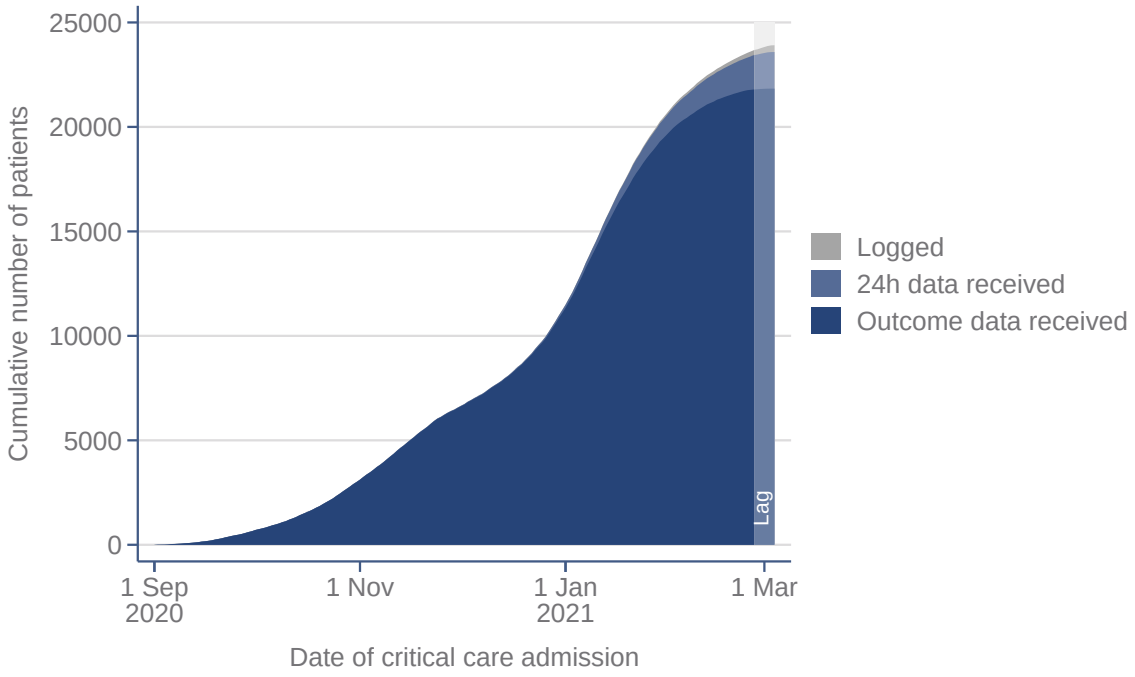


Figure 9. Cumulative number of patients

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

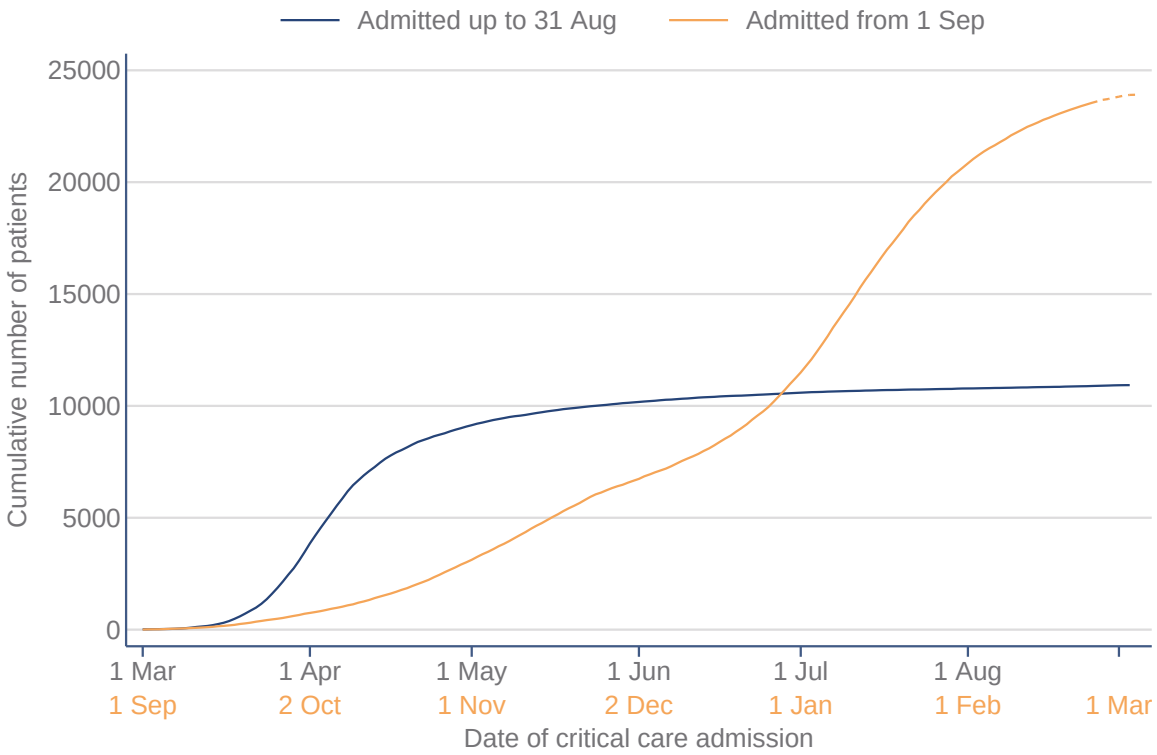


Figure 10. Cumulative number of patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date *

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

* Dashed line indicates lag in data submission.

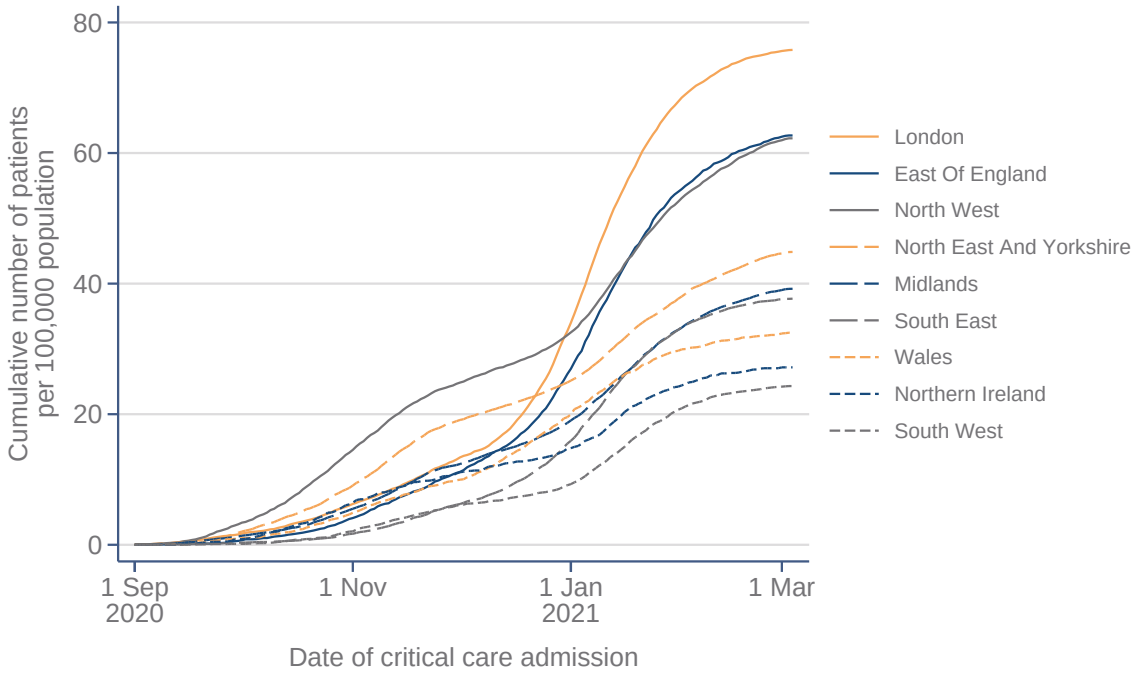


Figure 11. Cumulative number of patients per 100,000 adult population by region

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

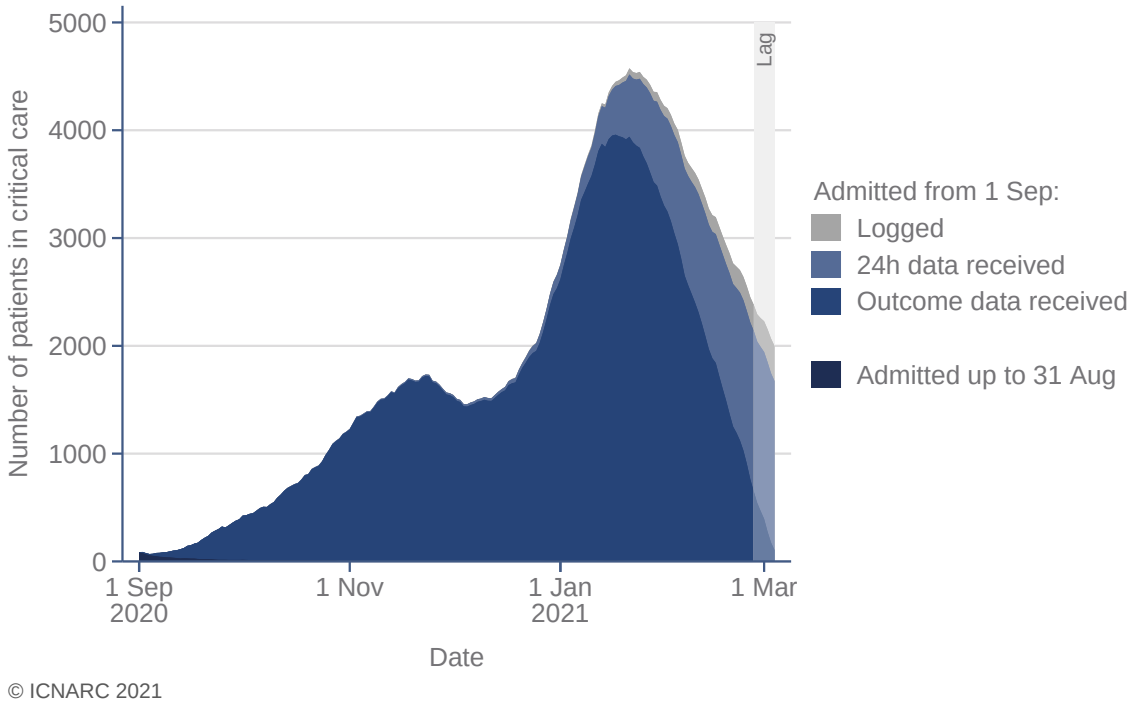


Figure 12. Number of patients in critical care *

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 4 March 2021.

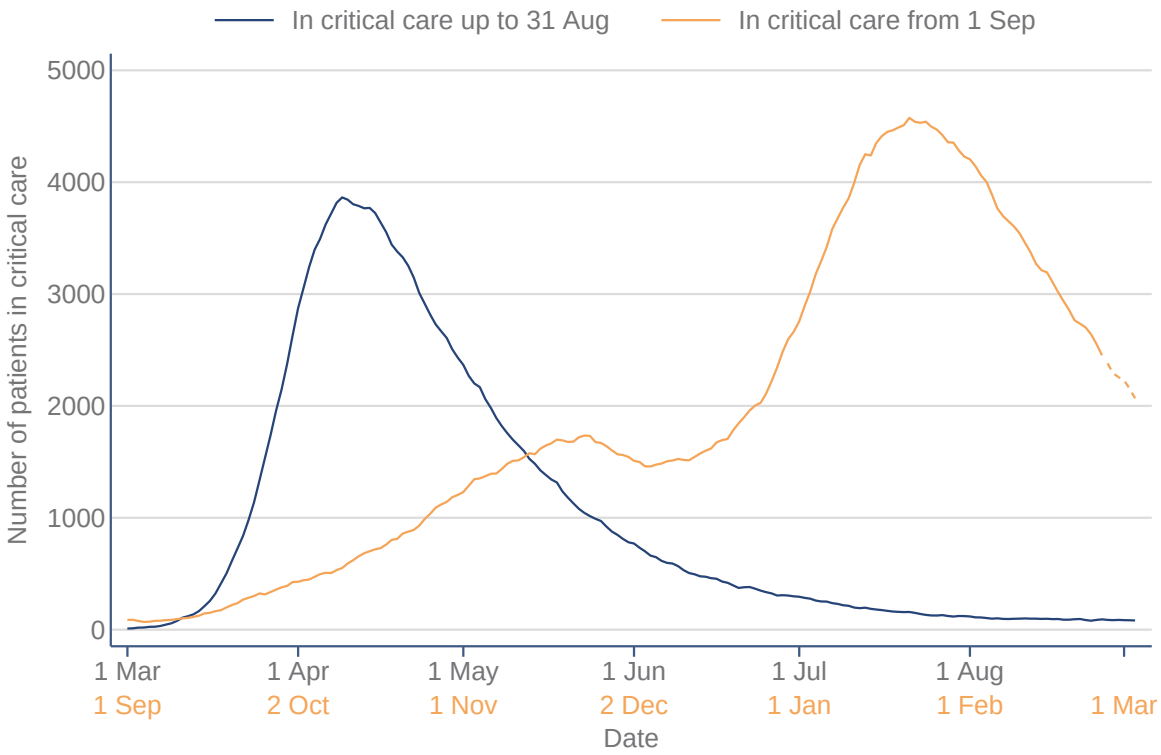


Figure 13. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date

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 4 March 2021. Dashed line indicates lag in data submission.

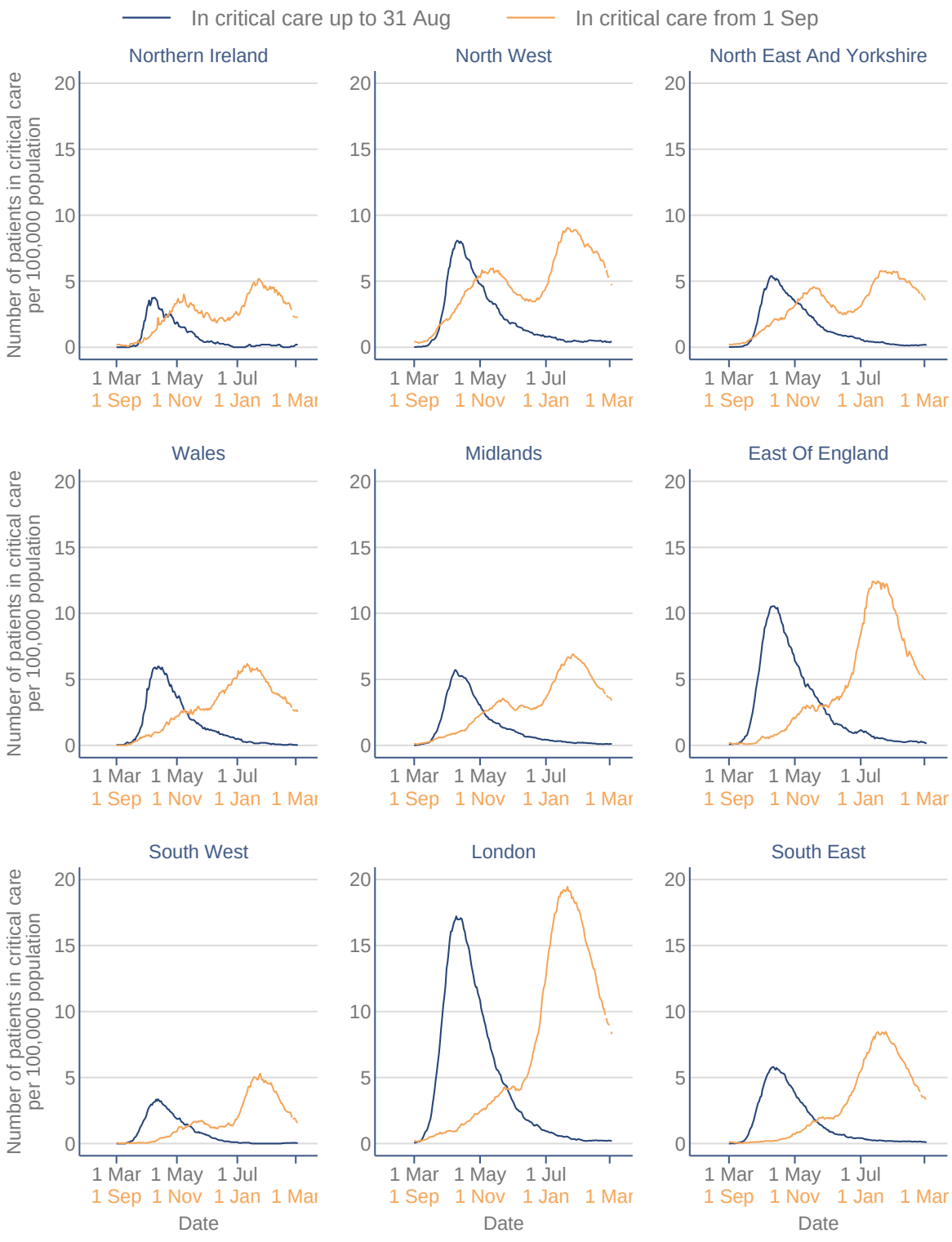


Figure 14. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region

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 4 March 2021. Dashed line indicates lag in data submission.

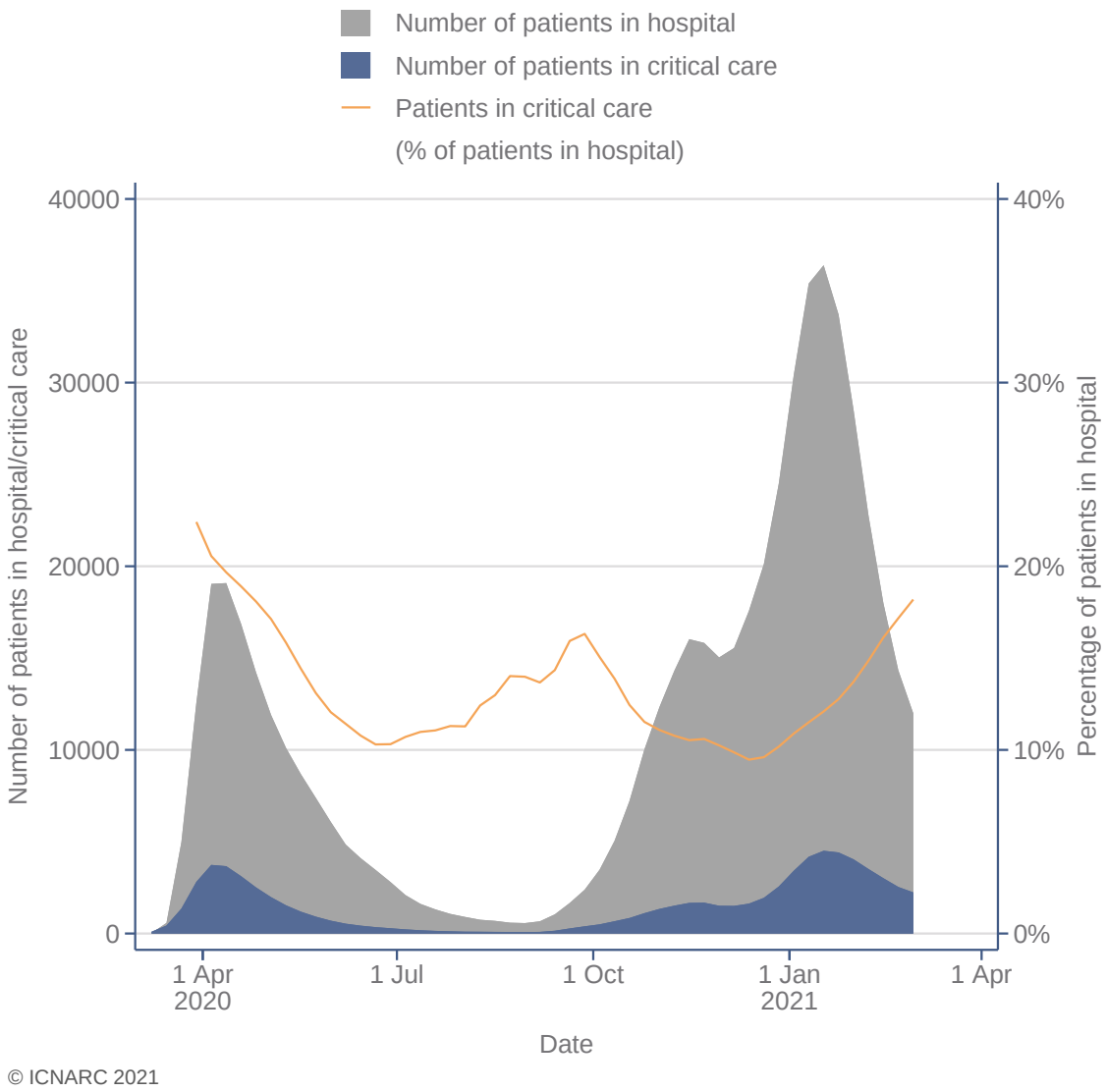


Figure 15. Number of patients in critical care compared with number in hospital

Comparison of the number of patients with confirmed COVID-19 in critical care by date * versus the total number in hospital (source: https://coronavirus.data.gov.uk/details/healthcare).

* Please note patients whose outcome data have not been received are assumed to remain in critical care as of 4 March 2021.

Figure 16 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 a critical care unit; and confirmed COVID-19 managed in a surge area outside of an established critical care unit.

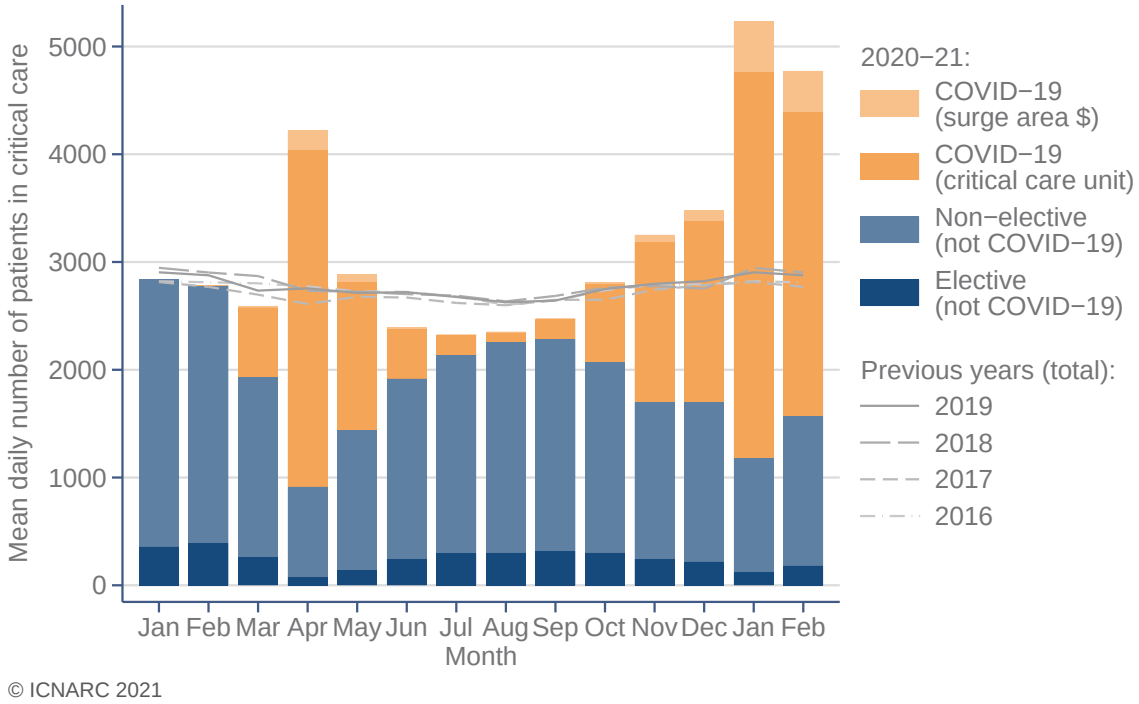


Figure 16. Average daily number of patients in critical care by month, 2016-2020 *

* 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 critical care unit data and not all surge areas are covered.

The numbers of admissions with acute myocardial infarction, stroke, trauma and self-harm (with drugs or other substances) recorded as primary or secondary reason for admission to critical care (with or without recording of COVID-19 as the other reason for admission) are shown in Figures 17 to 20.

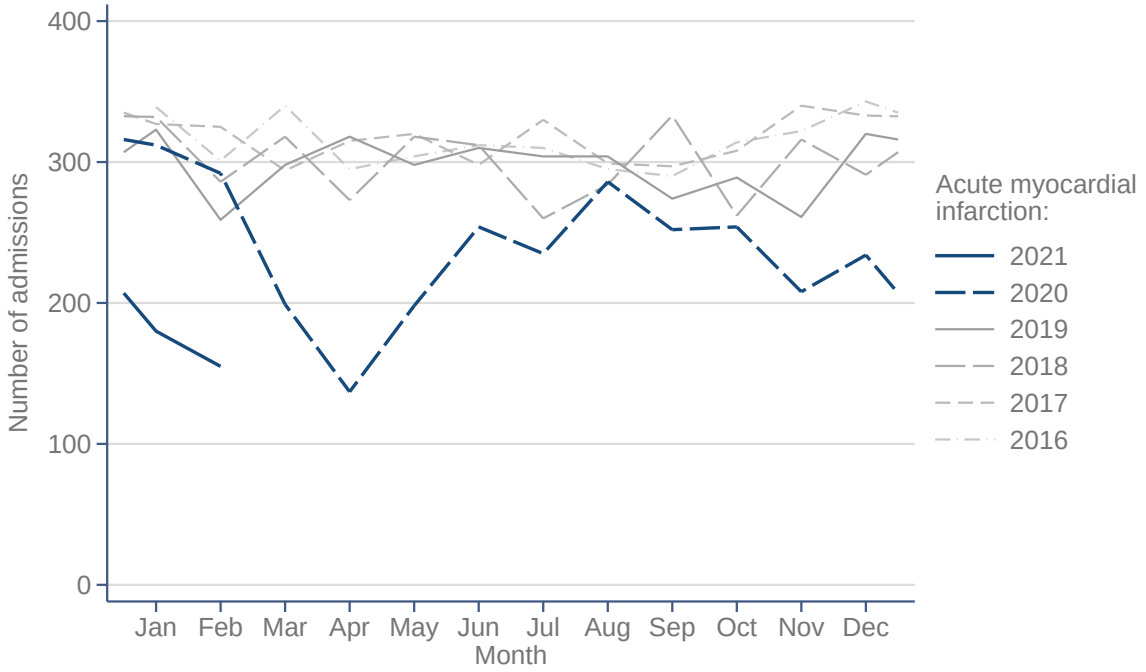


Figure 17. Number of admissions with acute myocardial infarction by month, 2016-2020 *

* 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.

