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25 years and counting...
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ICNARC report on COVID-19 in critical care:

England, Wales and Northern Ireland

3 June 2021

This report presents analyses of data on patients critically ill with confirmed COVID-19, admitted up to 23:59 on 31 May 2021 (reported to ICNARC by 23:59 on 2 June 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 31,703 admissions of 25,879 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 25,844 patients (Figure 1). Of the 25,879 total patients, 25,623 have outcomes reported and 256 patients were last reported as still receiving critical care. These patients are compared with a cohort of 10,954 patients with confirmed COVID-19 admitted up to 31 August 2020.

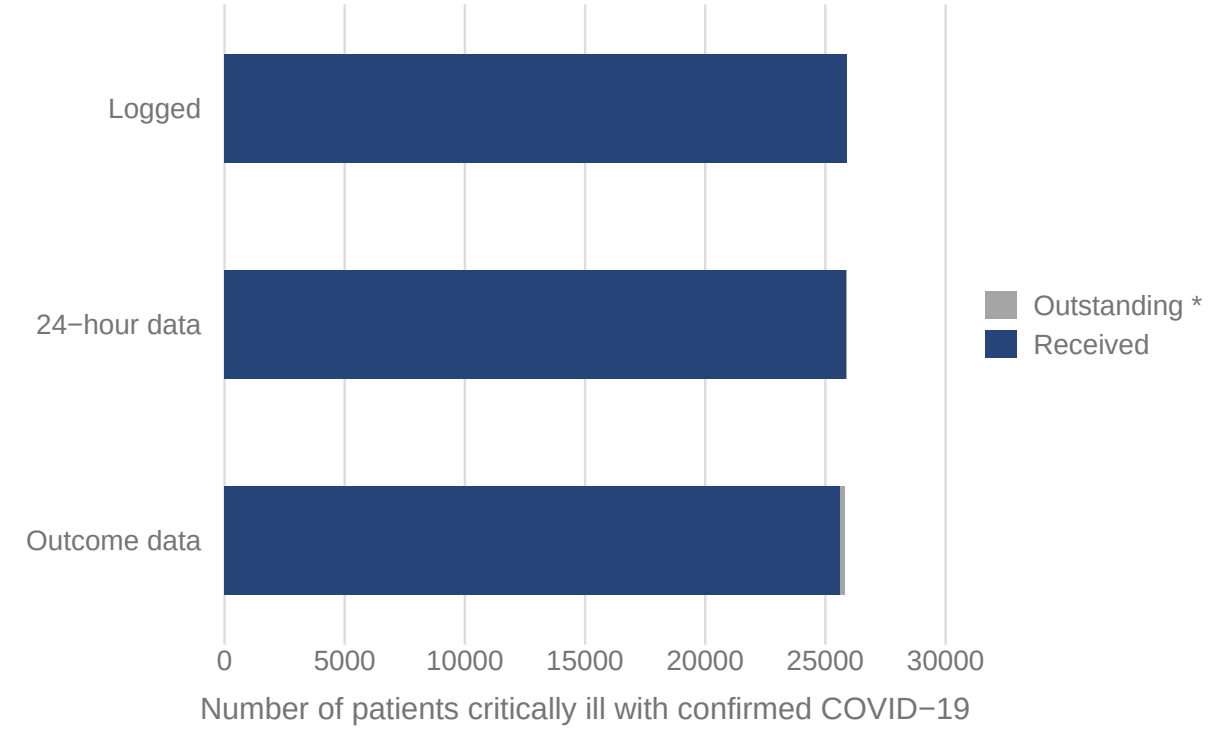


Figure 1. Numbers of patients with data included in this report and outstanding *

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 month's report, 169 patients were admitted to critical care within the last month (1 May 2021 to 31 May 2021). The geographical spread of these patients is shown in Figure 3.