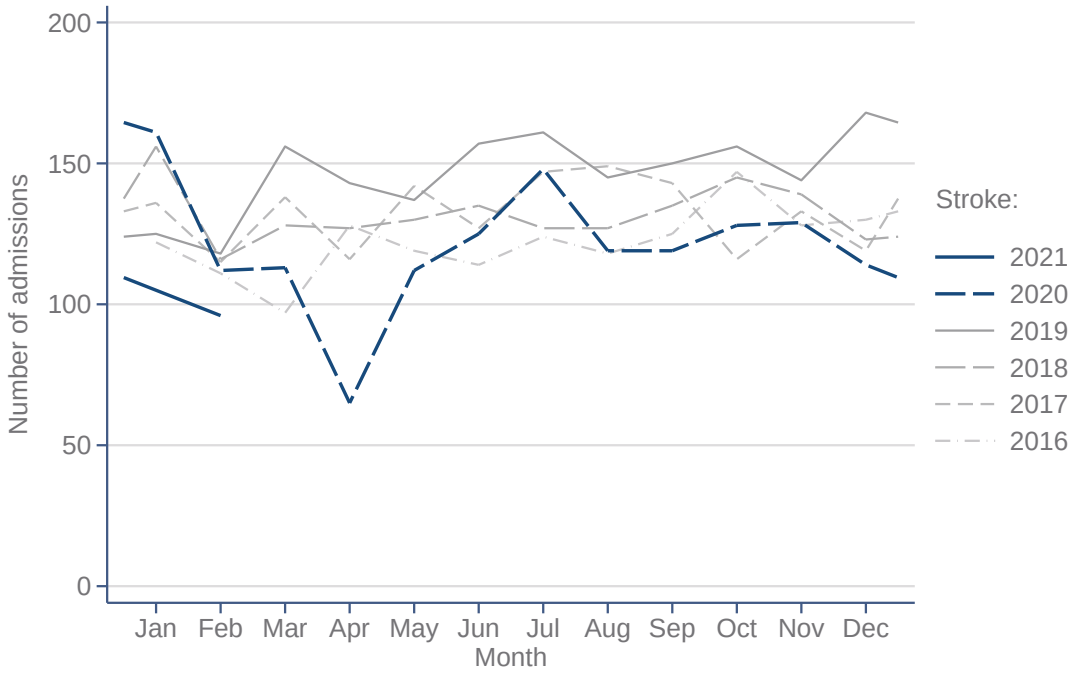


Figure 18. Number of admissions with stroke by month, 2016-2020 *

* 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.

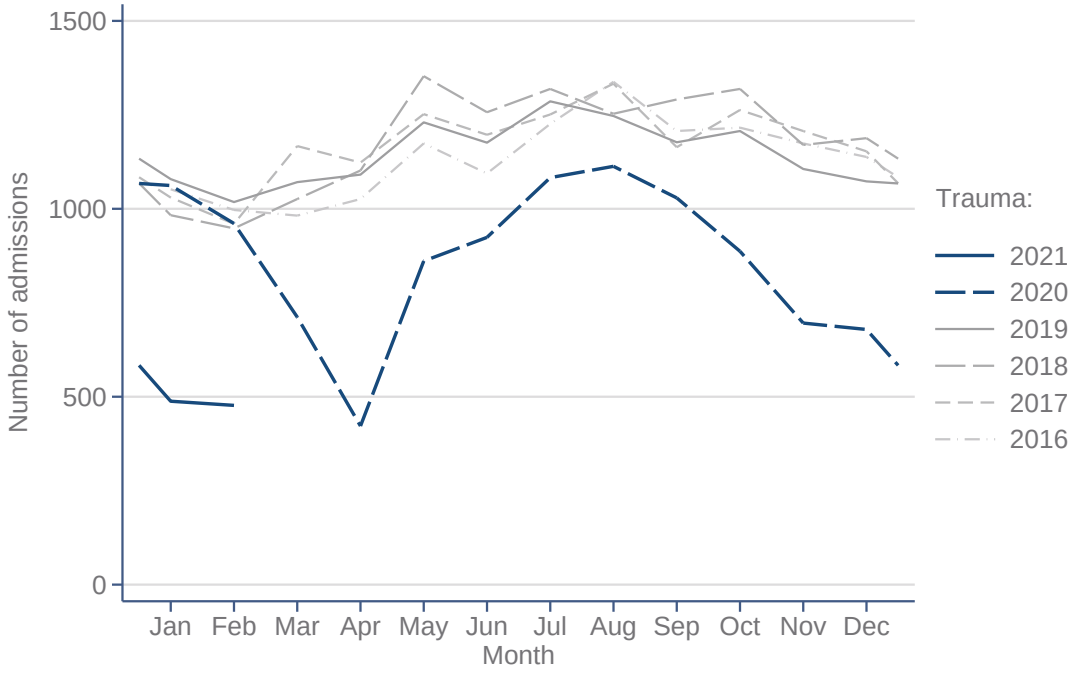


Figure 19. Number of admissions with trauma by month, 2016-2020 *

* 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.

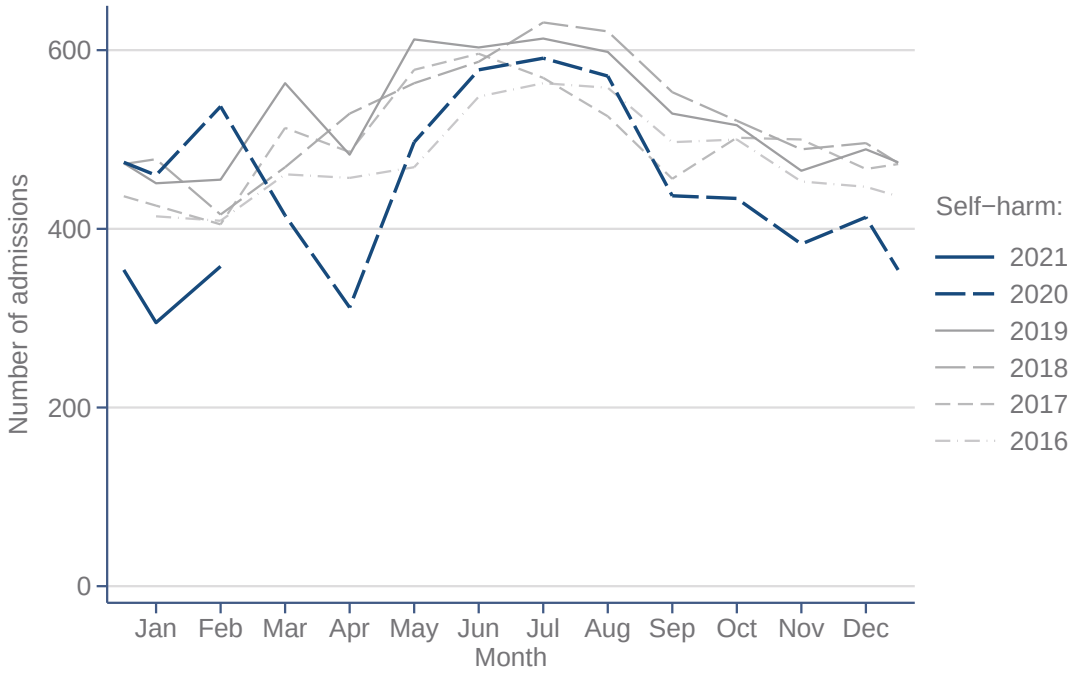


Figure 20. Number of admissions with self-harm (drugs or other substances) by month, 2016-2020 *

* 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.

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

Figure 21 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 22 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).

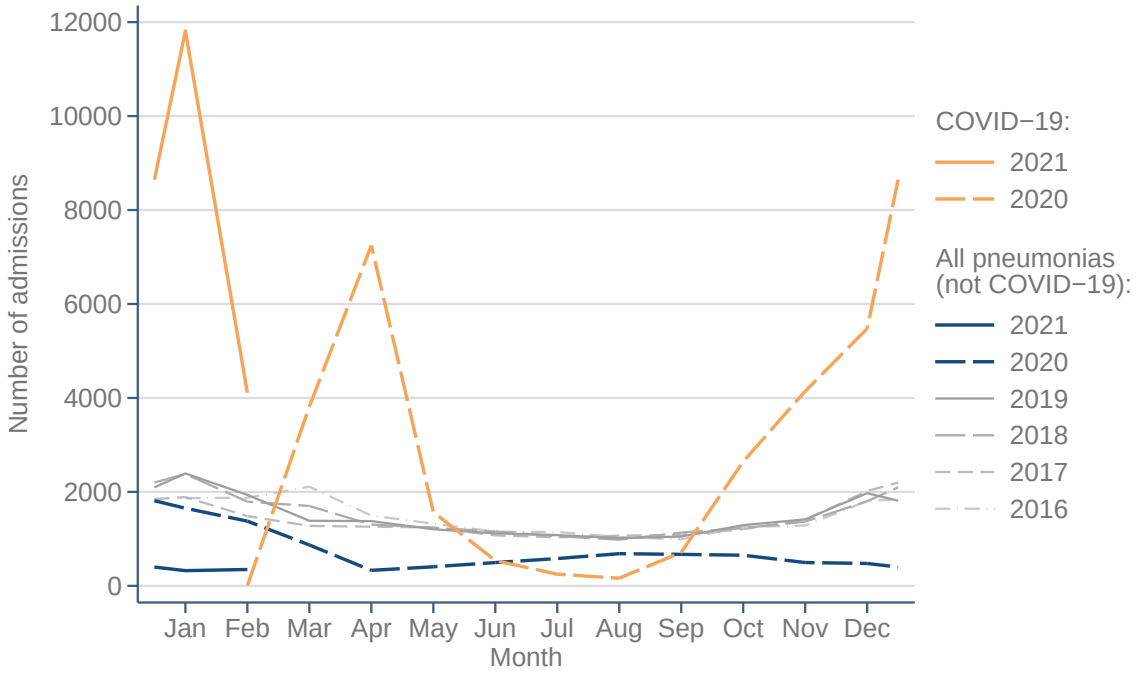


Figure 21. Number of admissions with pneumonia (not COVID-19) by month, 2016-2020 *, compared with confirmed COVID-19 during 2020

* 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.

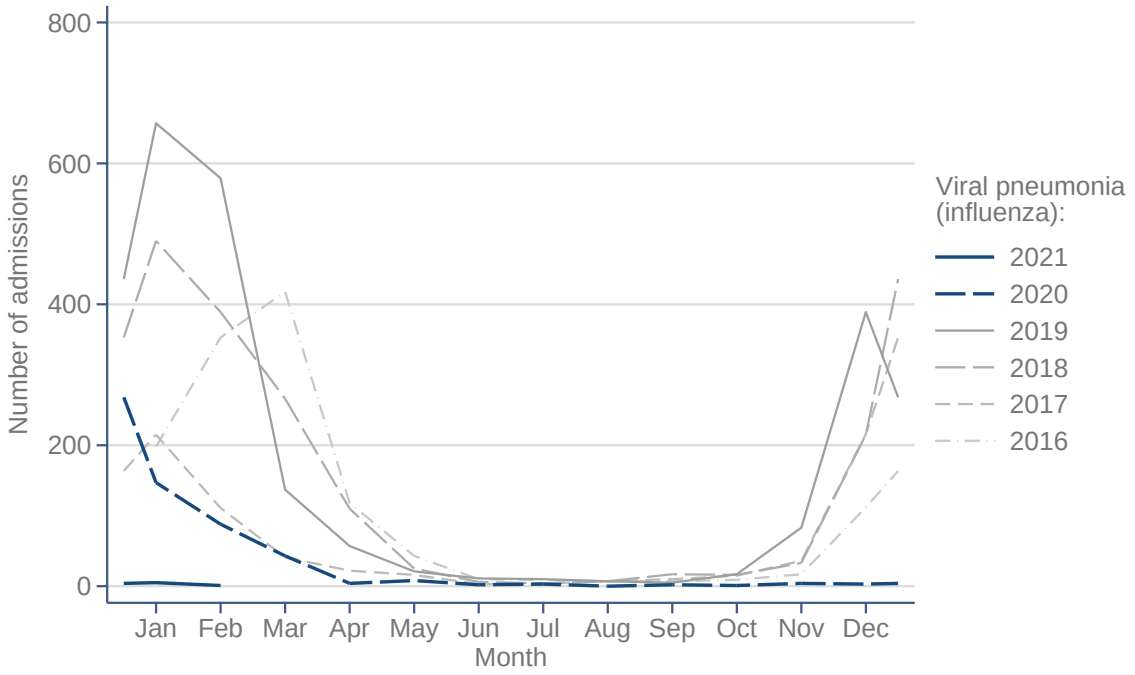


Figure 22. Number of admissions with viral pneumonia (influenza) by month, 2016-2020 *

* 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 those admitted up to 31 August 2020.

Table 1. Patient characteristics: demographics

Demographics	Patients with confirmed COVID-19	
	Admitted from 1 Sep (N=23,908)	Admitted up to 31 Aug (N=10,929)
Age at admission (years) [N=23885]		
Mean (SD)	59.3 (13.2)	58.8 (12.7)
Median (IQR)	61 (51, 69)	60 (51, 68)
Sex, n (%) [N=23883]		
Female	8128 (34.0)	3271 (29.9)
Male	15755 (66.0)	7653 (70.1)
Ethnicity, n (%) [N=22434]		
White	16116 (71.8)	6939 (66.0)
Mixed	339 (1.5)	191 (1.8)
Asian	3608 (16.1)	1680 (16.0)
Black	1223 (5.5)	1007 (9.6)
Other	1148 (5.1)	702 (6.7)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=23588]		
1 (least deprived)	2919 (12.4)	1543 (14.3)
2	3630 (15.4)	1737 (16.1)
3	4390 (18.6)	2083 (19.3)
4	5701 (24.2)	2609 (24.2)
5 (most deprived)	6948 (29.5)	2808 (26.0)
Urban/rural classification *, n (%) [N=23300]		
Major conurbation	10469 (44.9)	5224 (48.8)
Minor conurbation	874 (3.8)	337 (3.1)
City and town	9387 (40.3)	3984 (37.2)
Rural	2565 (11.0)	1150 (10.7)

* Please see Definitions on page 98.

Table 2. Patient characteristics: medical history

	Patients with confirmed COVID-19	
Medical history	**Admitted from 1 Sep (N=23,908)**	**Admitted up to 31 Aug (N=10,929)**
Dependency prior to admission to acute hospital, n (%) [N=22838]		
Able to live without assistance in daily activities	20171 (88.3)	9678 (89.3)
Some assistance with daily activities	2599 (11.4)	1114 (10.3)
Total assistance with all daily activities	68 (0.3)	40 (0.4)
Very severe comorbidities *, n (%) [N=22957]		
Cardiovascular	153 (0.7)	69 (0.6)
Respiratory	219 (1.0)	122 (1.1)
Renal	377 (1.6)	187 (1.7)
Liver	141 (0.6)	51 (0.5)
Metastatic disease	145 (0.6)	58 (0.5)
Haematological malignancy	361 (1.6)	216 (2.0)
Immunocompromised	769 (3.3)	387 (3.6)
Body mass index *, n (%) [N=21634]		
<18.5	150 (0.7)	79 (0.8)
18.5-<25	4255 (19.7)	2644 (25.5)
25-<30	6726 (31.1)	3570 (34.4)
30-<40	7983 (36.9)	3264 (31.4)
≥40	2520 (11.6)	831 (8.0)
CPR within previous 24h, n (%) [N=23264]		
In the community	153 (0.7)	50 (0.5)
In hospital	243 (1.0)	76 (0.7)
Prior hospital length of stay [N=23783]		
Mean (SD)	3.3 (9.9)	2.5 (6.2)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=2055]		
Currently pregnant	140 (6.8)	29 (3.7)
Recently pregnant (within 6 weeks)	137 (6.7)	41 (5.2)
Not known to be pregnant	1778 (86.5)	720 (91.1)

* Please see Definitions on page 98.

Table 3. Patient characteristics: indicators of acute severity

	Patients with confirmed COVID-19 and 24h data received	
Indicators of acute severity	**Admitted from 1 Sep (N=23,584)**	**Admitted up to 31 Aug (N=10,929)**
Invasively ventilated within first 24h *, n (%) [N=22474]	6739 (30.0)	5865 (54.3)
APACHE II Score [N=22823]		
Mean (SD)	14.5 (5.2)	15.0 (5.3)
Median (IQR)	14 (11, 17)	15 (11, 18)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=20972]	13.1 (9.6, 18.4)	15.8 (11.3, 22.0)
PaO_2 /FiO_2 ratio †, n (%) [N=20972]		
$<$ 13.3 kPa ($<$ 100 mmHg)	10773 (51.4)	3775 (36.9)
13.3-26.6 kPa (100-200 mmHg)	8025 (38.3)	4898 (47.9)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	2174 (10.4)	1553 (15.2)
FiO_2 †, median (IQR) [N=21171]	0.60 (0.45, 0.80)	0.50 (0.40, 0.70)

* Please see Definitions on page 98. 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_2 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 September 2020 to date is presented in Figure 23.

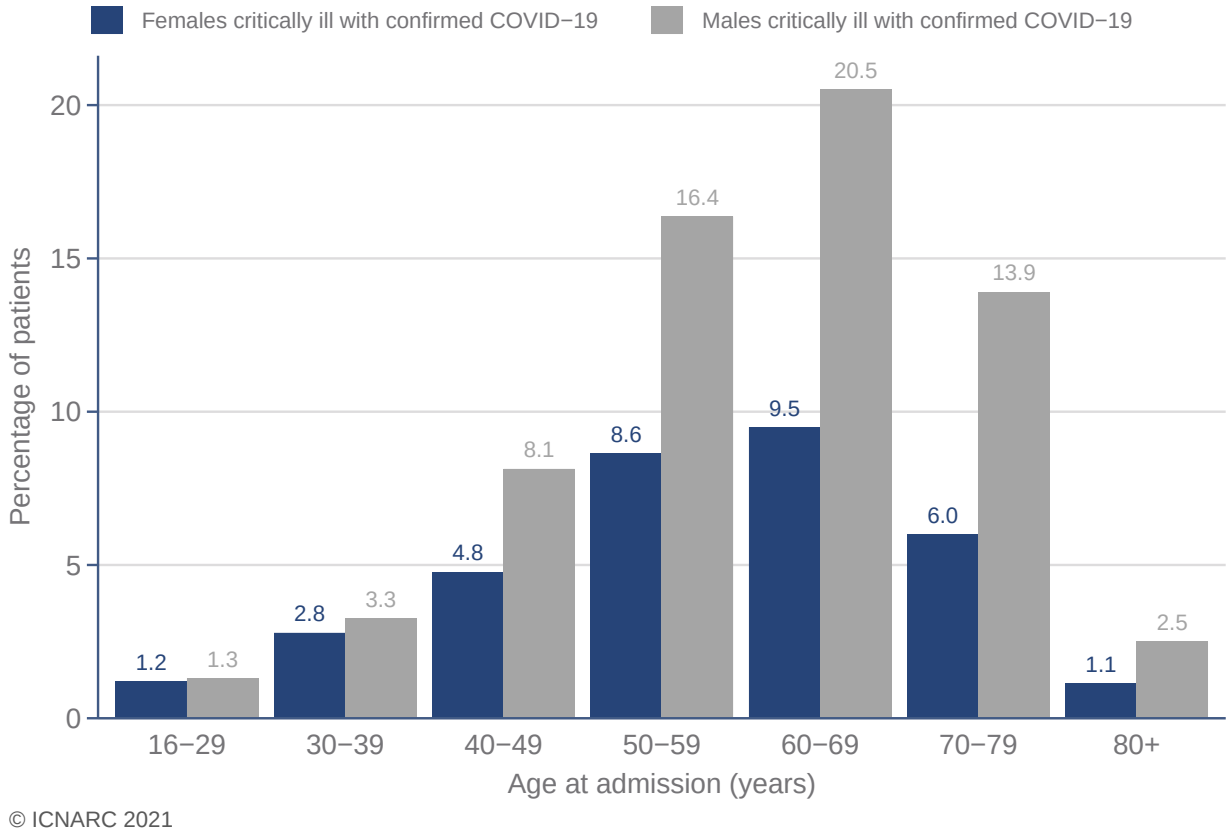


Figure 23. Age and sex distribution

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

The distribution of ethnicity for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date, compared with a local population matched on 2011 census ward for residence of patients critically ill with COVID-19, is presented in Figure 24.

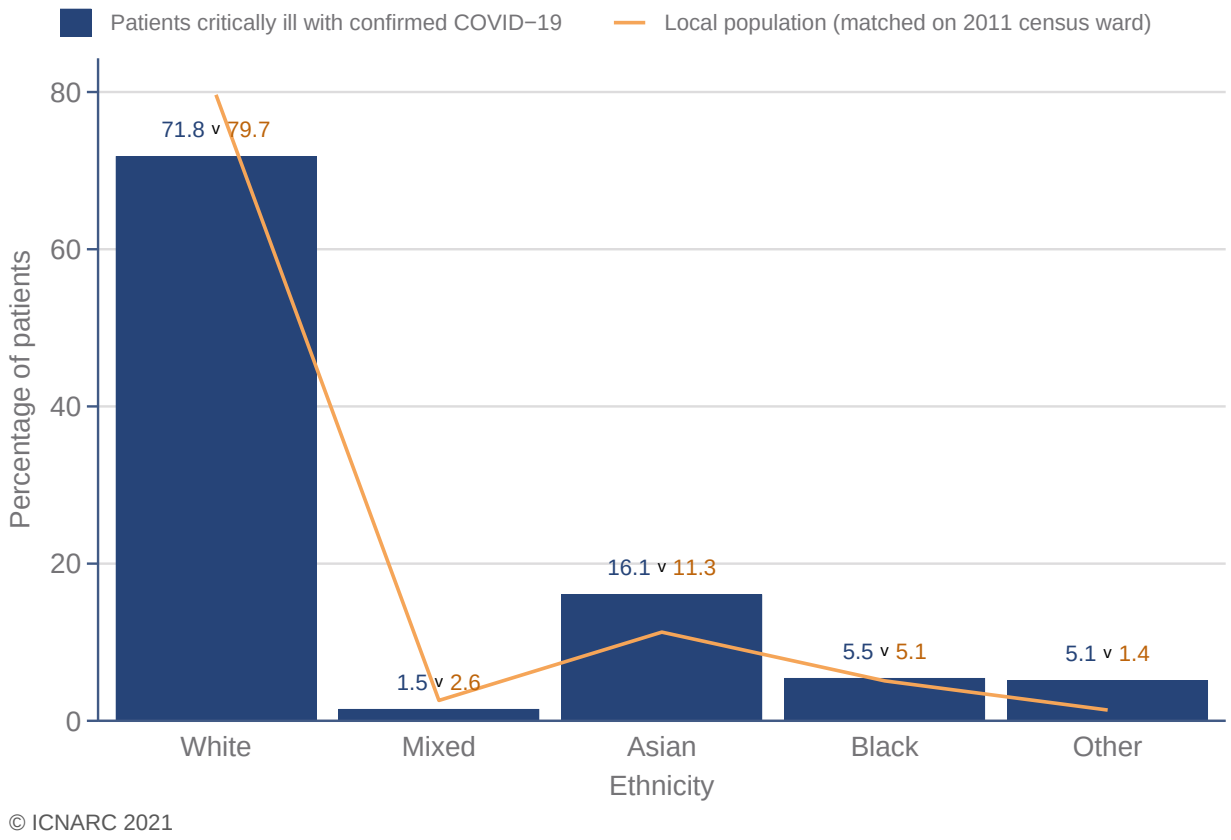


Figure 24. Ethnicity distribution compared with the local population

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) for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date, compared with the general population, is presented in Figure 25.

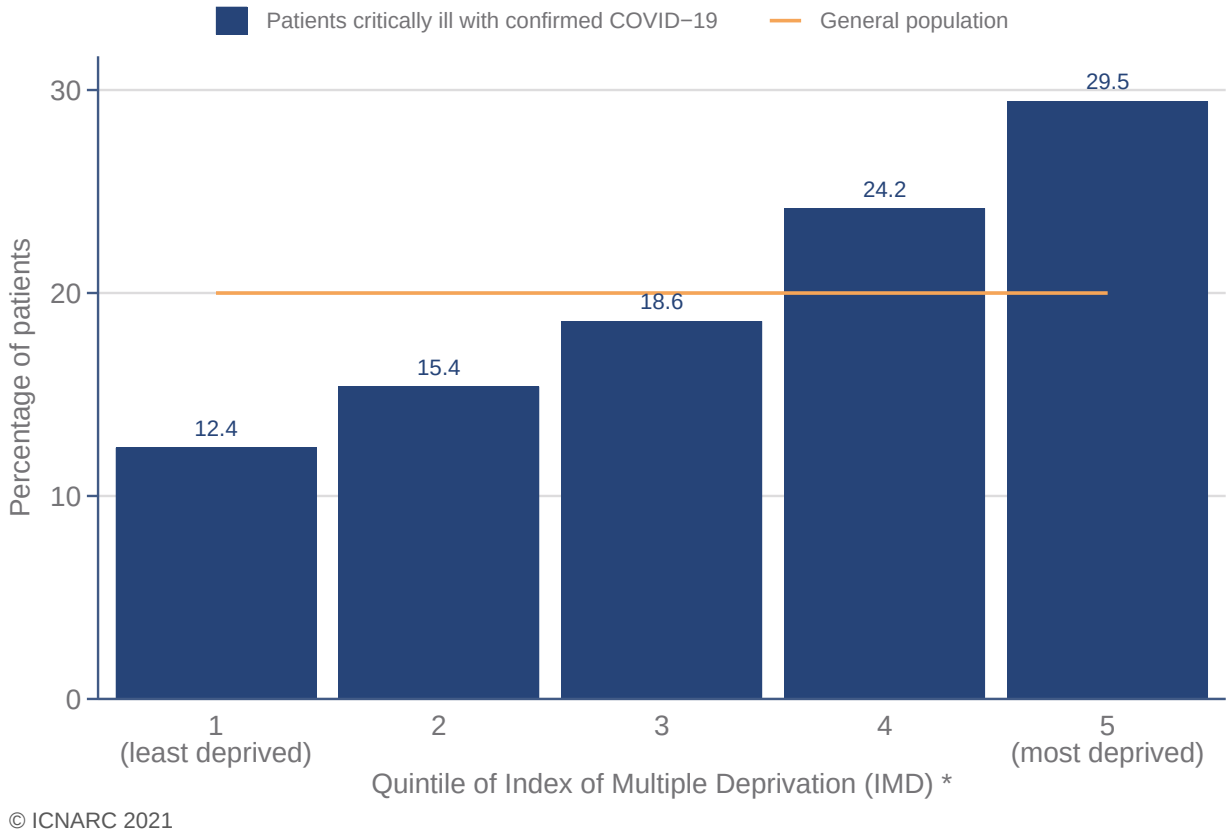


Figure 25. Index of Multiple Deprivation * distribution compared with the general population

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 98.

The distribution of the percentage of patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date 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 26.

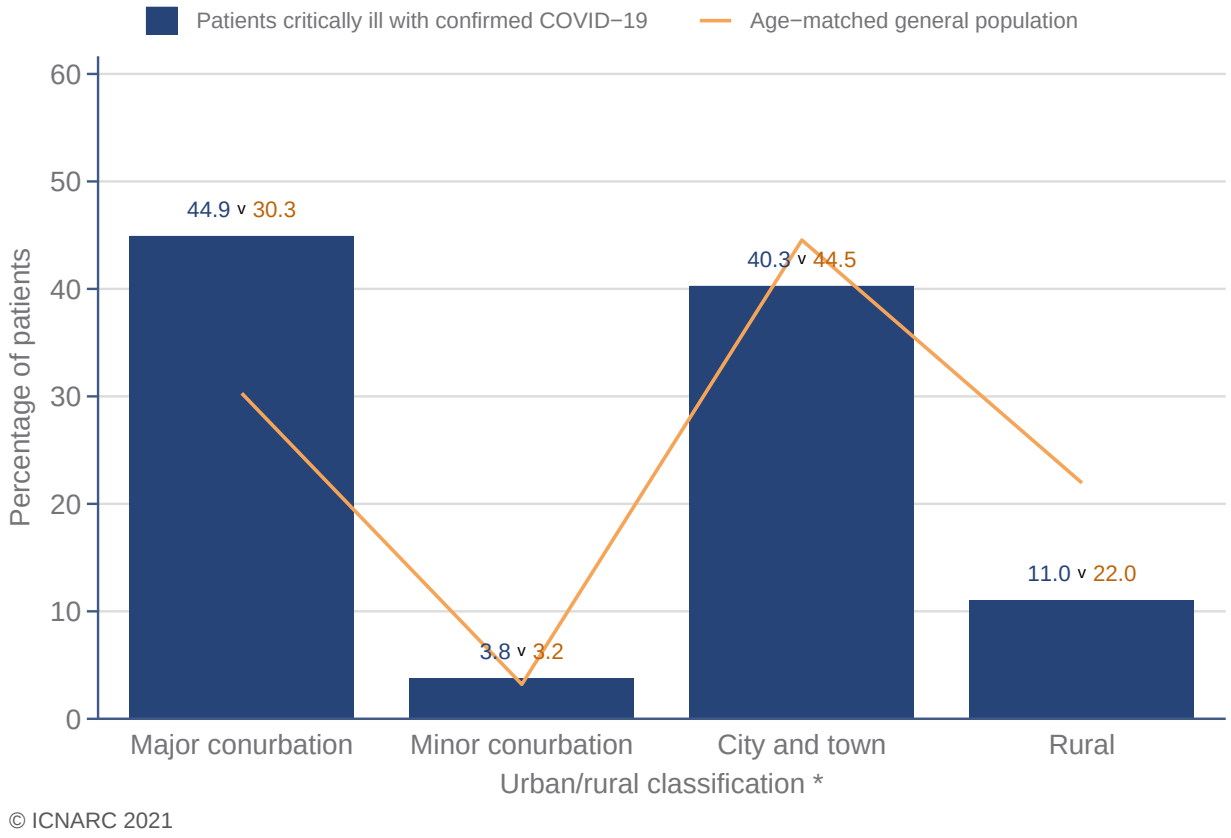


Figure 26. Urban/rural * distribution compared with the age-matched general population

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 98.

The distribution of body mass index (BMI) for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date, compared with an age- and sex-matched population (from the Health Survey for England 2018), is presented in Figure 27.

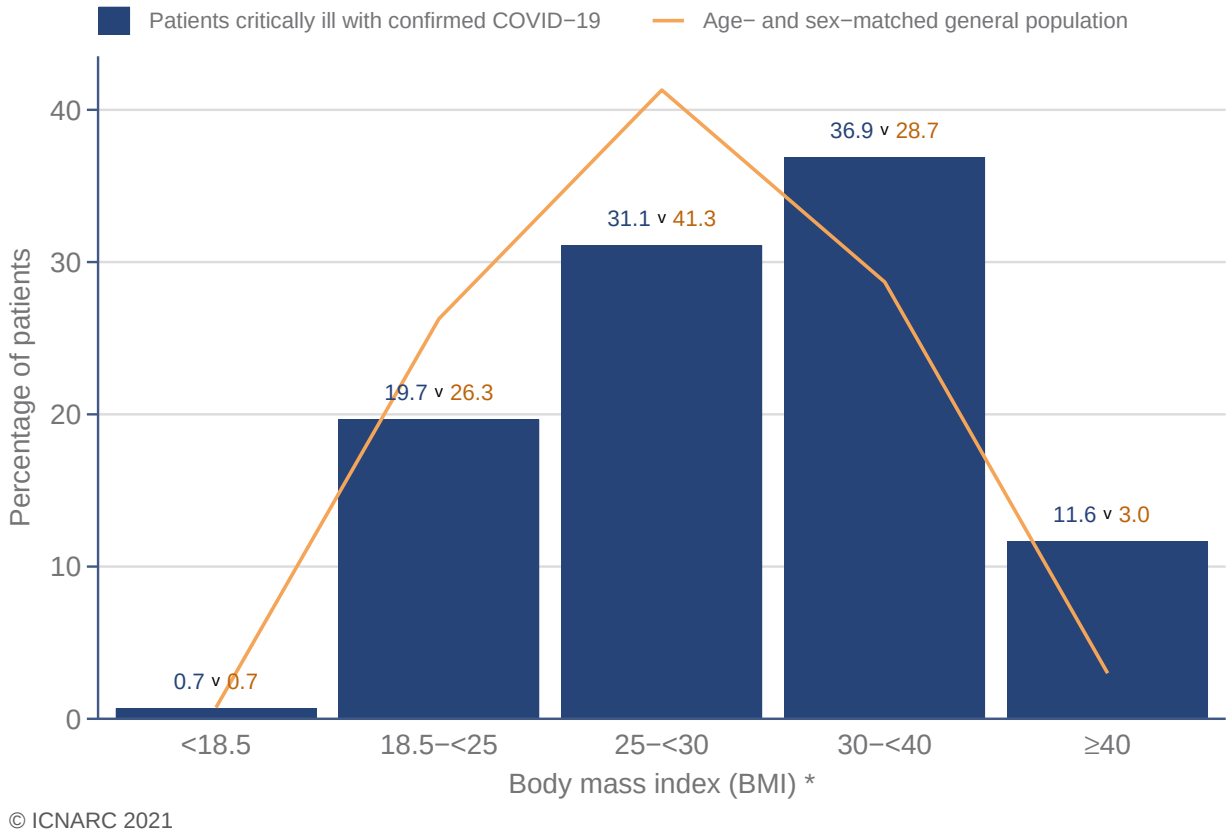


Figure 27. Body mass index * distribution compared with the age- and sex-matched general population

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 98.

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 those 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=6739)**	**Admitted up to 31 Aug (N=5865)**
Age at admission (years) [N=6730]		
Mean (SD)	58.8 (12.9)	58.5 (12.1)
Median (IQR)	61 (51, 68)	59 (51, 67)
Sex, n (%) [N=6733]		
Female	2333 (34.7)	1606 (27.4)
Male	4400 (65.3)	4254 (72.6)
Ethnicity, n (%) [N=6297]		
White	4238 (67.3)	3464 (61.4)
Mixed	106 (1.7)	115 (2.0)
Asian	1164 (18.5)	965 (17.1)
Black	422 (6.7)	651 (11.5)
Other	367 (5.8)	443 (7.9)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=6646]		
1 (least deprived)	770 (11.6)	785 (13.5)
2	944 (14.2)	924 (15.9)
3	1242 (18.7)	1152 (19.9)
4	1686 (25.4)	1488 (25.7)
5 (most deprived)	2004 (30.2)	1448 (25.0)
Urban/rural classification *, n (%) [N=6480]		
Major conurbation	3380 (52.2)	3131 (54.7)
Minor conurbation	150 (2.3)	119 (2.1)
City and town	2333 (36.0)	1907 (33.3)
Rural	615 (9.5)	566 (9.9)

* Please see Definitions on page 98.

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=6739)**	**Admitted up to 31 Aug (N=5865)**
Dependency prior to admission to acute hospital, n (%) [N=6592]		
Able to live without assistance in daily activities	5854 (88.8)	5361 (92.3)
Some assistance with daily activities	723 (11.0)	440 (7.6)
Total assistance with all daily activities	15 (0.2)	10 (0.2)
Very severe comorbidities *, n (%) [N=6610]		
Cardiovascular	46 (0.7)	20 (0.3)
Respiratory	50 (0.8)	33 (0.6)
Renal	83 (1.3)	79 (1.4)
Liver	61 (0.9)	23 (0.4)
Metastatic disease	23 (0.3)	20 (0.3)
Haematological malignancy	83 (1.3)	77 (1.3)
Immunocompromised	208 (3.1)	162 (2.8)
Body mass index *, n (%) [N=6400]		
<18.5	52 (0.8)	30 (0.5)
18.5-<25	1285 (20.1)	1415 (24.8)
25-<30	1990 (31.1)	1980 (34.7)
30-<40	2312 (36.1)	1852 (32.5)
≥40	761 (11.9)	423 (7.4)
CPR within previous 24h, n (%) [N=6688]		
In the community	108 (1.6)	39 (0.7)
In hospital	176 (2.6)	58 (1.0)
Prior hospital length of stay [N=6714]		
Mean (SD)	3.9 (11.8)	2.2 (5.3)
Median (IQR)	2 (0, 5)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=625]		
Currently pregnant	30 (4.8)	9 (2.4)
Recently pregnant (within 6 weeks)	57 (9.1)	22 (5.9)
Not known to be pregnant	538 (86.1)	345 (91.8)

* Please see Definitions on page 98.

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=6739)**	**Admitted up to 31 Aug (N=5865)**
APACHE II Score [N=6735]		
Mean (SD)	16.4 (5.4)	15.5 (5.2)
Median (IQR)	16 (13, 19)	15 (12, 19)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=6650]	12.7 (8.6, 19.2)	15.5 (10.9, 21.6)
PaO_2 /FiO_2 ratio †, n (%) [N=6650]		
$<$ 13.3 kPa ($<$ 100 mmHg)	3532 (53.1)	2255 (38.9)
13.3-26.6 kPa (100-200 mmHg)	2342 (35.2)	2761 (47.6)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	776 (11.7)	781 (13.5)
FiO_2 †, median (IQR) [N=6717]	0.65 (0.45, 0.90)	0.55 (0.40, 0.75)

* Please see Definitions on page 98. 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_2 during the first 24 hours of critical care.

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 those admitted up to 31 August 2020.

Table 7. Patient characteristics: demographics (any advanced respiratory support)

	Patients with confirmed COVID-19 and any advanced respiratory support *	
Demographics	**Admitted from 1 Sep (N=11,430)**	**Admitted up to 31 Aug (N=7875)**
Age at admission (years) [N=11419]		
Mean (SD)	59.7 (12.3)	58.6 (11.9)
Median (IQR)	61 (52, 69)	60 (51, 67)
Sex, n (%) [N=11418]		
Female	3726 (32.6)	2201 (28.0)
Male	7692 (67.4)	5669 (72.0)
Ethnicity, n (%) [N=10790]		
White	7473 (69.3)	4748 (62.6)
Mixed	166 (1.5)	148 (2.0)
Asian	1976 (18.3)	1297 (17.1)
Black	607 (5.6)	824 (10.9)
Other	568 (5.3)	565 (7.5)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=11293]		
1 (least deprived)	1373 (12.2)	1062 (13.6)
2	1665 (14.7)	1230 (15.8)
3	2052 (18.2)	1553 (20.0)
4	2808 (24.9)	1941 (24.9)
5 (most deprived)	3395 (30.1)	1997 (25.7)
Urban/rural classification *, n (%) [N=11089]		
Major conurbation	5287 (47.7)	4023 (52.2)
Minor conurbation	332 (3.0)	205 (2.7)
City and town	4266 (38.5)	2672 (34.7)
Rural	1202 (10.8)	801 (10.4)

* Please see Definitions on page 98.

Table 8. Patient characteristics: medical history (any advanced respiratory support)

	Patients with confirmed COVID-19 and any advanced respiratory support *	
Medical history	**Admitted from 1 Sep (N=11,430)**	**Admitted up to 31 Aug (N=7875)**
Dependency prior to admission to acute hospital, n (%) [N=11152]		
Able to live without assistance in daily activities	10001 (89.7)	7182 (92.0)
Some assistance with daily activities	1124 (10.1)	612 (7.8)
Total assistance with all daily activities	27 (0.2)	11 (0.1)
Very severe comorbidities *, n (%) [N=11169]		
Cardiovascular	64 (0.6)	26 (0.3)
Respiratory	91 (0.8)	48 (0.6)
Renal	157 (1.4)	94 (1.2)
Liver	87 (0.8)	31 (0.4)
Metastatic disease	45 (0.4)	24 (0.3)
Haematological malignancy	180 (1.6)	130 (1.7)
Immunocompromised	391 (3.5)	234 (3.0)
Body mass index *, n (%) [N=10659]		
<18.5	63 (0.6)	41 (0.5)
18.5-<25	2090 (19.6)	1888 (24.9)
25-<30	3379 (31.7)	2633 (34.7)
30-<40	3950 (37.1)	2468 (32.5)
≥40	1177 (11.0)	566 (7.5)
CPR within previous 24h, n (%) [N=11320]		
In the community	132 (1.2)	45 (0.6)
In hospital	207 (1.8)	71 (0.9)
Prior hospital length of stay [N=11400]		
Mean (SD)	3.5 (10.4)	2.2 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=903]		
Currently pregnant	51 (5.6)	15 (2.9)
Recently pregnant (within 6 weeks)	60 (6.6)	27 (5.2)
Not known to be pregnant	792 (87.7)	481 (92.0)

* Please see Definitions on page 98.

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

	Patients with confirmed COVID-19 and any advanced respiratory support *	
Indicators of acute severity	**Admitted from 1 Sep (N=11,430)**	**Admitted up to 31 Aug (N=7875)**
APACHE II Score [N=11055]		
Mean (SD)	15.5 (5.2)	15.4 (5.1)
Median (IQR)	15 (12, 18)	15 (12, 18)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=10616]	12.0 (8.9, 17.0)	15.0 (10.9, 21.0)
PaO_2 /FiO_2 ratio †, n (%) [N=10616]		
$<$ 13.3 kPa ($<$ 100 mmHg)	6195 (58.4)	3074 (40.3)
13.3-26.6 kPa (100-200 mmHg)	3473 (32.7)	3596 (47.1)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	948 (8.9)	963 (12.6)
FiO_2 †, median (IQR) [N=10731]	0.65 (0.50, 0.85)	0.55 (0.40, 0.70)

* Please see Definitions on page 98. 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_2 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 those admitted up to 31 August 2020.

Table 10. Patient characteristics: demographics (basic respiratory support only)

	Patients with confirmed COVID-19 and basic respiratory support only *	
Demographics	**Admitted from 1 Sep (N=9532)**	**Admitted up to 31 Aug (N=2787)**
Age at admission (years) [N=9528]		
Mean (SD)	59.3 (14.3)	59.4 (14.3)
Median (IQR)	60 (50, 70)	60 (50, 70)
Sex, n (%) [N=9527]		
Female	3404 (35.7)	959 (34.4)
Male	6123 (64.3)	1828 (65.6)
Ethnicity, n (%) [N=9038]		
White	6854 (75.8)	2013 (74.9)
Mixed	134 (1.5)	41 (1.5)
Asian	1217 (13.5)	351 (13.1)
Black	435 (4.8)	164 (6.1)
Other	398 (4.4)	120 (4.5)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=9418]		
1 (least deprived)	1217 (12.9)	440 (16.1)
2	1530 (16.2)	465 (17.0)
3	1763 (18.7)	488 (17.8)
4	2194 (23.3)	598 (21.8)
5 (most deprived)	2714 (28.8)	749 (27.3)
Urban/rural classification *, n (%) [N=9403]		
Major conurbation	3715 (39.5)	1049 (38.3)
Minor conurbation	433 (4.6)	128 (4.7)
City and town	4167 (44.3)	1238 (45.1)
Rural	1085 (11.5)	323 (11.8)

* Please see Definitions on page 98.

Table 11. Patient characteristics: medical history (basic respiratory support only)

	Patients with confirmed COVID-19 and basic respiratory support only *	
Medical history	**Admitted from 1 Sep (N=9532)**	**Admitted up to 31 Aug (N=2787)**
Dependency prior to admission to acute hospital, n (%) [N=9340]		
Able to live without assistance in daily activities	8084 (86.6)	2291 (82.9)
Some assistance with daily activities	1223 (13.1)	447 (16.2)
Total assistance with all daily activities	33 (0.4)	24 (0.9)
Very severe comorbidities *, n (%) [N=9362]		
Cardiovascular	73 (0.8)	39 (1.4)
Respiratory	117 (1.2)	71 (2.6)
Renal	159 (1.7)	76 (2.8)
Liver	36 (0.4)	17 (0.6)
Metastatic disease	85 (0.9)	25 (0.9)
Haematological malignancy	146 (1.6)	78 (2.8)
Immunocompromised	307 (3.3)	137 (5.0)
Body mass index *, n (%) [N=8785]		
<18.5	61 (0.7)	28 (1.1)
18.5-<25	1629 (18.5)	667 (26.3)
25-<30	2720 (31.0)	856 (33.8)
30-<40	3265 (37.2)	732 (28.9)
≥40	1110 (12.6)	250 (9.9)
CPR within previous 24h, n (%) [N=9431]		
In the community	13 (0.1)	5 (0.2)
In hospital	13 (0.1)	3 (0.1)
Prior hospital length of stay [N=9514]		
Mean (SD)	2.9 (9.0)	3.0 (7.3)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=896]		
Currently pregnant	63 (7.0)	11 (4.6)
Recently pregnant (within 6 weeks)	56 (6.3)	11 (4.6)
Not known to be pregnant	777 (86.7)	217 (90.8)

* Please see Definitions on page 98.

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

	Patients with confirmed COVID-19 and basic respiratory support only *	
Indicators of acute severity	**Admitted from 1 Sep (N=9532)**	**Admitted up to 31 Aug (N=2787)**
APACHE II Score [N=9405]		
Mean (SD)	13.4 (5.0)	14.2 (5.5)
Median (IQR)	13 (10, 16)	14 (10, 17)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=8347]	14.1 (10.8, 19.0)	17.5 (12.5, 24.0)
PaO_2 /FiO_2 ratio †, n (%) [N=8347]		
$<$ 13.3 kPa ($<$ 100 mmHg)	3666 (43.9)	696 (29.1)
13.3-26.6 kPa (100-200 mmHg)	3895 (46.7)	1264 (52.8)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	786 (9.4)	435 (18.2)
FiO_2 †, median (IQR) [N=8416]	0.60 (0.45, 0.70)	0.50 (0.35, 0.60)

* Please see Definitions on page 98. 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_2 during the first 24 hours of critical care.

Characteristics of patients critically ill with confirmed COVID-19 that received renal support at any time during their critical care stay admitted from 1 September 2020 to date are summarised in Tables 13-15 and compared with those admitted up to 31 August 2020.

Table 13. Patient characteristics: demographics (any renal support)

Demographics	Patients with confirmed COVID-19 and any renal support *	
	Admitted from 1 Sep (N=3312)	Admitted up to 31 Aug (N=2926)
Age at admission (years) [N=3310]		
Mean (SD)	60.8 (11.5)	59.1 (11.0)
Median (IQR)	62 (54, 69)	60 (52, 67)
Sex, n (%) [N=3310]		
Female	876 (26.5)	670 (22.9)
Male	2434 (73.5)	2254 (77.1)
Ethnicity, n (%) [N=3124]		
White	2028 (64.9)	1660 (58.9)
Mixed	53 (1.7)	49 (1.7)
Asian	630 (20.2)	483 (17.1)
Black	246 (7.9)	419 (14.9)
Other	167 (5.3)	206 (7.3)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=3275]		
1 (least deprived)	372 (11.4)	368 (12.7)
2	493 (15.1)	442 (15.3)
3	576 (17.6)	610 (21.1)
4	881 (26.9)	730 (25.2)
5 (most deprived)	953 (29.1)	747 (25.8)
Urban/rural classification *, n (%) [N=3214]		
Major conurbation	1641 (51.1)	1576 (55.0)
Minor conurbation	75 (2.3)	61 (2.1)
City and town	1169 (36.4)	952 (33.3)
Rural	329 (10.2)	274 (9.6)

* Please see Definitions on page 98.

Table 14. Patient characteristics: medical history (any renal support)

	Patients with confirmed COVID-19 and any renal support *	
Medical history	**Admitted from 1 Sep (N=3312)**	**Admitted up to 31 Aug (N=2926)**
Dependency prior to admission to acute hospital, n (%) [N=3248]		
Able to live without assistance in daily activities	2812 (86.6)	2668 (91.7)
Some assistance with daily activities	430 (13.2)	235 (8.1)
Total assistance with all daily activities	6 (0.2)	6 (0.2)
Very severe comorbidities *, n (%) [N=3253]		
Cardiovascular	30 (0.9)	15 (0.5)
Respiratory	28 (0.9)	17 (0.6)
Renal	288 (8.9)	150 (5.2)
Liver	34 (1.0)	6 (0.2)
Metastatic disease	21 (0.6)	13 (0.4)
Haematological malignancy	61 (1.9)	52 (1.8)
Immunocompromised	139 (4.3)	93 (3.2)
Body mass index *, n (%) [N=3115]		
<18.5	17 (0.5)	16 (0.6)
18.5-<25	635 (20.4)	653 (23.0)
25-<30	1056 (33.9)	969 (34.1)
30-<40	1103 (35.4)	984 (34.6)
≥40	304 (9.8)	221 (7.8)
CPR within previous 24h, n (%) [N=3284]		
In the community	28 (0.9)	10 (0.3)
In hospital	68 (2.1)	18 (0.6)
Prior hospital length of stay [N=3303]		
Mean (SD)	4.0 (11.3)	2.3 (5.4)
Median (IQR)	1 (0, 5)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=176]		
Currently pregnant	5 (2.8)	3 (1.9)
Recently pregnant (within 6 weeks)	5 (2.8)	4 (2.5)
Not known to be pregnant	166 (94.3)	152 (95.6)

* Please see Definitions on page 98.

Table 15. Patient characteristics: indicators of acute severity (any renal support)

	Patients with confirmed COVID-19 and any renal support *	
Indicators of acute severity	**Admitted from 1 Sep (N=3312)**	**Admitted up to 31 Aug (N=2926)**
Invasively ventilated within first 24h *, n (%) [N=3200]	1556 (48.6)	2119 (73.0)
APACHE II Score [N=3219]		
Mean (SD)	17.9 (5.9)	16.9 (5.6)
Median (IQR)	17 (14, 21)	16 (13, 20)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=3052]	12.2 (8.9, 17.6)	14.4 (10.5, 20.0)
PaO_2 /FiO_2 ratio †, n (%) [N=3052]		
$<$ 13.3 kPa ($<$ 100 mmHg)	1724 (56.5)	1237 (43.9)
13.3-26.6 kPa (100-200 mmHg)	1028 (33.7)	1275 (45.2)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	300 (9.8)	308 (10.9)
FiO_2 †, median (IQR) [N=3101]	0.65 (0.50, 0.80)	0.60 (0.44, 0.75)

* Please see Definitions on page 98. 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_2 during the first 24 hours of critical care.

From 1 September to date, there have been 3010 inter-hospital critical care transfers of 2690 patients with confirmed COVID-19, of which 2358 transfers of 2234 patients were classified as being for comparable critical care. The percentage of transfers by month is shown in Figure 28, and the transfers for comparable critical care by region are shown in Figure 29.

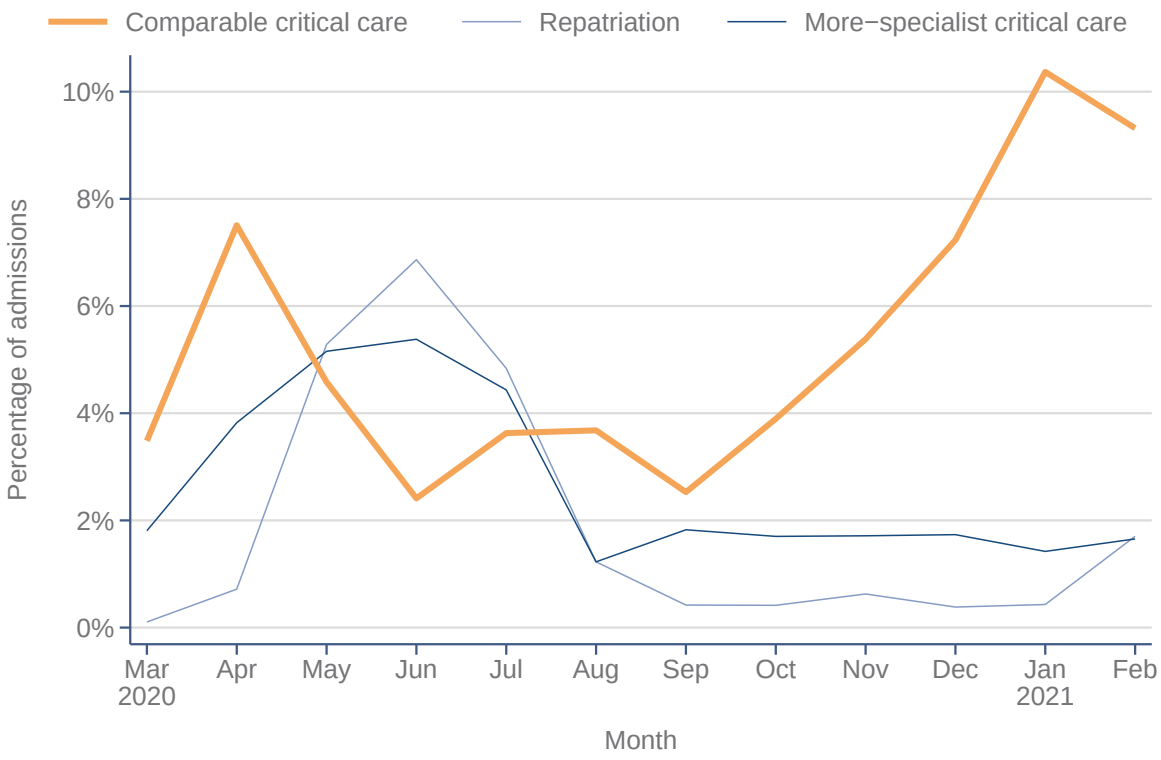


Figure 28. Inter-hospital critical care transfers

Percentage of critical care admissions with confirmed COVID-19 that were transfers between critical care units in different hospitals by month of admission and reason for transfer *.

* Please see Definitions on page 98. Dashed line indicates incomplete month.

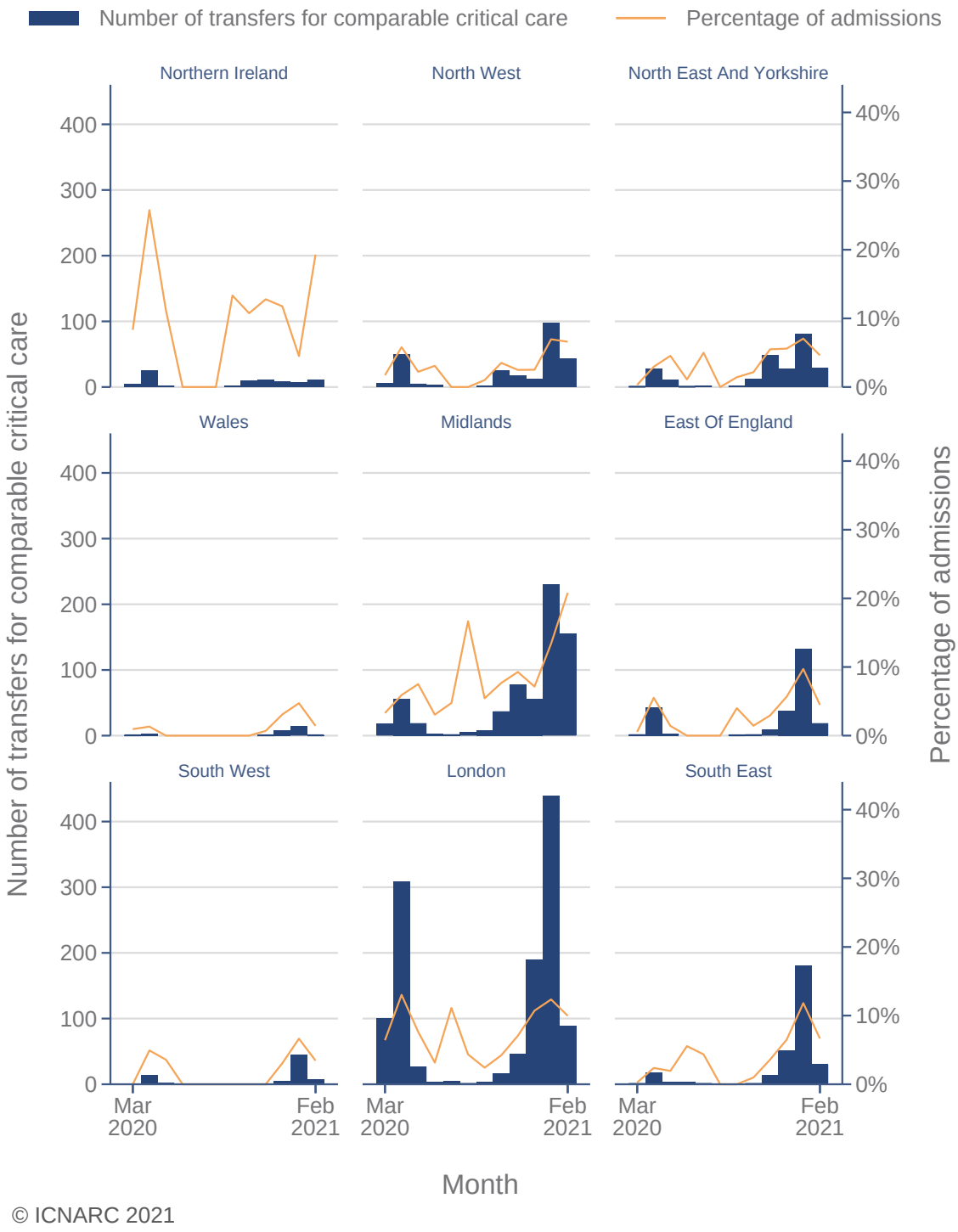


Figure 29. Inter-hospital critical care transfers for comparable critical care by region

Number and percentage of critical care admissions with confirmed COVID-19 that were transfers between critical care units in different hospitals for comparable critical care * by month of admission.

* Please see Definitions on page 98. Dashed line and shading indicates incomplete month.

The distribution of the number of days from critical care admission to transfer for comparable critical care for patients critically ill with confirmed COVID-19 is shown in Figure 30.

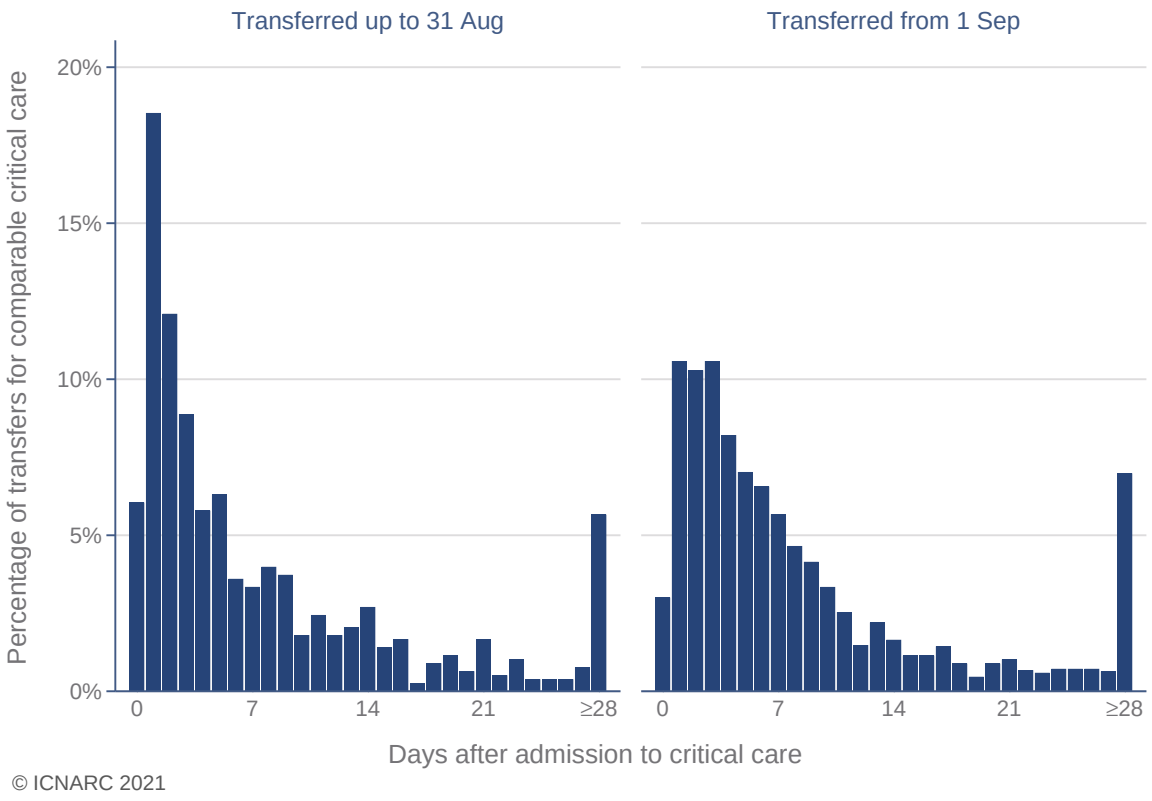


Figure 30. Timing of inter-hospital critical care transfers for comparable critical care *

Percentage of patients critically ill with confirmed COVID-19 transferred for comparable critical care* by number of days from critical care admission to first transfer.

* Please see Definitions on page 98.

The percentage of transfers for comparable critical care that were to a hospital within or outside of the critical care unit's local transfer group is shown overall in Figure 31 and by month of transfer in Figure 32.

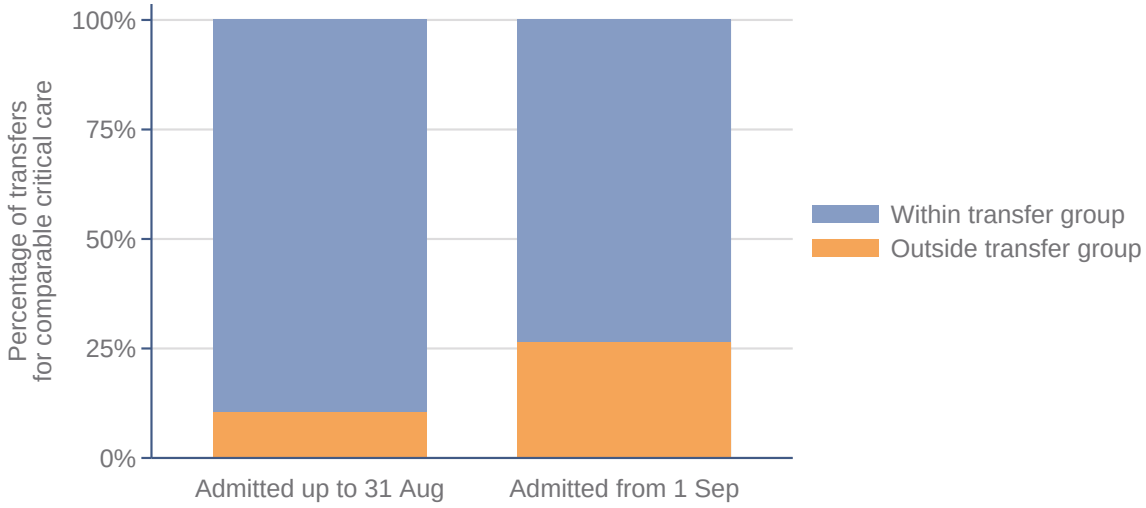


Figure 31. Inter-hospital critical care transfers for comparable critical care within and outside transfer group *

Percentage of transfers for comparable critical care * of patients critically ill with confirmed COVID-19 by whether the hospital was within or outside the local transfer group *.

* Please see Definitions on page 98.

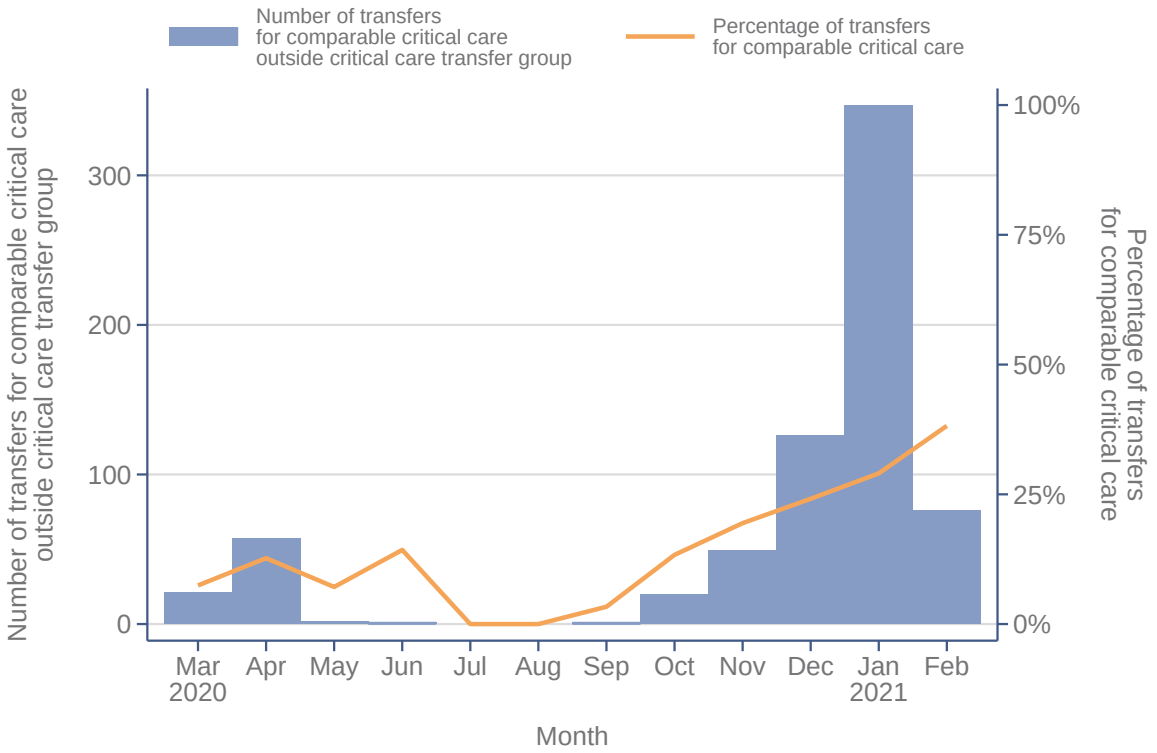


Figure 32. Inter-hospital critical care transfers for comparable critical care outside transfer group * by month

Number and percentage of transfers for comparable critical care * of patients critically ill with confirmed COVID-19 that were outside the local transfer group * by month of transfer.

* Please see Definitions on page 98. Dashed line and shading indicates incomplete month.

Characteristics of patients critically ill with confirmed COVID-19 that were transferred to a critical care unit in another hospital for comparable critical care admitted from 1 September 2020 to date are summarised in Tables 16-18 and compared with those admitted up to 31 August 2020.

Table 16. Patient characteristics: demographics (any transfer for comparable critical care)

	Patients with confirmed COVID-19 transferred for comparable critical care	
Demographics	**Admitted from 1 Sep (N=2234)**	**Admitted up to 31 Aug (N=744)**
Age at admission (years) [N=2230]		
Mean (SD)	59.4 (11.8)	57.8 (11.2)
Median (IQR)	61 (53, 68)	59 (52, 66)
Sex, n (%) [N=2224]		
Female	728 (32.7)	173 (23.3)
Male	1496 (67.3)	569 (76.7)
Ethnicity, n (%) [N=2159]		
White	1368 (63.4)	357 (49.0)
Mixed	30 (1.4)	18 (2.5)
Asian	472 (21.9)	194 (26.6)
Black	149 (6.9)	86 (11.8)
Other	140 (6.5)	74 (10.2)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=2213]		
1 (least deprived)	251 (11.3)	94 (12.7)
2	314 (14.2)	90 (12.2)
3	410 (18.5)	149 (20.2)
4	524 (23.7)	216 (29.2)
5 (most deprived)	714 (32.3)	190 (25.7)
Urban/rural classification *, n (%) [N=2163]		
Major conurbation	1301 (60.1)	528 (74.1)
Minor conurbation	59 (2.7)	27 (3.8)
City and town	640 (29.6)	125 (17.5)
Rural	163 (7.5)	33 (4.6)

* Please see Definitions on page 98.

Table 17. Patient characteristics: medical history (any transfer for comparable critical care)

	Patients with confirmed COVID-19 transferred for comparable critical care	
Medical history	**Admitted from 1 Sep (N=2234)**	**Admitted up to 31 Aug (N=744)**
Dependency prior to admission to acute hospital, n (%) [N=2130]		
Able to live without assistance in daily activities	1955 (91.8)	698 (95.4)
Some assistance with daily activities	170 (8.0)	32 (4.4)
Total assistance with all daily activities	5 (0.2)	2 (0.3)
Very severe comorbidities *, n (%) [N=2141]		
Cardiovascular	4 (0.2)	0 (0.0)
Respiratory	10 (0.5)	4 (0.5)
Renal	12 (0.6)	5 (0.7)
Liver	6 (0.3)	0 (0.0)
Metastatic disease	1 (0.0)	1 (0.1)
Haematological malignancy	17 (0.8)	5 (0.7)
Immunocompromised	37 (1.7)	14 (1.9)
Body mass index *, n (%) [N=1969]		
<18.5	10 (0.5)	5 (0.7)
18.5-<25	345 (17.5)	170 (23.4)
25-<30	666 (33.8)	286 (39.3)
30-<40	780 (39.6)	232 (31.9)
≥40	168 (8.5)	35 (4.8)
CPR within previous 24h, n (%) [N=2196]		
In the community	8 (0.4)	0 (0.0)
In hospital	14 (0.6)	6 (0.8)
Prior hospital length of stay [N=2229]		
Mean (SD)	2.6 (4.3)	1.9 (3.7)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=175]		
Currently pregnant	10 (5.7)	1 (3.3)
Recently pregnant (within 6 weeks)	6 (3.4)	1 (3.3)
Not known to be pregnant	159 (90.9)	28 (93.3)

* Please see Definitions on page 98.

Table 18. Patient characteristics: indicators of acute severity (any transfer for comparable critical care)

	Patients with confirmed COVID-19 transferred for comparable critical care	
Indicators of acute severity	**Admitted from 1 Sep (N=2234)**	**Admitted up to 31 Aug (N=744)**
Invasively ventilated within first 24h *, n (%) [N=2064]	1225 (59.4)	597 (82.0)
APACHE II Score [N=2081]		
Mean (SD)	14.7 (4.7)	14.3 (4.9)
Median (IQR)	14 (12, 17)	14 (11, 17)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=1951]	12.2 (8.9, 16.4)	15.2 (11.0, 20.0)
PaO_2 /FiO_2 ratio †, n (%) [N=1951]		
$<$ 13.3 kPa ($<$ 100 mmHg)	1145 (58.7)	264 (38.0)
13.3-26.6 kPa (100-200 mmHg)	680 (34.9)	362 (52.1)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	126 (6.5)	69 (9.9)
FiO_2 †, median (IQR) [N=1993]	0.65 (0.50, 0.85)	0.60 (0.45, 0.75)

* Please see Definitions on page 98. 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_2 during the first 24 hours of critical care.

Critical care outcomes have been received for 21,832 (of 23,908) patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date. Of these, 8594 have died and 13,238 have been discharged from critical care (Figures 33 and 34). The remaining 2076 were last reported to still be receiving critical care.

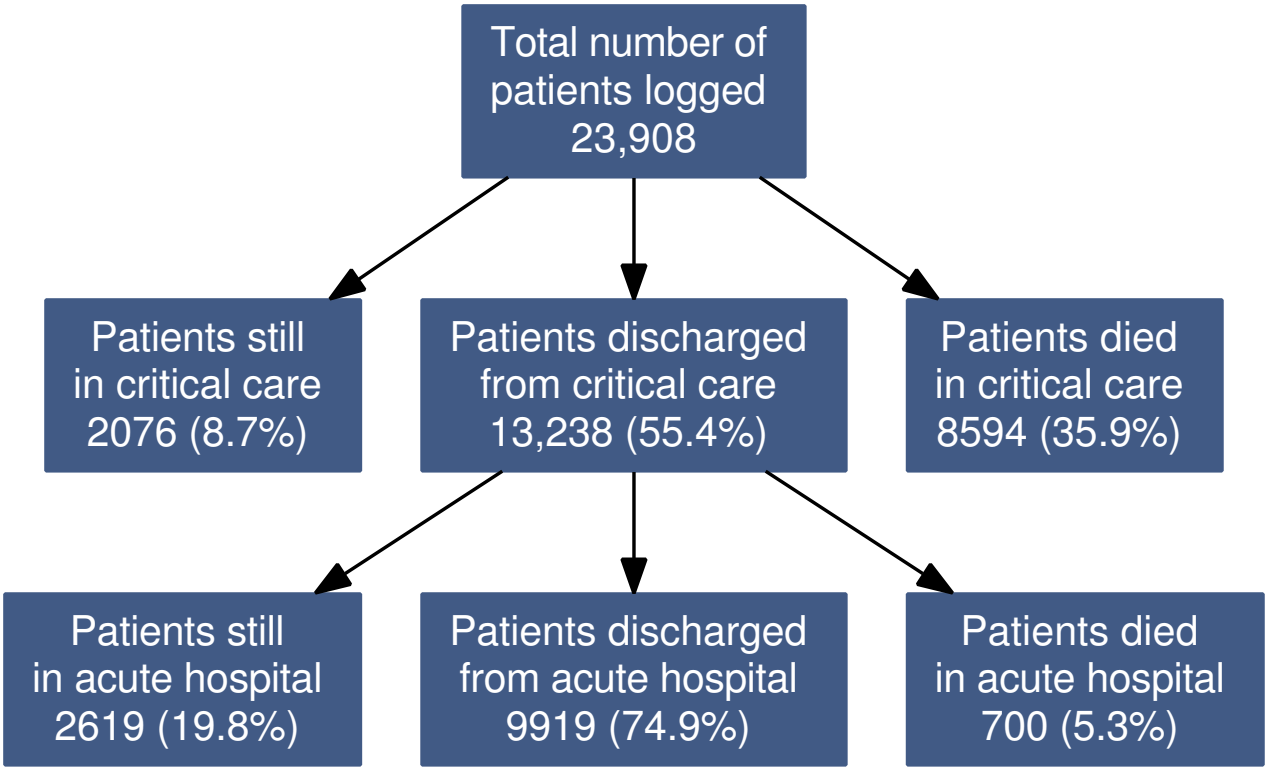


Figure 33. Critical care and acute hospital outcomes

Critical care and acute hospital outcomes for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date.

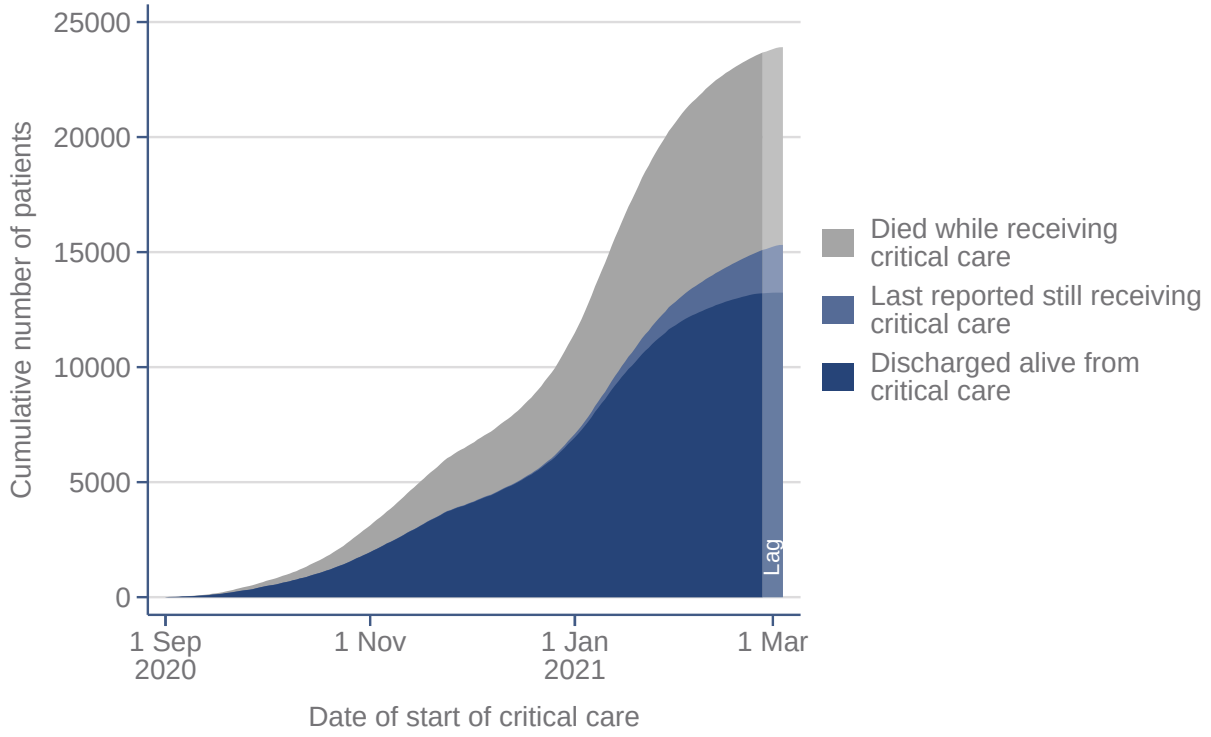


Figure 34. Cumulative outcomes *

Cumulative outcomes for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by date of admission to critical care.

* Please note that patients whose outcome data have not been received are assumed to remain in critical care as of 4 March 2021.

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 19 and compared with those admitted up to 31 August 2020.

Table 19. 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=23,908)**	**Admitted up to 31 Aug (N=10,929)**
Outcome at end of critical care, n (%)		
Discharged	13238 (55.4)	6618 (60.6)
Died	8594 (35.9)	4309 (39.4)
Still receiving critical care	2076 (8.7)	2 (0.0)
Duration of critical care	**(N=21,797)**	**(N=10,922)**
Duration of critical care (days) †, median (IQR)		
Survivors	6 (3, 13)	12 (5, 28)
Non-survivors	11 (6, 18)	9 (5, 16)
Organ support (Critical Care Minimum Dataset) *	**(N=21,647)**	**(N=10,926)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	11430 (52.9)	7875 (72.1)
Basic respiratory support only	9532 (44.2)	2787 (25.5)
No respiratory support	626 (2.9)	264 (2.4)
Advanced cardiovascular support	4592 (21.3)	3366 (30.8)
Basic cardiovascular support only	15902 (73.7)	7098 (65.0)
No cardiovascular support	1094 (5.1)	462 (4.2)
Renal support	3312 (15.3)	2926 (26.8)
Liver support	155 (0.7)	114 (1.0)
Neurological support	1361 (6.3)	997 (9.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	11 (6, 20)	14 (7, 24)
Total (advanced + basic) respiratory support	9 (4, 16)	11 (5, 22)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	9 (5, 16)	11 (5, 22)
Renal support	6 (3, 11)	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 98.

† 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

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received invasive ventilation during the first 24 hours in critical care admitted from 1 September 2020 to date are summarised in Table 20 and compared with those admitted up to 31 August 2020.

Table 20. 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=6739)**	**Admitted up to 31 Aug (N=5865)**
Outcome at end of critical care, n (%)		
Discharged	2849 (42.3)	3132 (53.4)
Died	3213 (47.7)	2733 (46.6)
Still receiving critical care	677 (10.0)	0 (0.0)
Duration of critical care	**(N=6054)**	**(N=5863)**
Duration of critical care (days) †, median (IQR)		
Survivors	14 (8, 28)	22 (12, 35)
Non-survivors	11 (6, 18)	10 (5, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=6009)**	**(N=5864)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	2322 (38.6)	2392 (40.8)
Basic cardiovascular support only	3679 (61.2)	3459 (59.0)
No cardiovascular support	8 (0.1)	13 (0.2)
Renal support	1556 (25.9)	2119 (36.1)
Liver support	95 (1.6)	80 (1.4)
Neurological support	786 (13.1)	719 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	11 (6, 20)	14 (7, 24)
Total (advanced + basic) respiratory support	13 (7, 21)	15 (8, 26)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	13 (7, 21)	15 (8, 26)
Renal support	6 (3, 12)	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 98.

† 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

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to date are summarised in Table 21 and compared with those admitted up to 31 August 2020.

Table 21. Critical care outcome, duration of critical care and organ support (any advanced respiratory support)

	Patients with confirmed COVID-19 and any advanced respiratory support *	
Critical care outcome	**Admitted from 1 Sep (N=13,367 ‡)**	**Admitted up to 31 Aug (N=7875)**
Outcome at end of critical care, n (%)		
Discharged	4687 (35.1)	4121 (52.3)
Died	6743 (50.4)	3754 (47.7)
Still receiving critical care ‡	1937 (14.5)	0 (0.0)
Duration of critical care	**(N=11,418)**	**(N=7871)**
Duration of critical care (days) †, median (IQR)		
Survivors	16 (8, 32)	23 (12, 37)
Non-survivors	13 (8, 20)	10 (6, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=11,430)**	**(N=7875)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	4384 (38.4)	3296 (41.9)
Basic cardiovascular support only	7027 (61.5)	4563 (57.9)
No cardiovascular support	19 (0.2)	16 (0.2)
Renal support	2961 (25.9)	2776 (35.3)
Liver support	144 (1.3)	110 (1.4)
Neurological support	1291 (11.3)	971 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	11 (6, 20)	14 (7, 24)
Total (advanced + basic) respiratory support	14 (8, 23)	16 (8, 27)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	14 (9, 23)	16 (9, 27)
Renal support	6 (3, 12)	8 (4, 15.5)

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 98.

† 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

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received basic respiratory support only during their critical care stay admitted from 1 September 2020 to date are summarised in Table 22 and compared with those admitted up to 31 August 2020.

Table 22. Critical care outcome, duration of critical care and organ support (basic respiratory support only)

	Patients with confirmed COVID-19 and basic respiratory support only *	
Critical care outcome	**Admitted from 1 Sep (N=9915 ‡)**	**Admitted up to 31 Aug (N=2787)**
Outcome at end of critical care, n (%)		
Discharged	7843 (79.1)	2246 (80.6)
Died	1689 (17.0)	541 (19.4)
Still receiving critical care ‡	383 (3.9)	0 (0.0)
Duration of critical care	**(N=9524)**	**(N=2786)**
Duration of critical care (days) †, median (IQR)		
Survivors	5 (3, 7)	4 (2, 7)
Non-survivors	5 (2, 9)	4 (2, 7)
Organ support (Critical Care Minimum Dataset) *	**(N=9532)**	**(N=2787)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	174 (1.8)	53 (1.9)
Basic cardiovascular support only	8479 (89.0)	2323 (83.4)
No cardiovascular support	879 (9.2)	411 (14.7)
Renal support	284 (3.0)	115 (4.1)
Liver support	8 (0.1)	3 (0.1)
Neurological support	62 (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, 3)	2 (1, 3)
Total (advanced + basic) cardiovascular support	5 (3, 8)	5 (3, 7)
Renal support	4 (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 98.

† 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 – renal support

Critical care outcome, duration of critical care and organ support for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received renal support at any time during their critical care stay admitted from 1 September 2020 to date are summarised in Table 23 and compared with those admitted up to 31 August 2020.

Table 23. Critical care outcome, duration of critical care and organ support (any renal support)

	Patients with confirmed COVID-19 and any renal support *	
Critical care outcome	**Admitted from 1 Sep (N=3755 ‡)**	**Admitted up to 31 Aug (N=2926)**
Outcome at end of critical care, n (%)		
Discharged	875 (23.3)	1277 (43.6)
Died	2437 (64.9)	1649 (56.4)
Still receiving critical care ‡	443 (11.8)	0 (0.0)
Duration of critical care	**(N=3307)**	**(N=2926)**
Duration of critical care (days) †, median (IQR)		
Survivors	22 (8, 41)	32 (19, 46)
Non-survivors	15 (8, 22)	13 (7, 20)
Organ support (Critical Care Minimum Dataset) *	**(N=3312)**	**(N=2926)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	2961 (89.4)	2776 (94.9)
Basic respiratory support only	284 (8.6)	115 (3.9)
No respiratory support	67 (2.0)	35 (1.2)
Advanced cardiovascular support	1773 (53.5)	1586 (54.2)
Basic cardiovascular support only	1512 (45.7)	1331 (45.5)
No cardiovascular support	27 (0.8)	9 (0.3)
Liver support	90 (2.7)	78 (2.7)
Neurological support	387 (11.7)	413 (14.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	14 (8, 24)	18 (11, 30)
Total (advanced + basic) respiratory support	16 (9, 26)	19 (11, 33)
Advanced cardiovascular support	3 (2, 6)	4 (2, 7)
Total (advanced + basic) cardiovascular support	16 (9, 26)	19 (11, 32)
Renal support	6 (3, 11)	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 98.

† 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.

Critical care outcome by patient characteristics

Critical care outcome for patients critically ill with confirmed COVID-19 for whom outcomes have been received admitted from 1 September 2020 to 31 December 2020 (to allow for almost complete outcomes) are summarised in Table 24.

Table 24. Critical care outcome by patient characteristics, admitted up to 31 December 2020

Patient subgroup	Patients with confirmed COVID-19 and outcome received (N=11,086)	
	Discharged alive from critical care n (%)	Died in critical care n (%)
Age at admission to critical care		
16-49	1869 (82.0)	409 (18.0)
50-69	3551 (62.2)	2158 (37.8)
70+	1374 (44.5)	1717 (55.5)
Sex		
Female	2419 (65.5)	1273 (34.5)
Male	4377 (59.3)	3008 (40.7)
BMI		
<25	1282 (58.8)	898 (41.2)
25-<30	1947 (57.9)	1417 (42.1)
≥30	3193 (65.3)	1693 (34.7)
Assistance required with daily activities		
No	5942 (62.9)	3510 (37.1)
Yes	768 (51.9)	711 (48.1)
Any very severe comorbidities *		
No	6259 (62.9)	3699 (37.1)
Yes	447 (46.1)	522 (53.9)
Any respiratory support *		
Basic only	4187 (81.4)	955 (18.6)
Advanced	2302 (41.2)	3285 (58.8)
Any renal support *	475 (27.3)	1267 (72.7)

* Please see Definitions on page 98.

Critical care outcome by patient characteristics – invasively ventilated first 24 hours

Critical care outcome for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received invasive ventilation during the first 24 hours in critical care admitted from 1 September 2020 to 31 December 2020 (to allow for almost complete outcomes) are summarised in Table 25.

Table 25. Critical care outcome by patient characteristics, admitted up to 31 December 2020 (invasively ventilated first 24 hours)

	Patients with confirmed COVID-19 invasively ventilated first 24 hours * (N=2819)	
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	404 (69.7)	176 (30.3)
50-69	725 (48.8)	761 (51.2)
70+	220 (29.3)	531 (70.7)
Sex		
Female	495 (52.1)	456 (47.9)
Male	855 (45.8)	1011 (54.2)
BMI		
<25	261 (45.1)	318 (54.9)
25-<30	373 (43.1)	492 (56.9)
≥30	670 (53.4)	584 (46.6)
Assistance required with daily activities		
No	1176 (48.6)	1246 (51.4)
Yes	162 (44.1)	205 (55.9)
Any very severe comorbidities *		
No	1257 (49.1)	1301 (50.9)
Yes	80 (34.8)	150 (65.2)
Any renal support *	196 (26.0)	558 (74.0)

* Please see Definitions on page 98.

Critical care outcome by patient characteristics – advanced respiratory support

Critical care outcome for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to 31 December 2020 (to allow for almost complete outcomes) are summarised in Table 26.

Table 26. Critical care outcome by patient characteristics, admitted up to 31 December 2020 (any advanced respiratory support)

Patients with confirmed COVID-19 and any advanced respiratory support * (N=5587)		
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	647 (63.9)	366 (36.1)
50-69	1279 (41.4)	1808 (58.6)
70+	372 (25.1)	1110 (74.9)
Sex		
Female	815 (46.4)	940 (53.6)
Male	1485 (38.8)	2342 (61.2)
BMI		
<25	428 (39.4)	659 (60.6)
25-<30	621 (36.2)	1096 (63.8)
≥30	1155 (46.1)	1350 (53.9)
Assistance required with daily activities		
No	2026 (41.5)	2860 (58.5)
Yes	256 (39.8)	388 (60.2)
Any very severe comorbidities *		
No	2137 (42.3)	2915 (57.7)
Yes	143 (30.2)	330 (69.8)
Any renal support *	364 (23.5)	1184 (76.5)

* Please see Definitions on page 98.

Critical care outcome by patient characteristics – basic respiratory support

Critical care outcome for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received advanced respiratory support only during their critical care stay admitted from 1 September 2020 to 31 December 2020 (to allow for almost complete outcomes) are summarised in Table 27.

Table 27. Critical care outcome by patient characteristics, admitted up to 31 December 2020 (basic respiratory support only)

	Patients with confirmed COVID-19 and basic respiratory support only * (N=5142)	
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	1128 (96.9)	36 (3.1)
50-69	2141 (86.6)	330 (13.4)
70+	916 (60.9)	589 (39.1)
Sex		
Female	1487 (82.6)	314 (17.4)
Male	2698 (80.8)	640 (19.2)
BMI		
<25	729 (76.4)	225 (23.6)
25-<30	1244 (80.1)	310 (19.9)
≥30	1957 (85.6)	328 (14.4)
Assistance required with daily activities		
No	3678 (85.5)	622 (14.5)
Yes	452 (58.6)	319 (41.4)
Any very severe comorbidities *		
No	3864 (83.5)	761 (16.5)
Yes	267 (59.3)	183 (40.7)
Any renal support *	78 (49.7)	79 (50.3)

* Please see Definitions on page 98.

Critical care outcome by patient characteristics – renal support

Critical care outcome for patients critically ill with confirmed COVID-19 for whom outcomes have been received and who received renal support at any time during their critical care stay admitted from 1 September 2020 to 31 December 2020 (to allow for almost complete outcomes) are summarised in Table 28.

Table 28. Critical care outcome by patient characteristics, admitted up to 31 December 2020 (any renal support)

Patient subgroup	Patients with confirmed COVID-19 and any renal support * (N=1742)	
	Discharged alive from critical care n (%)	Died in critical care n (%)
Age at admission to critical care		
16-49	110 (42.3)	150 (57.7)
50-69	281 (27.8)	729 (72.2)
70+	84 (17.8)	388 (82.2)
Sex		
Female	145 (31.9)	310 (68.1)
Male	330 (25.6)	957 (74.4)
BMI		
<25	99 (28.0)	254 (72.0)
25-<30	123 (22.1)	434 (77.9)
≥30	233 (31.3)	511 (68.7)
Assistance required with daily activities		
No	378 (25.8)	1086 (74.2)
Yes	94 (35.7)	169 (64.3)
Any very severe comorbidities *		
No	364 (25.6)	1059 (74.4)
Yes	109 (35.9)	195 (64.1)
Any respiratory support *		
Basic only	78 (49.7)	79 (50.3)
Advanced	364 (23.5)	1184 (76.5)

* Please see Definitions on page 98.

To explore the potential impact of vaccination on patients critically ill with confirmed COVID-19, we mapped the nine priority groups, identified by the Joint Committee on Vaccination and Immunisation (JCVI) for Phase 1 of the UK vaccination strategy, to the available data fields in the Case Mix Programme dataset (Harrison et al, 2021). Figure 35 shows the numbers of patients critically ill with confirmed COVID-19 by week of admission, split into: priority groups 1-4 (the initial priority groups, all of whom were offered a first dose of vaccine by 15 February 2021); priority groups 5-9 (the remaining priority groups from Phase 1, all of whom are due to be offered a first dose of vaccine by 15 April 2021); and Phase 2 (the rest of the population). Figure 36 shows the percentage of patients critically ill with confirmed COVID-19 by week of admission, split into the same categories.
While the number in priority groups 1-4 does appear to be reducing quicker than in other categories translating to a lower percentage, it is still very early to expect to see benefit from vaccination. We will continue to monitor these changes over time.

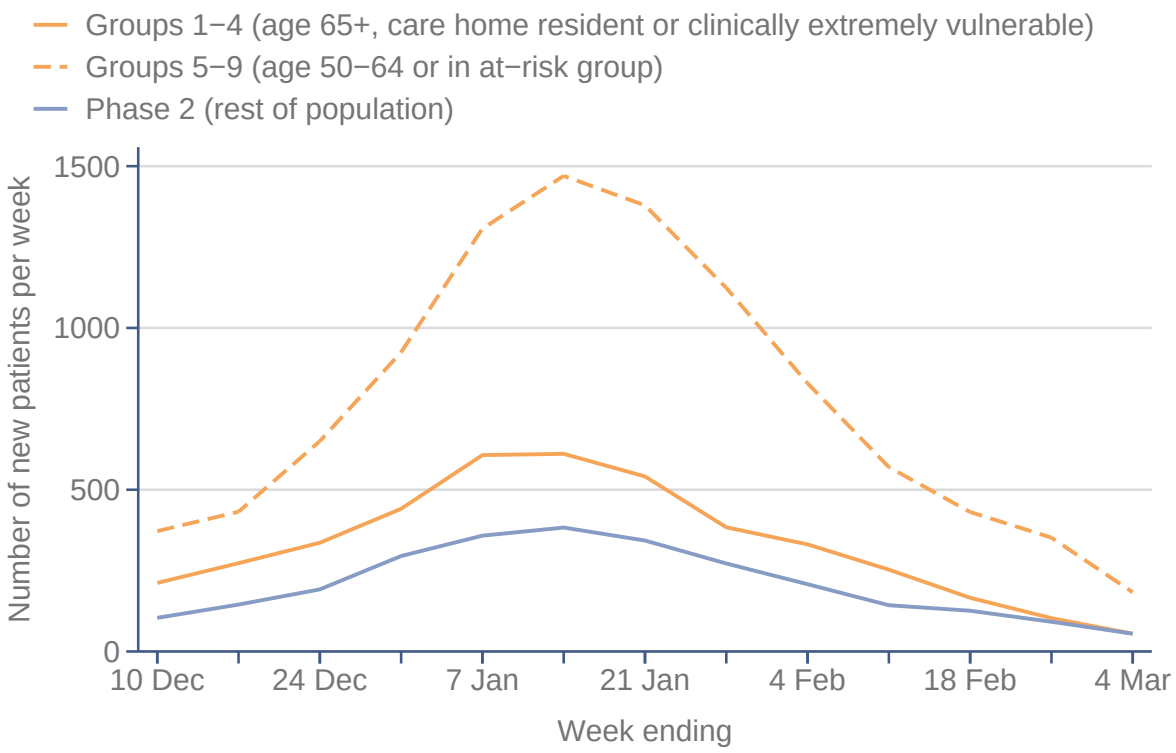


Figure 35. Weekly admissions by vaccine priority groups

Weekly trend in the numbers of patients critically ill with confirmed COVID-19 by vaccine priority group from the week ending 10 December 2020 (start of the vaccination programme) to date. Please note that some priority groups were unable to be mapped, for example due to absence of occupation data.

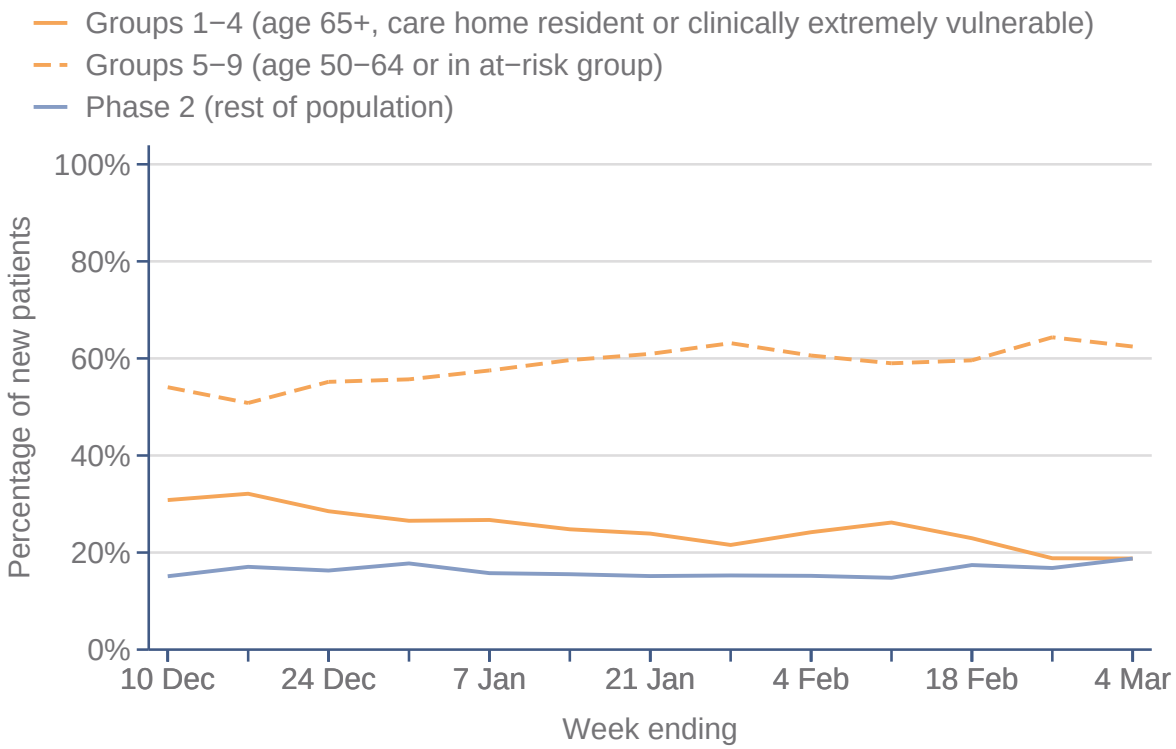


Figure 36. Percentage of weekly admissions by vaccine priority groups

Weekly trend in the percentages of patients critically ill with confirmed COVID-19 by vaccine priority group from the week ending 10 December 2020 (start of the vaccination programme) to date. Please note that some priority groups were unable to be mapped, for example due to absence of occupation data.

The numbers of critically ill women with confirmed COVID-19 reported to be currently and recently pregnant on admisison to critical care are shown in Figure 37 and, as a percentage of women aged 16-49 years, in Figure 38. Characteristics and critical care outcome of women aged 16-49 years by pregnancy status are reported in Table 29 for women admitted from 1 September to date and compared with women admitted up to 31 August in Table 30.

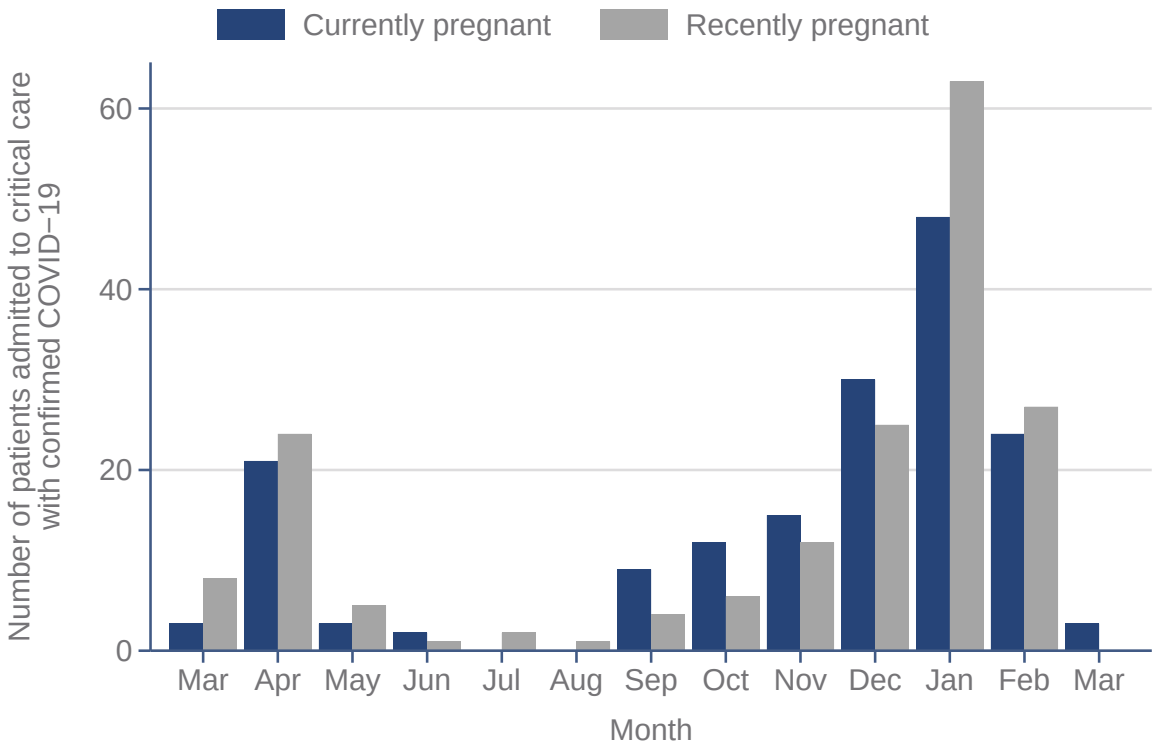


Figure 37. Numbers currently and recently pregnant

Monthly trend in the number of women reported to be currently or recently pregnant on admission to critical care.

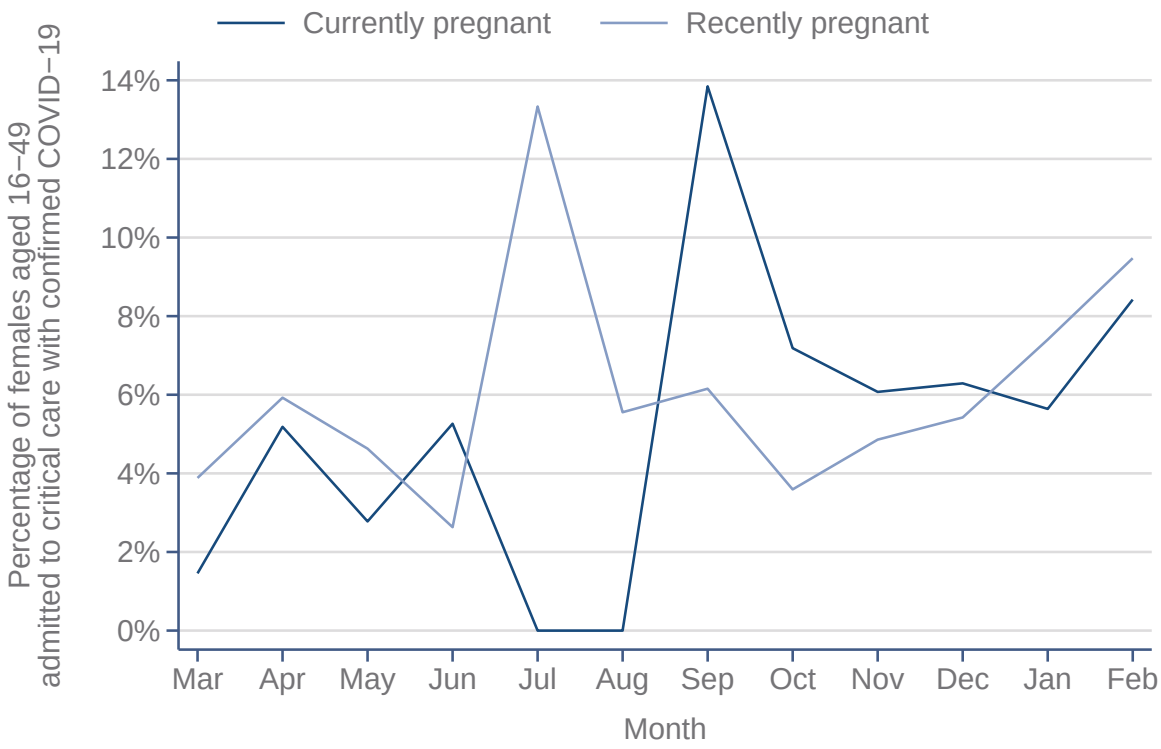


Figure 38. Percentages currently and recently pregnant

Monthly trend in the percentage of women aged 16-49 years reported to be currently or recently pregnant on admission to critical care.

Table 29. Characteristics of females aged 16-49 admitted from 1 September by pregnancy status

Characteristics	Women with confirmed COVID-19 aged 16-49 years		
	Currently pregnant (N=140)	Recently pregnant (N=137)	Not known to be pregnant (N=1778)
Age at admission (years)			
Mean (SD)	32.6 (5.8)	32.8 (5.7)	40.2 (7.7)
Median (IQR)	33 (29, 37)	32 (29, 37)	42 (36, 47)
Ethnicity, n (%)			
White	54 (40.6)	70 (53.8)	1119 (66.1)
Mixed	6 (4.5)	9 (6.9)	33 (1.9)
Asian	45 (33.8)	32 (24.6)	327 (19.3)
Black	19 (14.3)	12 (9.2)	122 (7.2)
Other	9 (6.8)	7 (5.4)	93 (5.5)
IMD quintile *, n (%)			
1 (least deprived)	12 (8.7)	13 (9.8)	157 (9.0)
2	10 (7.2)	18 (13.5)	194 (11.1)
3	24 (17.4)	26 (19.5)	305 (17.4)
4	45 (32.6)	28 (21.1)	466 (26.6)
5 (most deprived)	47 (34.1)	48 (36.1)	631 (36.0)
First pregnancy, n (%)	N/A	57 (42.9)	N/A
Invasively ventilated within first 24h *, n (%)	30 (22.6)	57 (44.2)	538 (31.7)
APACHE II Score			
Mean (SD)	11.7 (3.9)	11.2 (4.3)	12.4 (5.0)
Median (IQR)	12 (9, 14)	11 (9, 14)	12 (9, 15)
PaO_2 /FiO_2 ratio † (kPa), median (IQR)	17.0 (11.5, 26.0)	18.9 (12.2, 29.4)	13.8 (9.8, 20.4)
PaO_2 /FiO_2 ratio †, n (%)			
$<$ 13.3 kPa ($<$ 100 mmHg)	38 (31.1)	38 (31.1)	38 (31.1)
13.3-26.6 kPa (100-200 mmHg)	36 (29.3)	36 (29.3)	36 (29.3)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	737 (46.8)	737 (46.8)	737 (46.8)
FiO_2 †, median (IQR)	0.50 (0.35, 0.70)	0.45 (0.30, 0.70)	0.60 (0.40, 0.80)
Outcome at end of critical care, n (%)			
Discharged	117 (83.6)	125 (91.2)	1334 (75.0)
Died	5 (3.6)	2 (1.5)	318 (17.9)
Still receiving critical care	18 (12.9)	10 (7.3)	126 (7.1)

* Please see Definitions on page 98. Indicators of acute severity are based on data from the first 24 hours of critical care. N/A denotes not available.

† Derived from the arterial blood gas with the lowest PaO_2 during the first 24 hours of critical care.

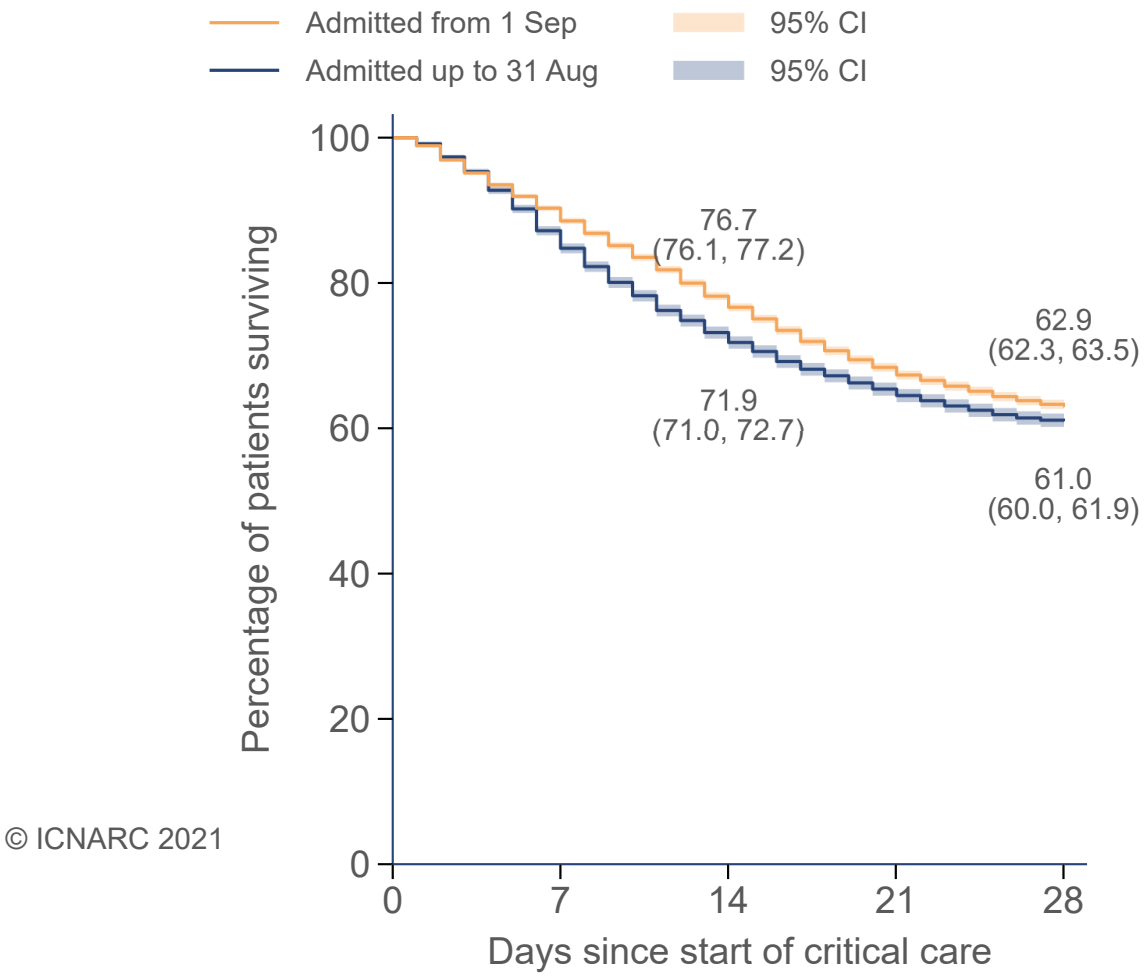
Table 30. Characteristics of females aged 16-49 admitted up to 31 August by pregnancy status

Characteristics	Women with confirmed COVID-19 aged 16-49 years		
	Currently pregnant (N=29)	Recently pregnant (N=41)	Not known to be pregnant (N=720)
Age at admission (years)			
Mean (SD)	34.2 (5.7)	32.3 (5.4)	40.3 (7.6)
Median (IQR)	34 (31, 39)	32 (28, 35)	42 (35, 46)
Ethnicity, n (%)			
White	12 (42.9)	13 (32.5)	412 (59.1)
Mixed	0 (0.0)	1 (2.5)	16 (2.3)
Asian	6 (21.4)	10 (25.0)	135 (19.4)
Black	4 (14.3)	10 (25.0)	81 (11.6)
Other	6 (21.4)	6 (15.0)	53 (7.6)
IMD quintile *, n (%)			
1 (least deprived)	5 (17.2)	2 (4.9)	77 (10.9)
2	4 (13.8)	2 (4.9)	84 (11.9)
3	4 (13.8)	10 (24.4)	124 (17.5)
4	8 (27.6)	12 (29.3)	161 (22.7)
5 (most deprived)	8 (27.6)	15 (36.6)	262 (37.0)
First pregnancy, n (%)	N/A	15 (36.6)	N/A
Invasively ventilated within first 24h *, n (%)	9 (32.1)	22 (53.7)	345 (48.5)
APACHE II Score			
Mean (SD)	11.7 (3.9)	11.7 (4.6)	13.2 (5.5)
Median (IQR)	11 (9, 14)	12 (9, 14)	12 (10, 16)
PaO_2 /FiO_2 ratio † (kPa), median (IQR)	18.7 (14.3, 29.2)	22.0 (15.6, 34.7)	17.2 (12.2, 25.1)
PaO_2 /FiO_2 ratio †, n (%)			
$<$ 13.3 kPa ($<$ 100 mmHg)	6 (21.4)	6 (21.4)	6 (21.4)
13.3-26.6 kPa (100-200 mmHg)	6 (15.4)	6 (15.4)	6 (15.4)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	211 (31.5)	211 (31.5)	211 (31.5)
FiO_2 †, median (IQR)	0.50 (0.35, 0.60)	0.40 (0.28, 0.50)	0.50 (0.35, 0.65)
Outcome at end of critical care, n (%)			
Discharged	28 (96.6)	37 (90.2)	557 (77.4)
Died	1 (3.4)	4 (9.8)	163 (22.6)
Still receiving critical care	0 (0.0)	0 (0.0)	0 (0.0)

* Please see Definitions on page 98. Indicators of acute severity are based on data from the first 24 hours of critical care. N/A denotes not available.

† Derived from the arterial blood gas with the lowest PaO_2 during the first 24 hours of critical care.

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 39 and compared with those admitted up to 31 August 2020.



Admitted from 1 Sep					
At risk	23584	20602	17387	14749	13110
Died (in hospital)	0	2693	5422	7502	8465
Censored	0	289	775	1333	2009
Admitted up to 31 Aug					
At risk	10929	9266	7854	7058	6662
Died (in hospital)	0	1663	3075	3871	4266
Censored	0	0	0	0	1

Figure 39. 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).

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 40-43 and compared with those admitted up to 31 August 2020.

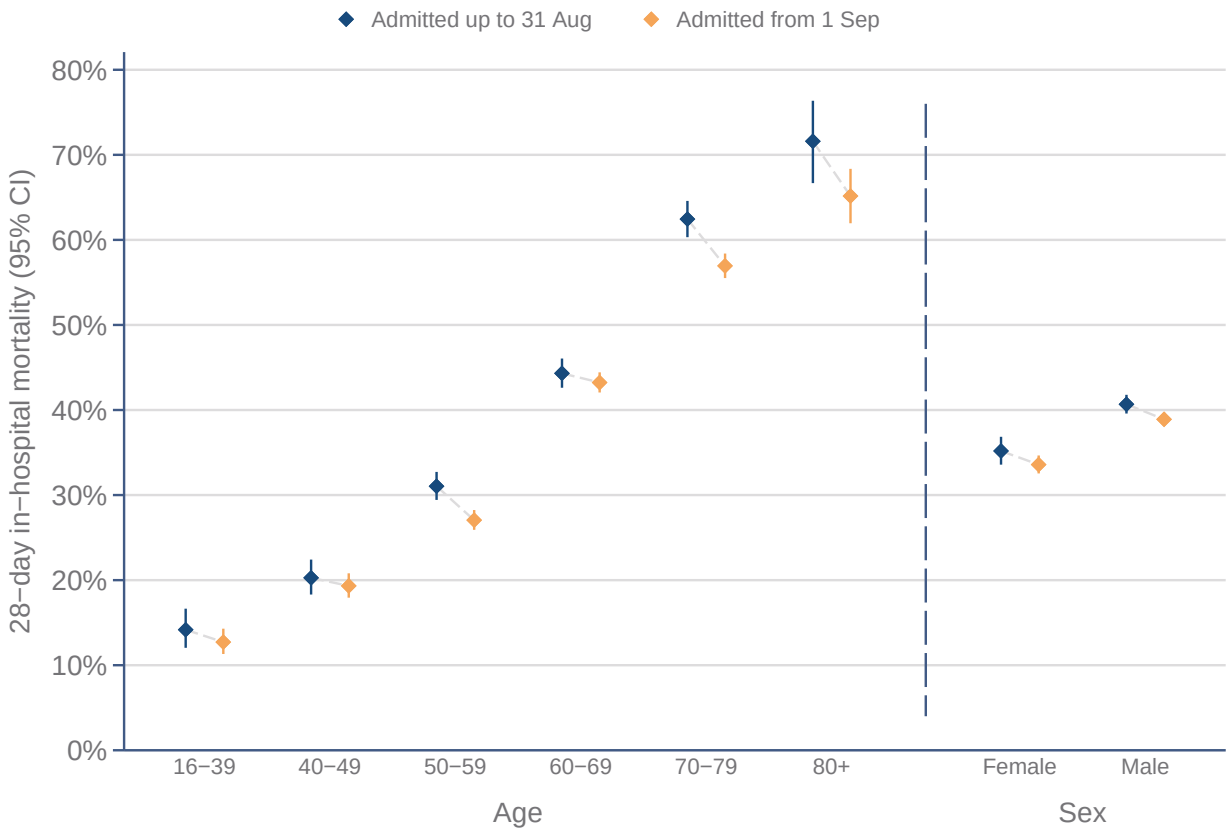


Figure 40. 28-day in-hospital mortality by patient characteristics (demographics)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

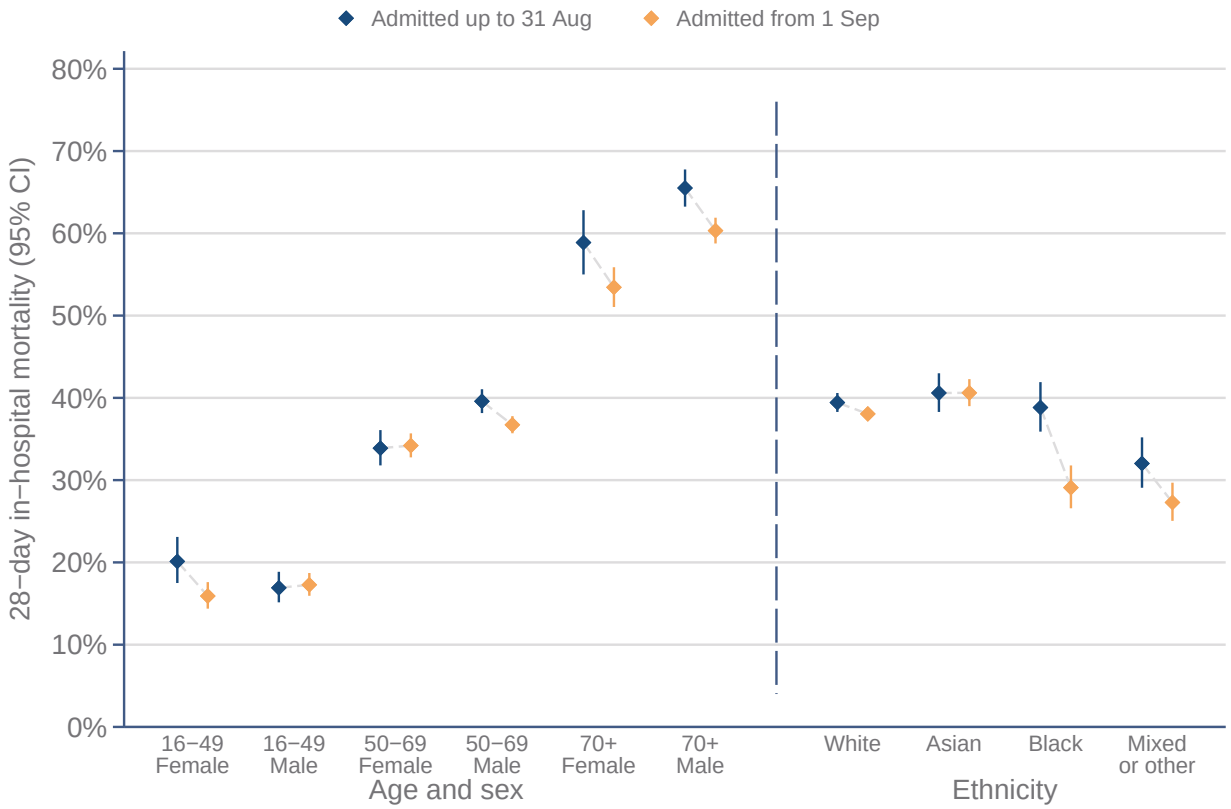


Figure 41. 28-day in-hospital mortality by patient characteristics (demographics continued)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

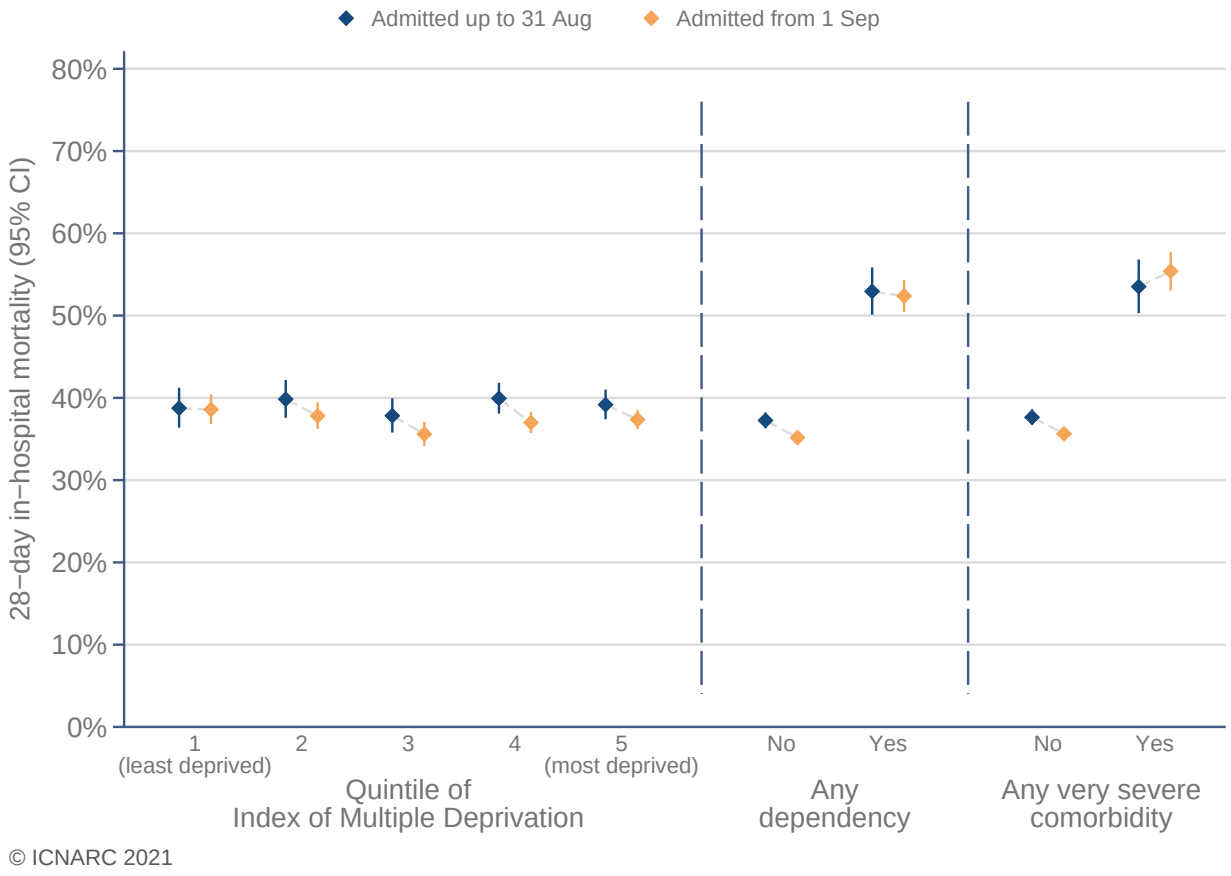


Figure 42. 28-day in-hospital mortality by patient characteristics (demographics and medical history)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

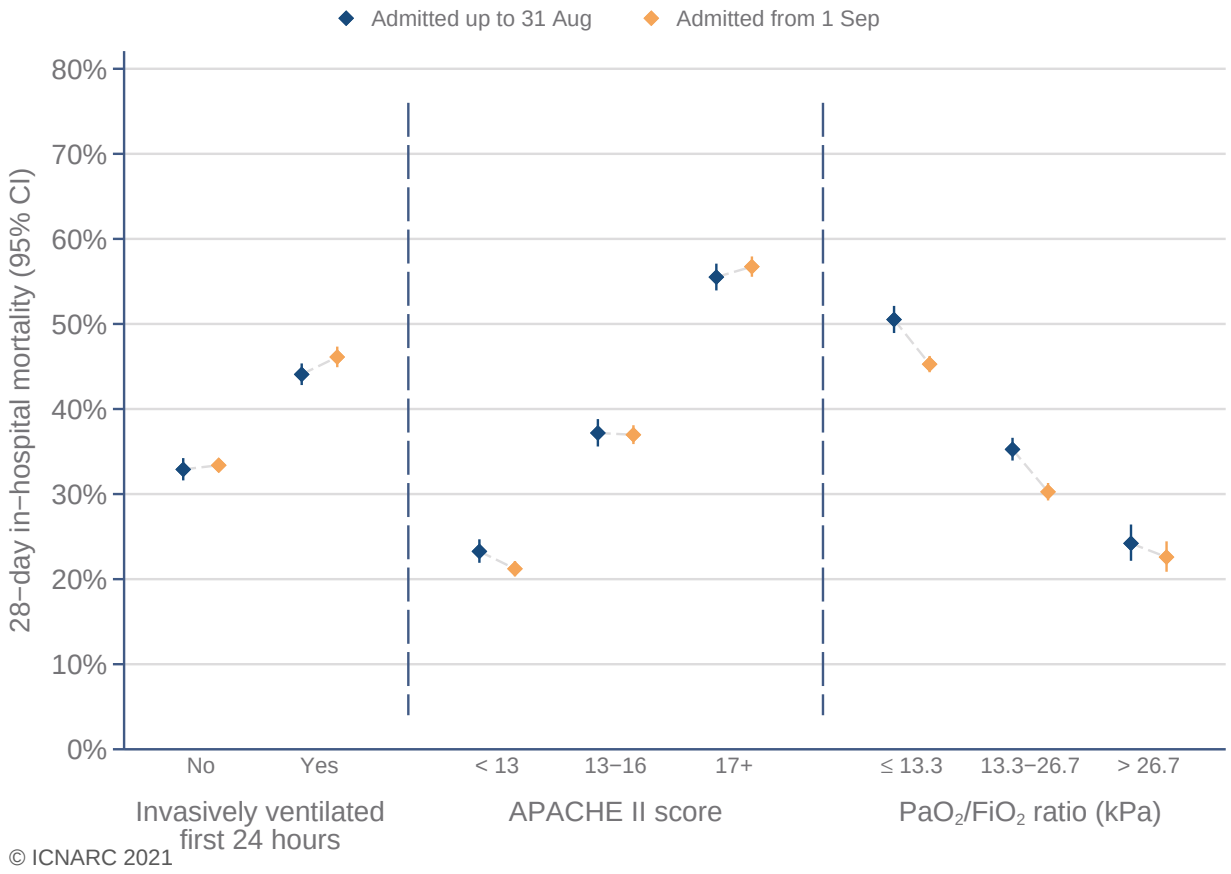


Figure 43. 28-day in-hospital mortality by patient characteristics (indicators of acute severity *)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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 98. 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 44-46 and compared with those admitted up to 31 August 2020.

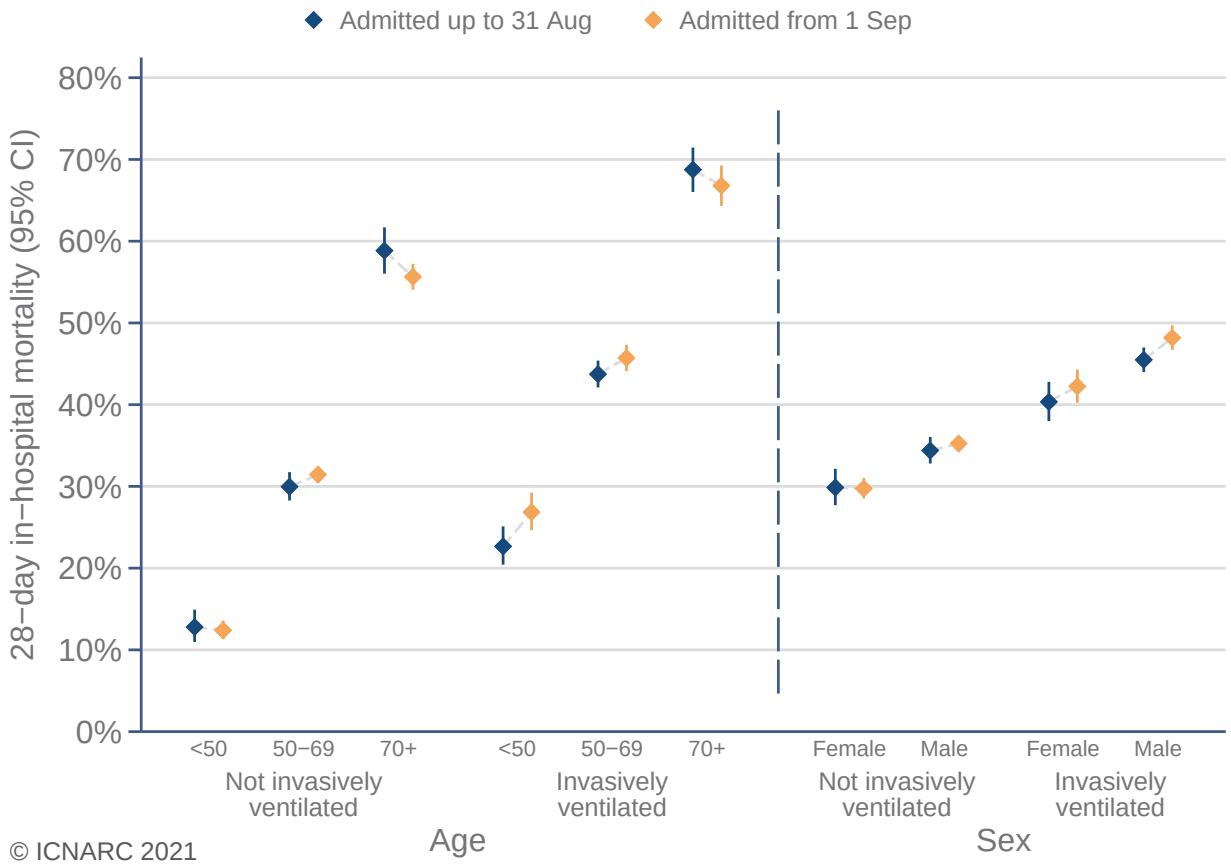


Figure 44. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

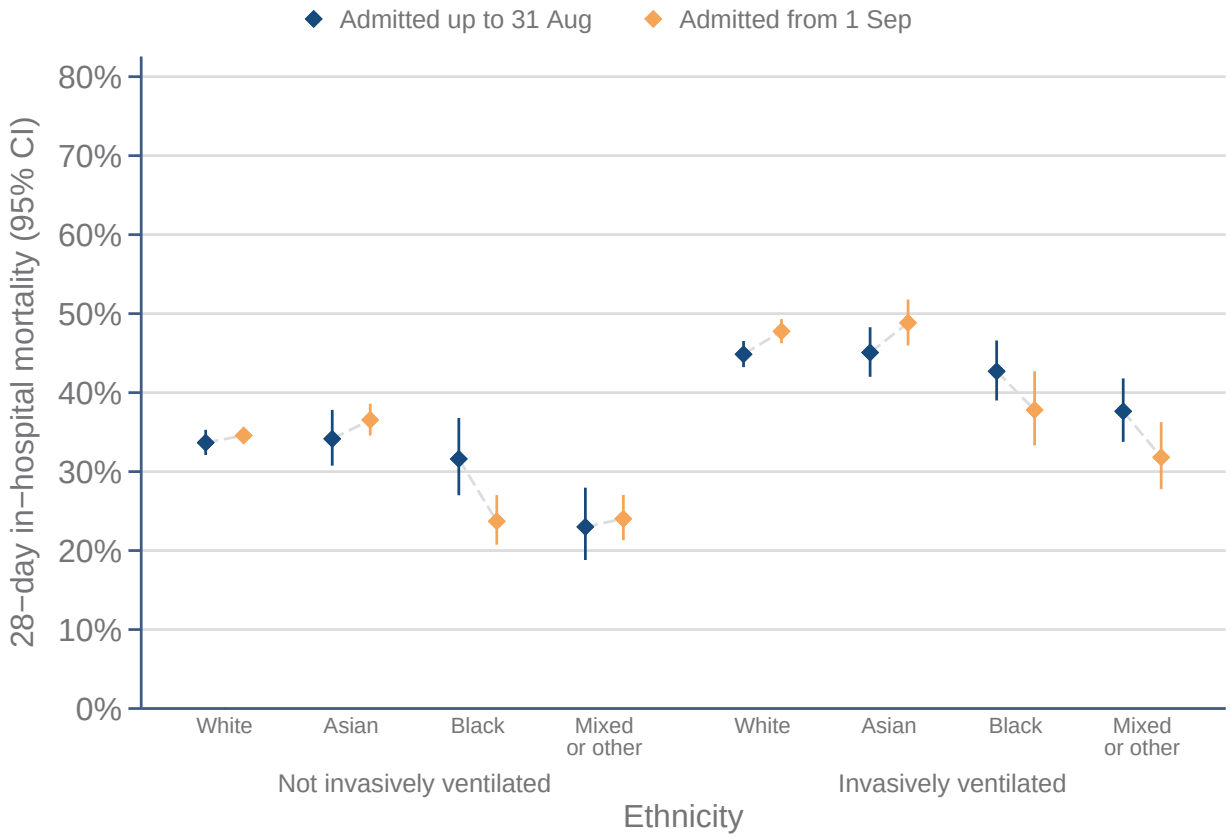


Figure 45. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics continued)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

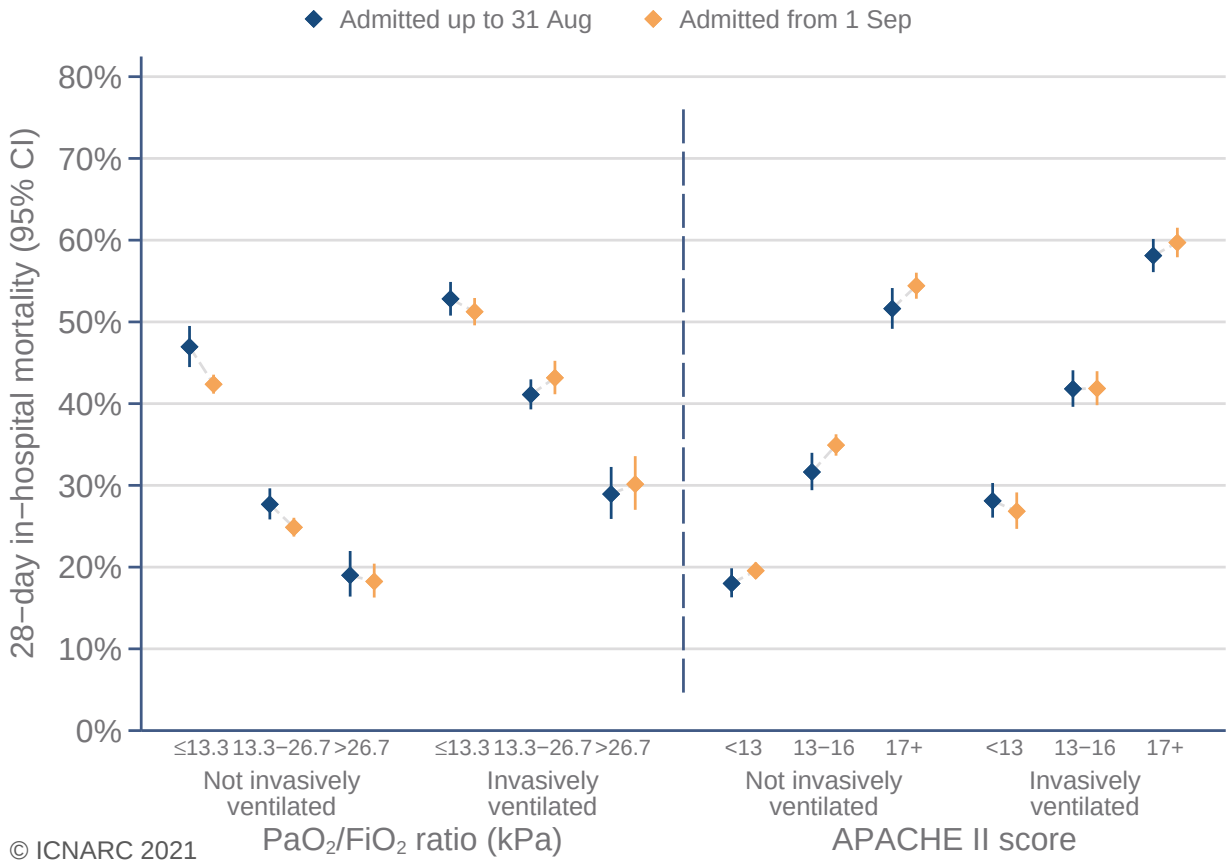


Figure 46. 28-day in-hospital mortality by patient characteristics and invasive ventilation (acute severity)

Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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 98. Indicators of acute severity are based on data from the first 24 hours of critical care.

28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by the number of days in hospital prior to admission to critical care, separately for those invasively ventilated and not invasively ventilated during the first 24 hours of critical care, is presented in Figure 47 and compared with those admitted up to 31 August 2020.

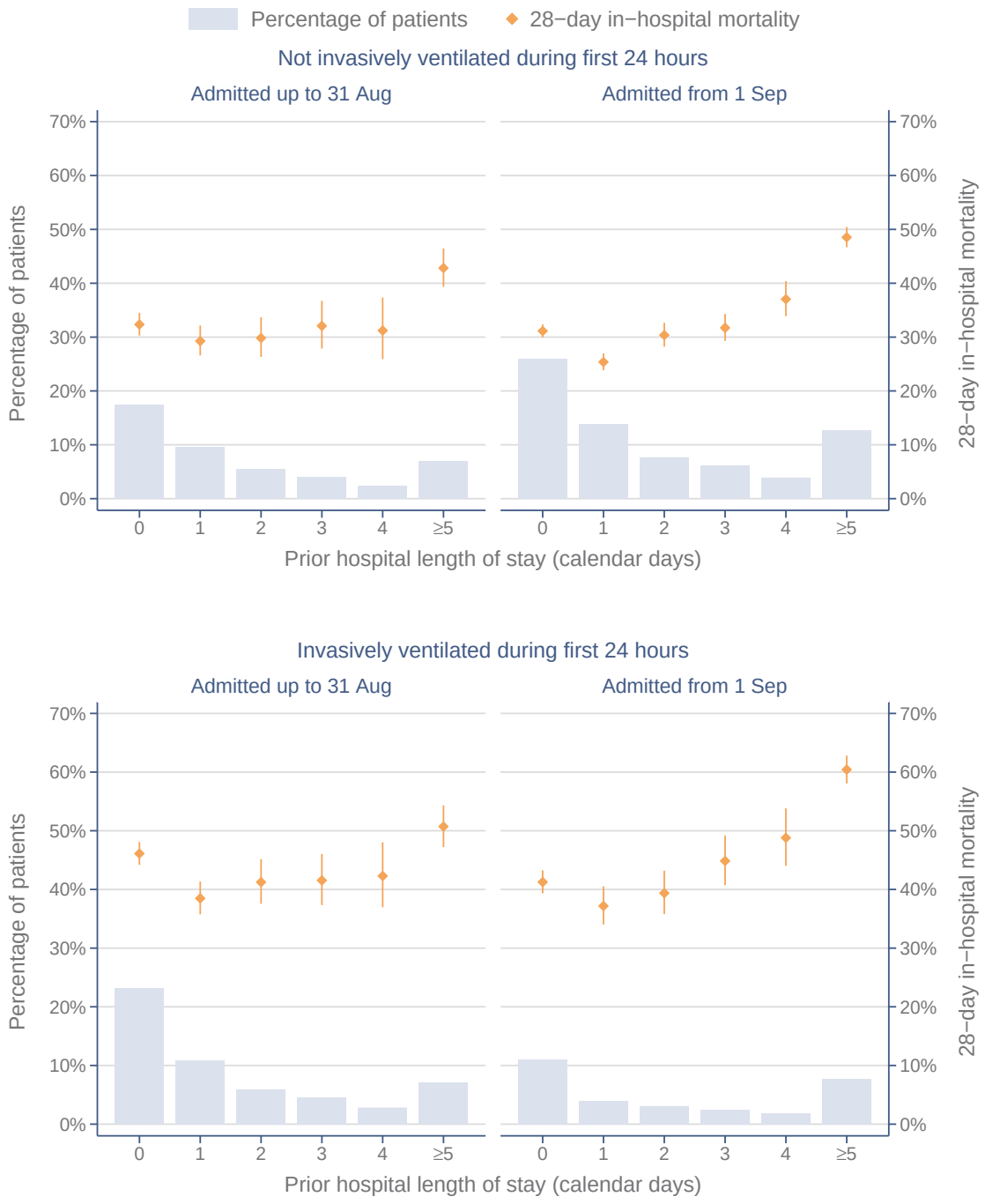
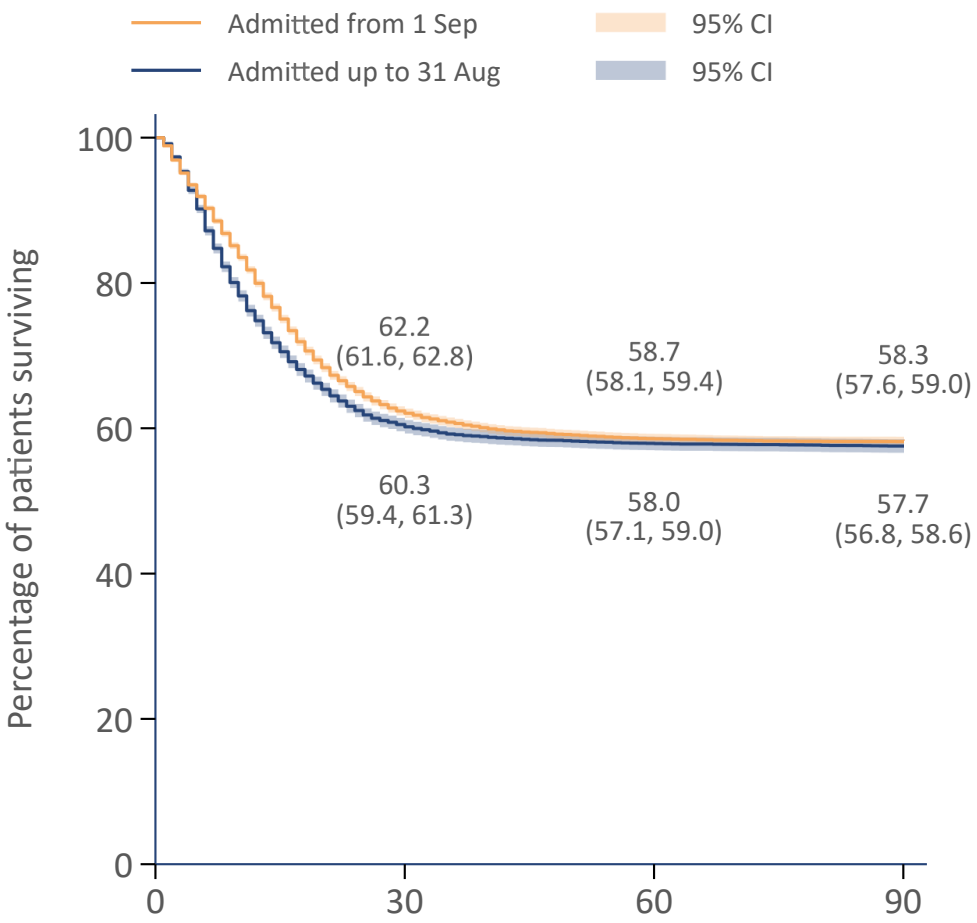


Figure 47. Percentage of patients and 28-day in-hospital mortality by invasive ventilation and prior hospital length of stay

Percentages of patients are reported as a percentage of all patients critically ill with confirmed COVID-19 admitted within the time period. Estimates of 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 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).

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 from 1 September 2020 to date is shown in Figure 48 and compared with those admitted up to 31 August 2020.



Admitted from 1 Sep				
At risk	23584	12739	6981	4046
Died (in hospital)	0	8613	9247	9287
Censored	0	2232	7356	10251
Admitted up to 31 Aug				
At risk	10929	6594	6321	6279
Died (in hospital)	0	4334	4585	4621
Censored				

Figure 48. In-hospital survival to 90 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 90 days assumed to survive to 90 days. Please note that these survival curves are not adjusted for differences in patient characteristics (see Tables 1-3).

Monthly trends in characteristics for patients critically ill with confirmed COVID-19 are shown for key summary statistics in Figures 49-51 and as full distributions in Figures 52-54.

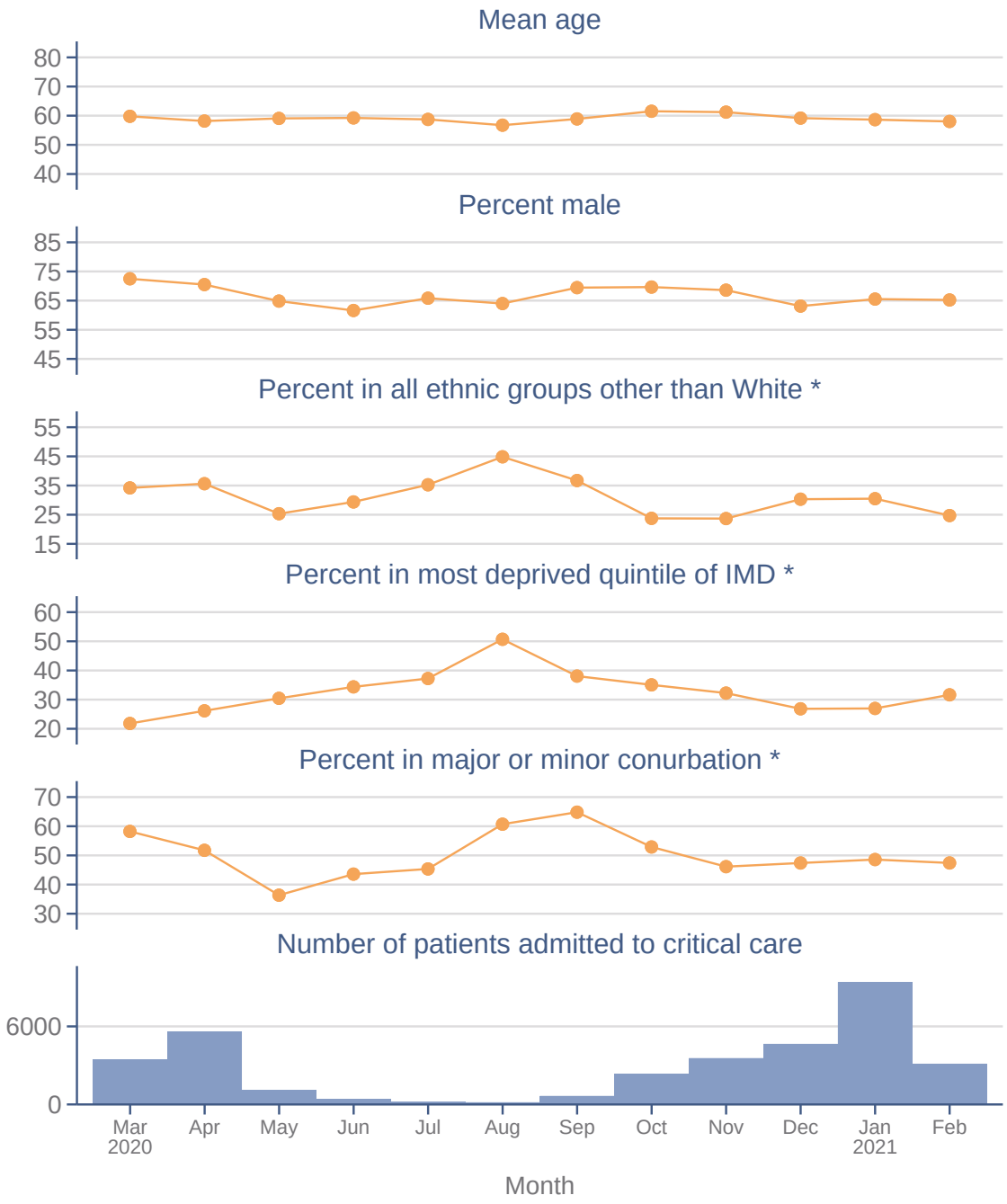


Figure 49. Monthly trend in patient characteristics (demographics)

Monthly trend in patient characteristics (demographics) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Dashed line and shading indicates incomplete month.

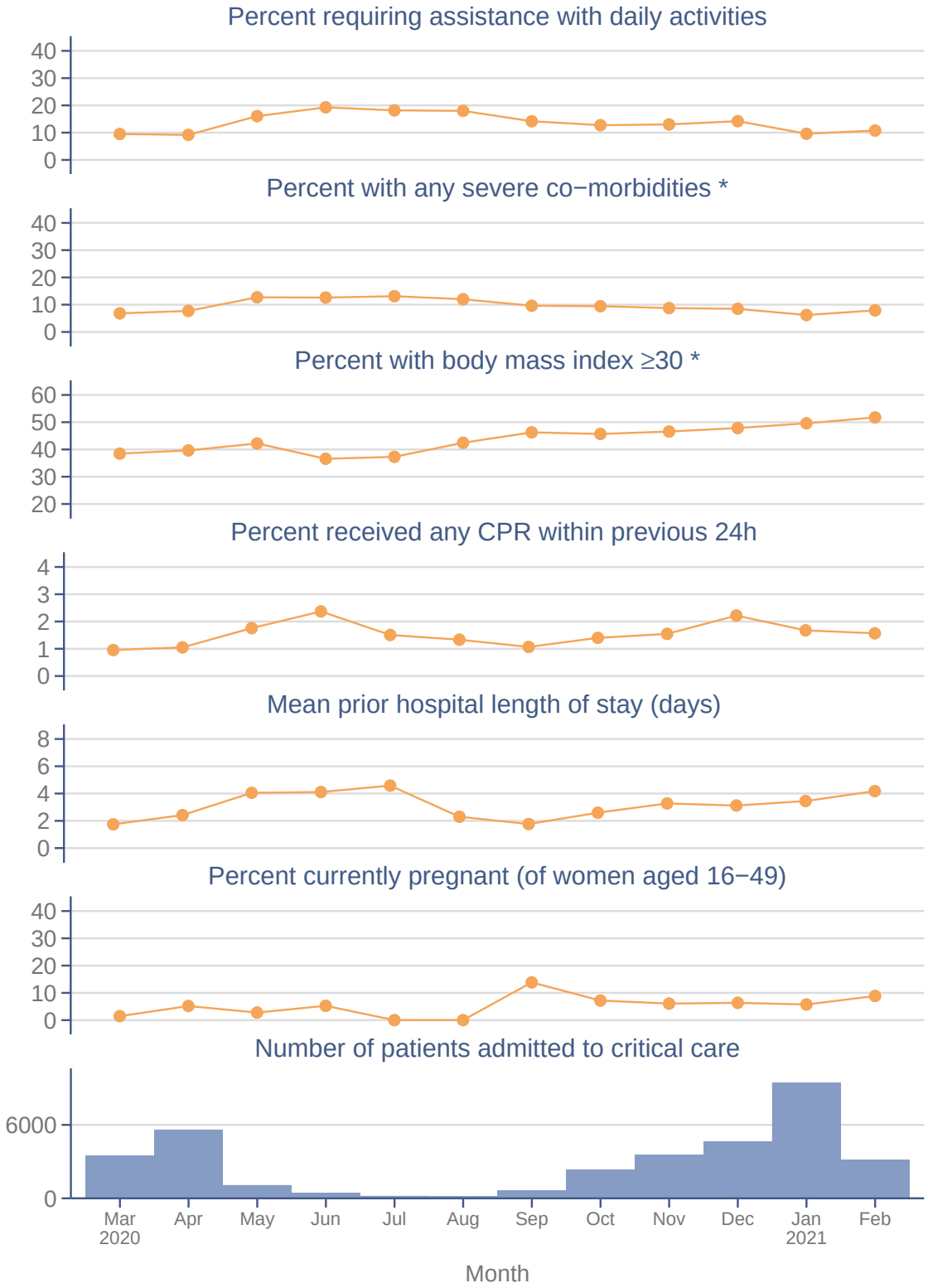


Figure 50. Monthly trend in patient characteristics (medical history)

Monthly trend in patient characteristics (medical history) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Dashed line and shading indicates incomplete month.

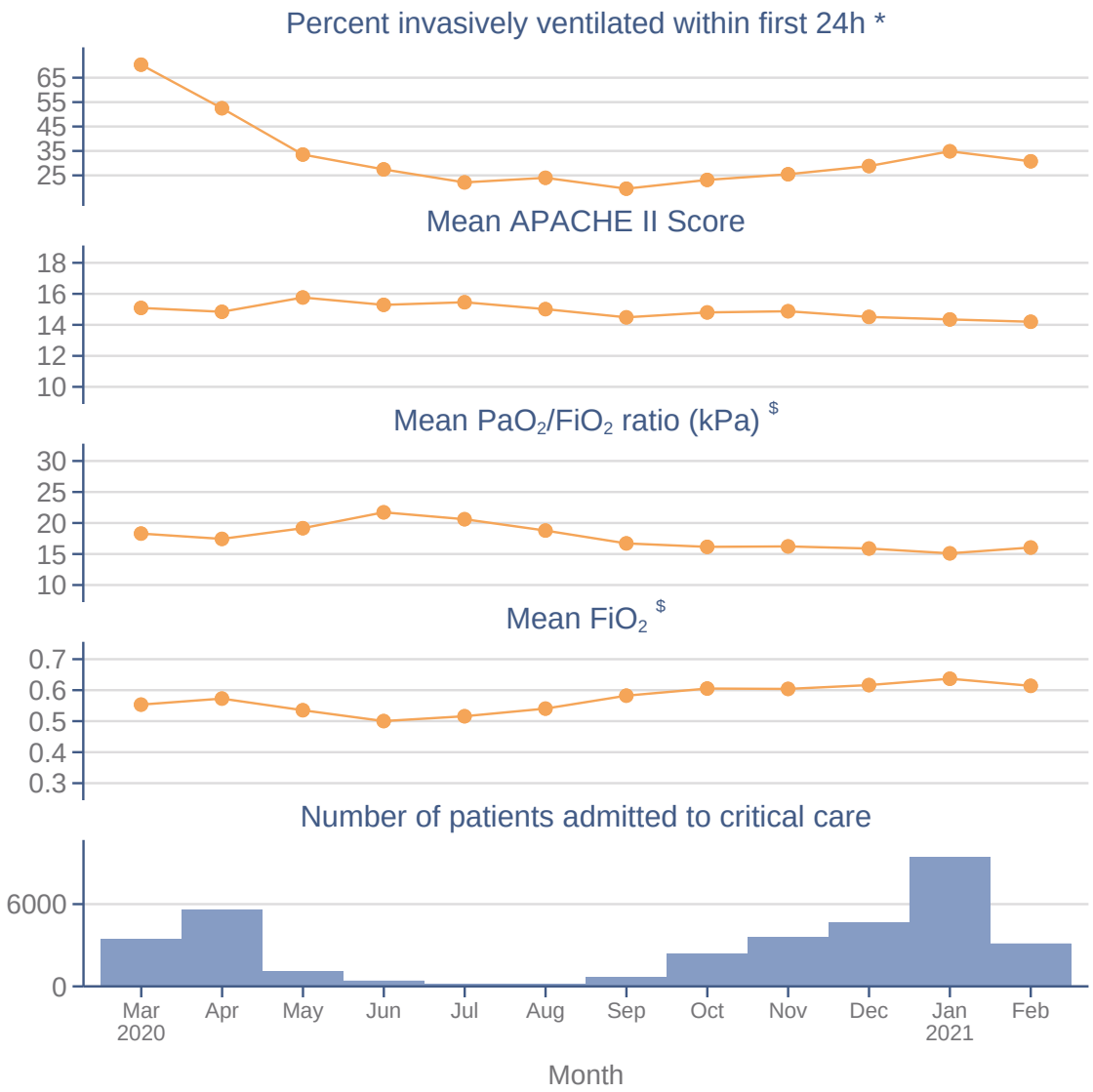


Figure 51. Monthly trend in patient characteristics (indicators of acute severity)

Monthly trend in patient characteristics (indicators of acute severity) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Dashed line and shading indicates incomplete month.

$ Derived from the arterial blood gas with the lowest PaO_2 during the first 24 hours of critical care.

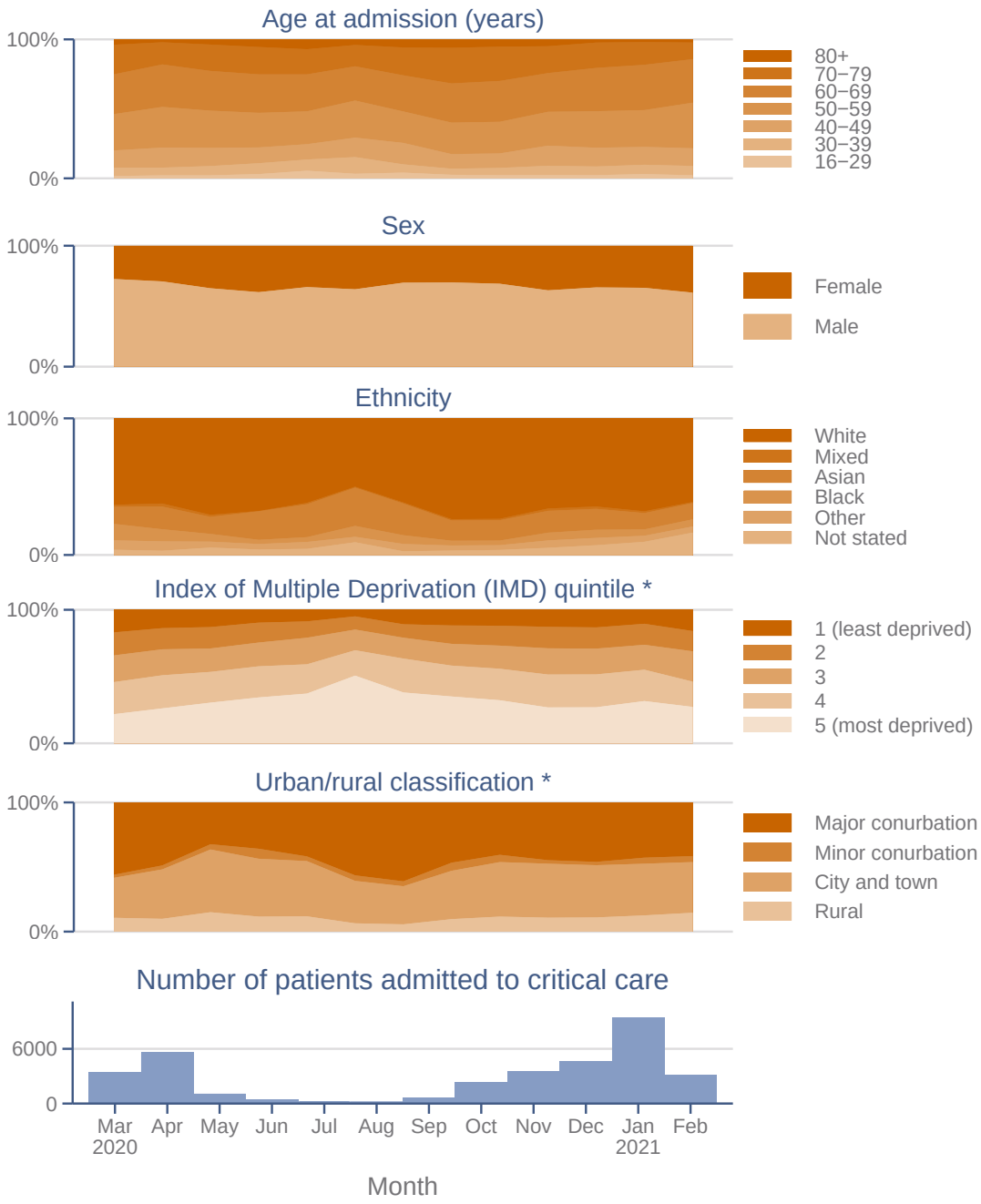


Figure 52. Monthly trend in patient characteristics (demographics) – distributions

Monthly trend in the distribution of patient characteristics (demographics) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Shading indicates incomplete month.

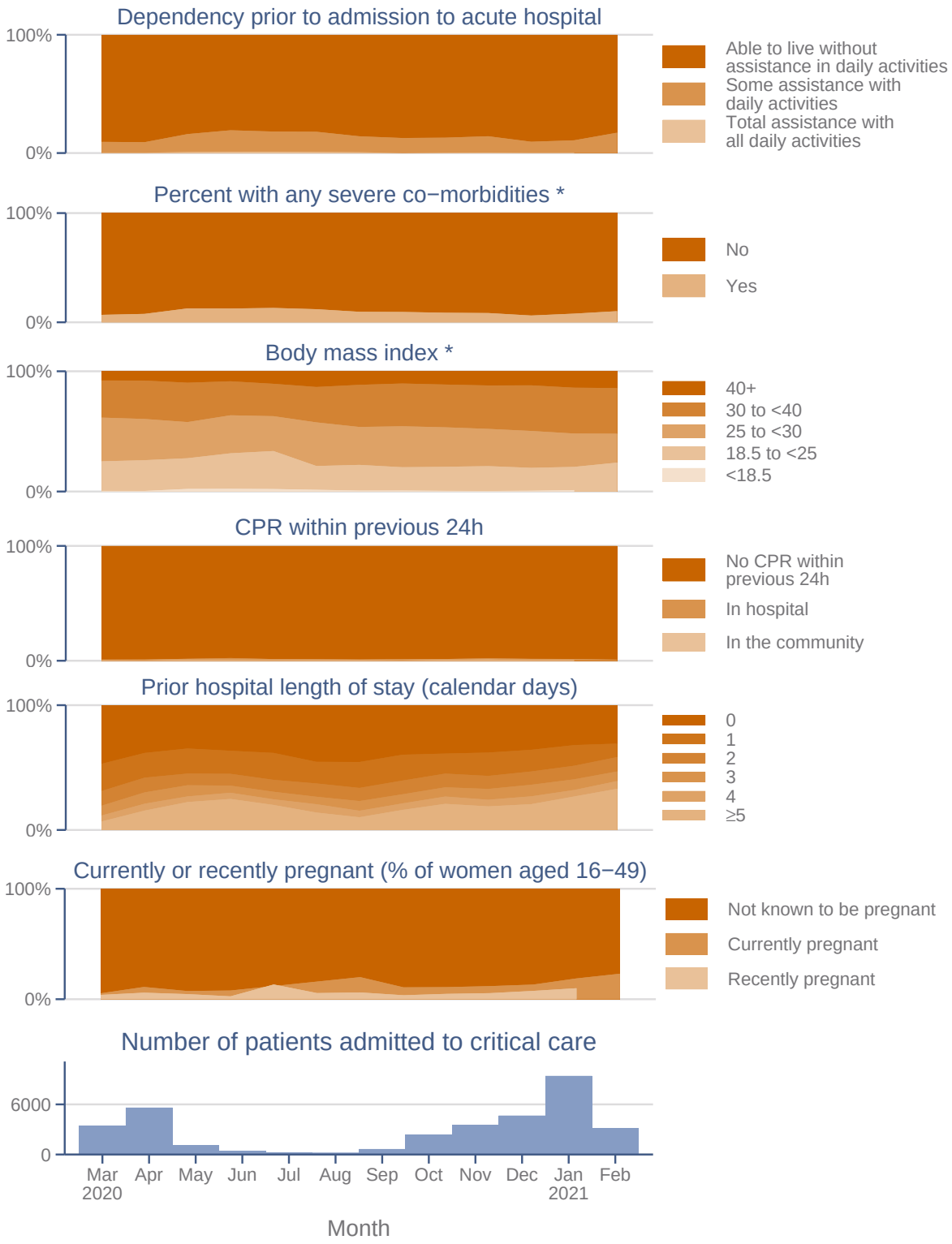


Figure 53. Monthly trend in patient characteristics (medical history) – distributions

Monthly trend in the distribution of patient characteristics (medical history) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Shading indicates incomplete month.

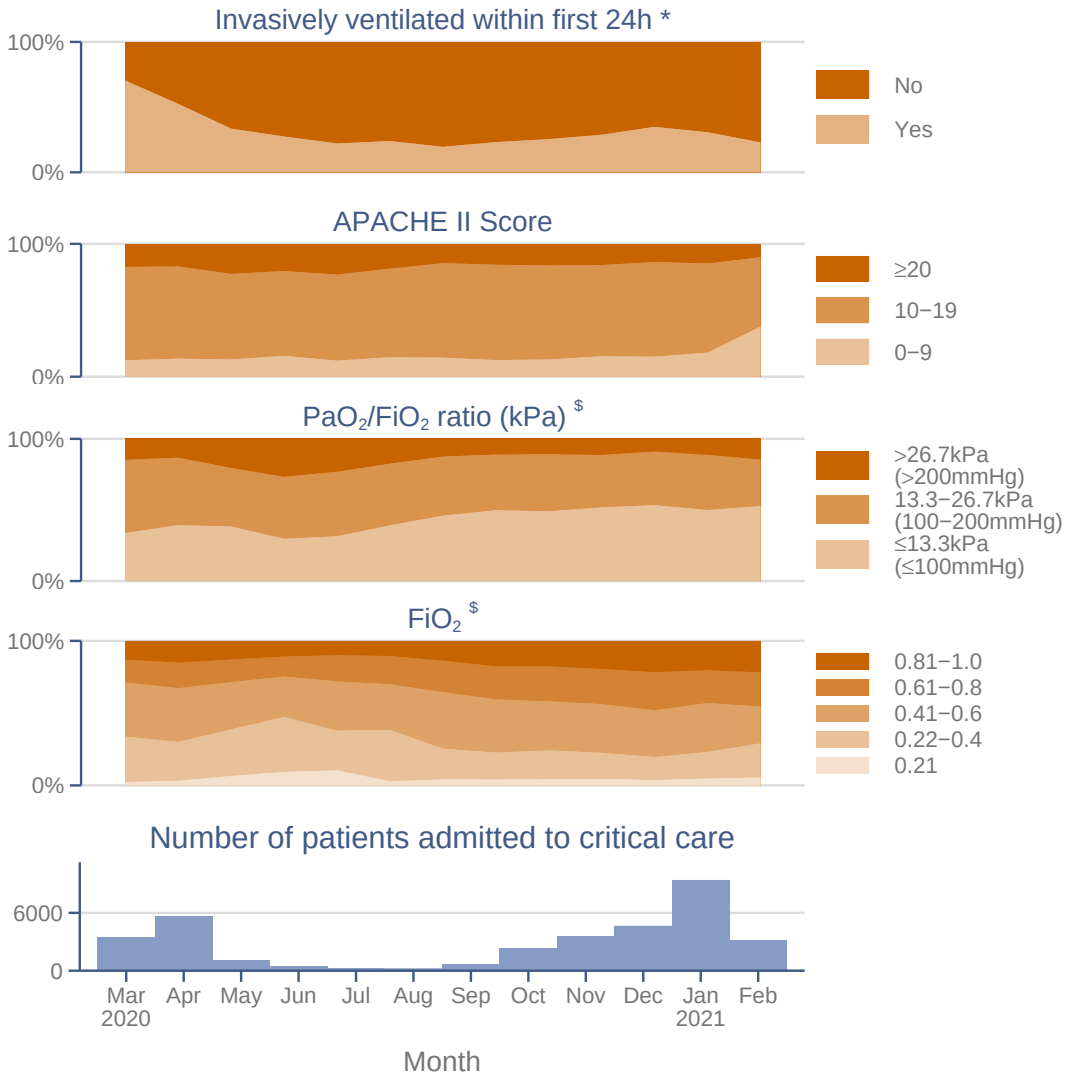


Figure 54. Monthly trend in patient characteristics (indicators of acute severity) – distributions

Monthly trend in the distribution of patient characteristics (indicators of acute severity) for patients critically ill with confirmed COVID-19.

* Please see Definitions on page 98. Shading indicates incomplete month.

$ Derived from the arterial blood gas with the lowest PaO_2 during the first 24 hours of critical care.

Figure 55 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 56-58 show monthly variation in patient characteristics relating to ventilation and timing of critical care compared with the change in mortality.

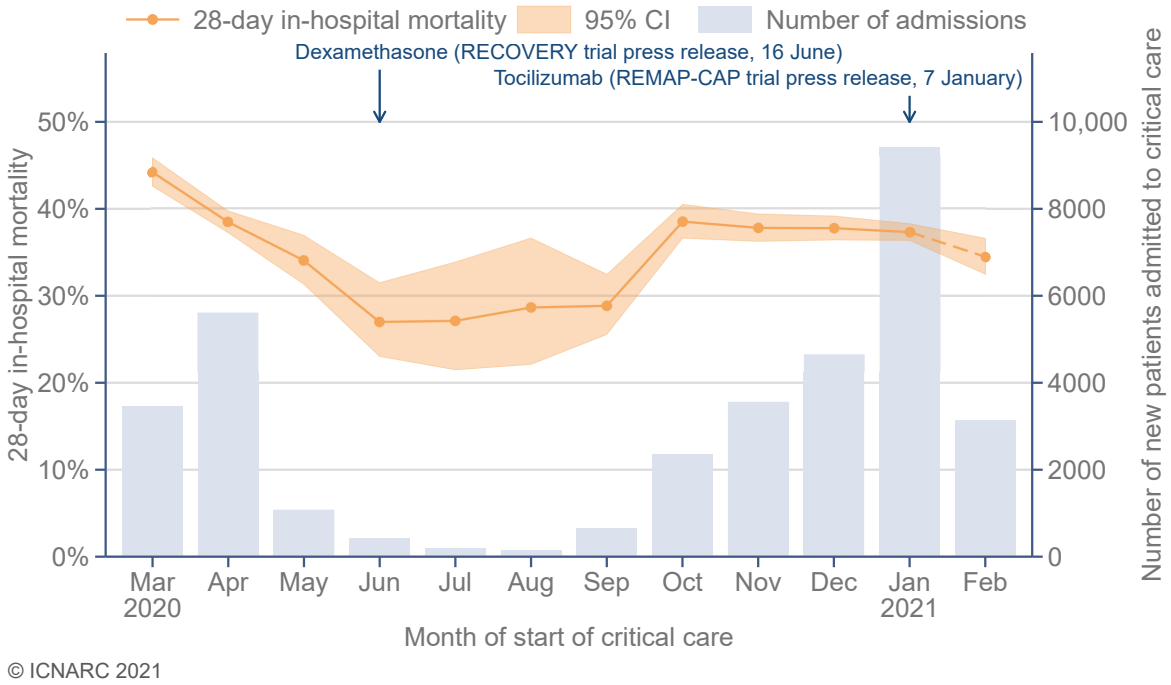


Figure 55. Number of admissions and 28-day in-hospital mortality by month

Number of new admissions and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of admission to 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).

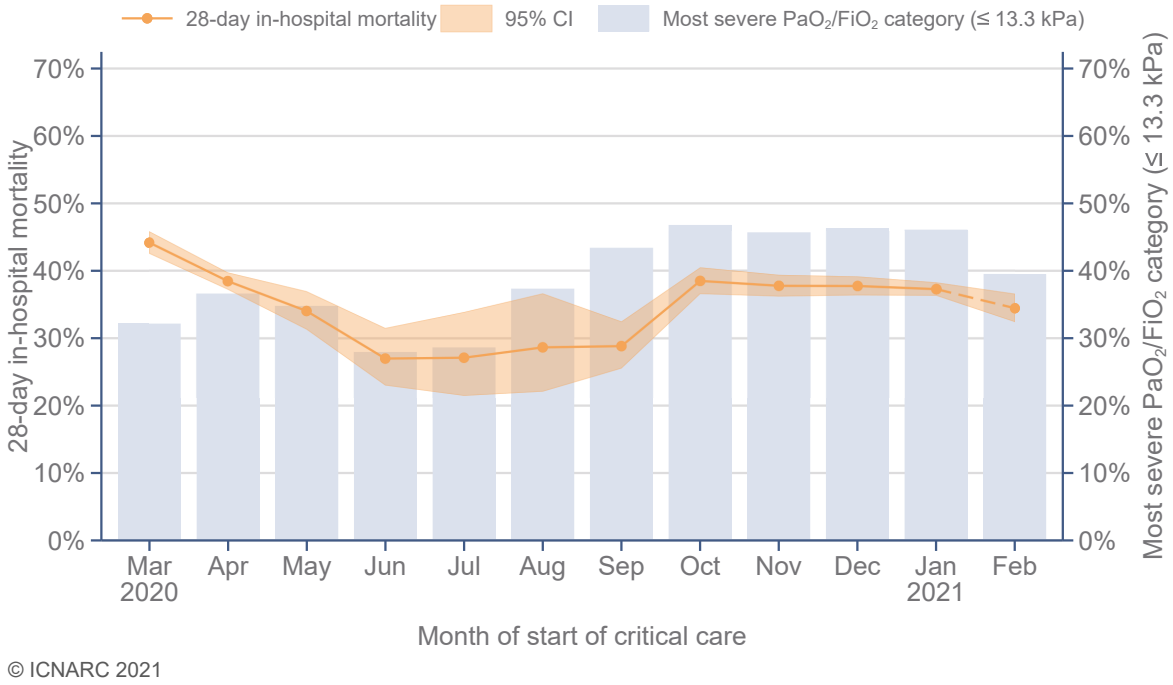


Figure 56. PaO_2/FiO_2 and 28-day in-hospital mortality by month

Percentage of patients in most severe PaO_2/FiO_2 category ($\leq$ 13.3 kPa) and 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 by month of admission to 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).

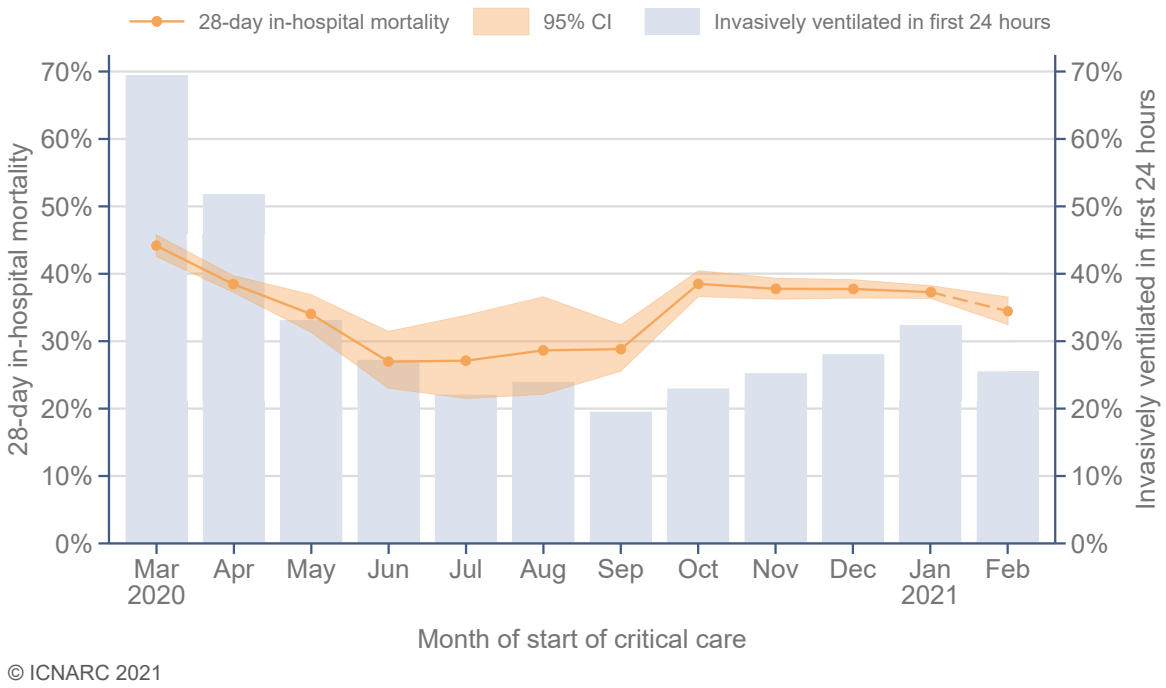


Figure 57. Invasive ventilation first 24 hours and 28-day in-hospital mortality by month

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 admission to 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).

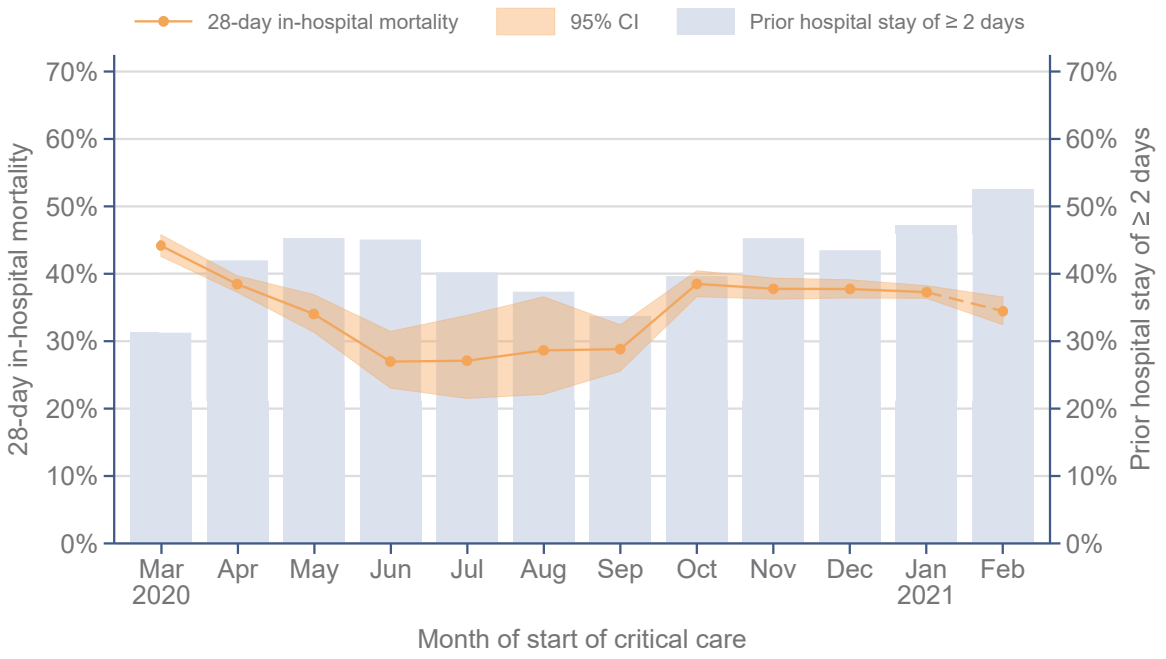


Figure 58. Prior hospital length of stay and 28-day in-hospital mortality by month

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 admission to 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).

Changes in mortality over time may be driven in part by changes in the characteristics of patients admitted to critical care, i.e. their average predicted risk of death at the time of admission (due to illness severity, comorbidities or demographic risk factors). To adjust for changes in the predicted risk of death over time, we developed a risk prediction model using all patients critically ill with COVID-19 first admitted from 1 March to 30 April 2020 (Ferrando-Vivas et al, 2021). We validated the model using both the same patients and patients admitted from 1 May to 31 August 2020.

Figure 59 shows observed vs predicted 28-day mortality by month. Based on the characteristics and outcomes of patients admitted during March and April, the predicted risk of death has increased over time, indicating that patients either: (a) are more acutely unwell at the point of admission to critical care; and/or (b) have greater levels of underlying comorbidity; and/or (c) have greater levels of demographic risk factors. The trend in observed 28-day mortality indicates that patient outcomes have improved over time; and that while observed 28-day mortality has returned to levels comparable with the first wave, this remains lower than the predicted 28-day mortality, which has increased.

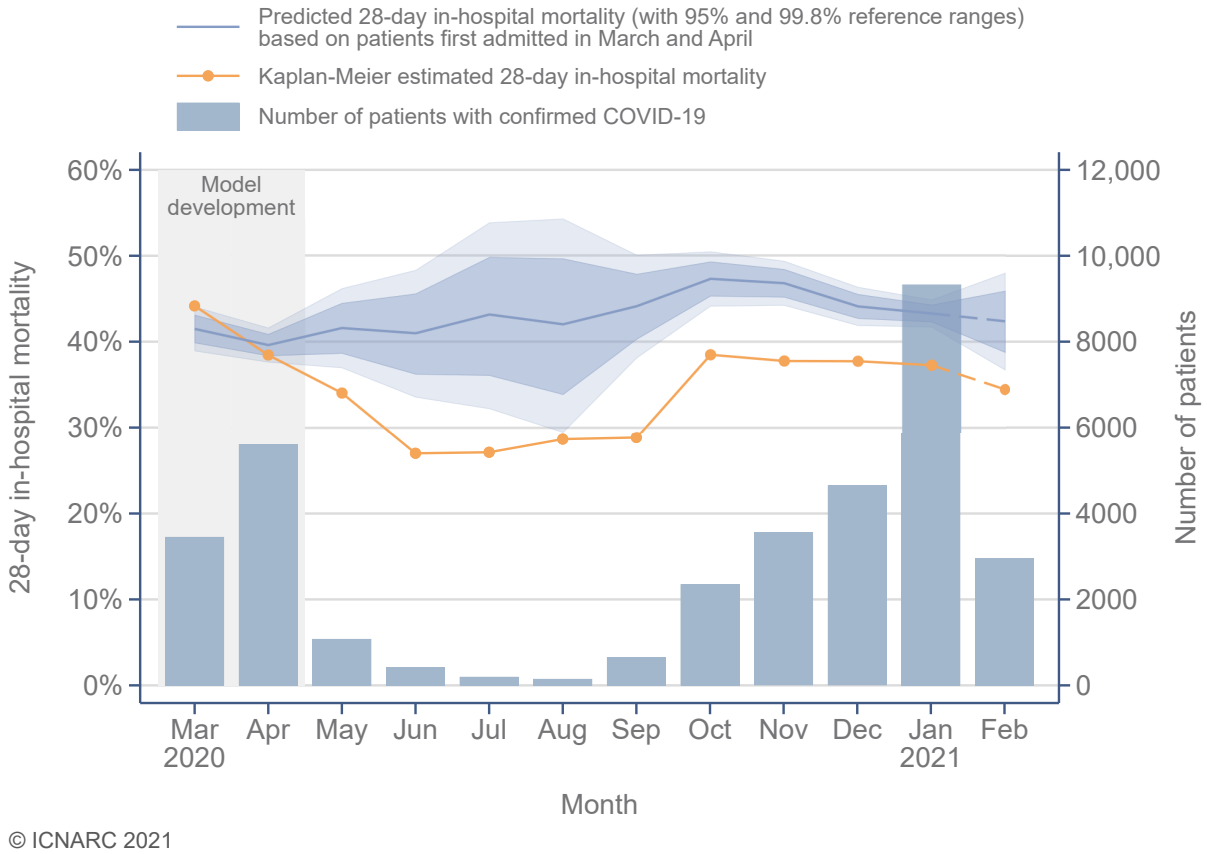


Figure 59. Risk-adjusted 28-day in-hospital mortality

Kaplan-Meier based estimates of observed 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 compared with predicted mortality from a prediction model developed using data for patients admitted during March and April 2020. If the observed outcomes are as predicted by the model, then we would expect the observed mortality to lie within the 95% reference range 19 times out of 20 and within the 99.8% reference range 998 times out of 1000.

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 60.

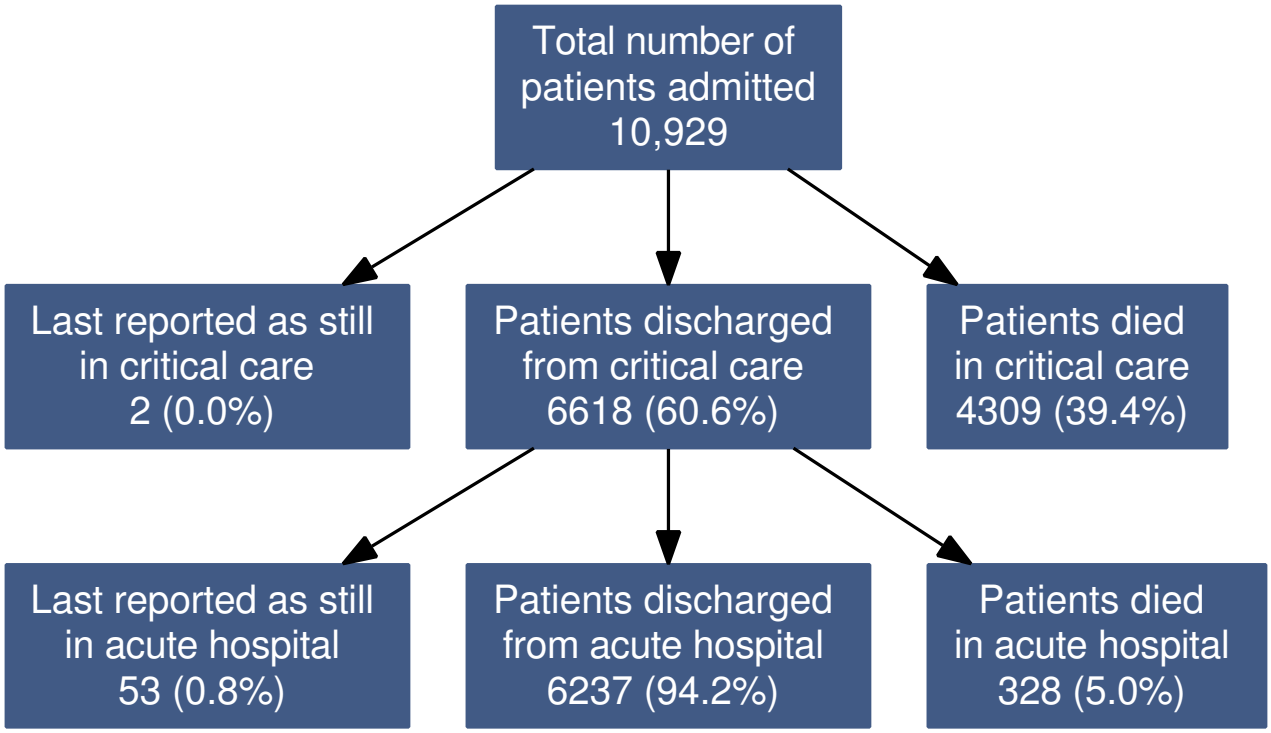


Figure 60. Critical care and acute hospital outcomes for patients admitted up to 31 August 2020

Of 10,158 patients critically ill with confirmed COVID-19 admitted up to 31 May 2020, 5724 have been discharged alive from acute hospital and, of these, 128 have subsequently been readmitted to critical care.

Definitions

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

Critical care transfer groups are groups of local critical care units developed to reduce the number of long distance transfers that take place and to ensure that transfers are contained within the critical care network or, by special agreement, between hospitals at the borders of adjacent networks.

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

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
- 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
- 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
- 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* 2020; doi:10.1164/rccm.202008-321OC
- 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
- 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

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; doi:10.1136/heartjnl-2020-317393
- Pairo-Castineira E, Clohisey S, Klaric L, et al. Genetic mechanisms of critical illness in Covid-19. *Nature* 2020; doi:10.1038/s41586-020-03065-y
- Mathur R, Rentsch CT, Morton C, et al. 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
- Aveyard P, Gao M, Lindson N, et al. Association between pre-existing respiratory disease and its treatments and severe COVID-19: population cohort study. *Lancet Respir Med*, in press.

Acknowledgement

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

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