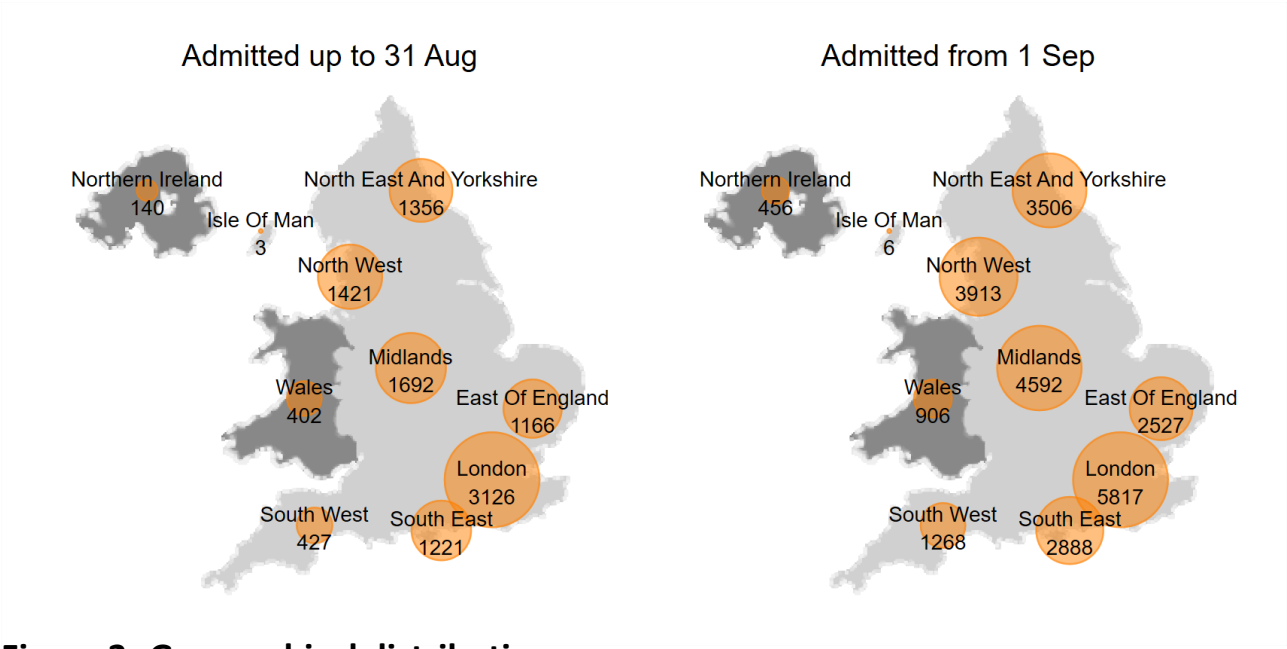


Figure 2. Geographical distribution

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.

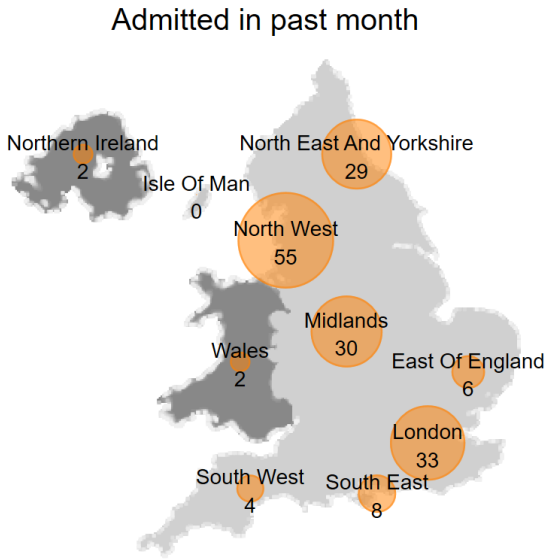


Figure 3. Geographical distribution – last month

Geographical distribution of patients critically ill with confirmed COVID-19 admitted during the last month 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.

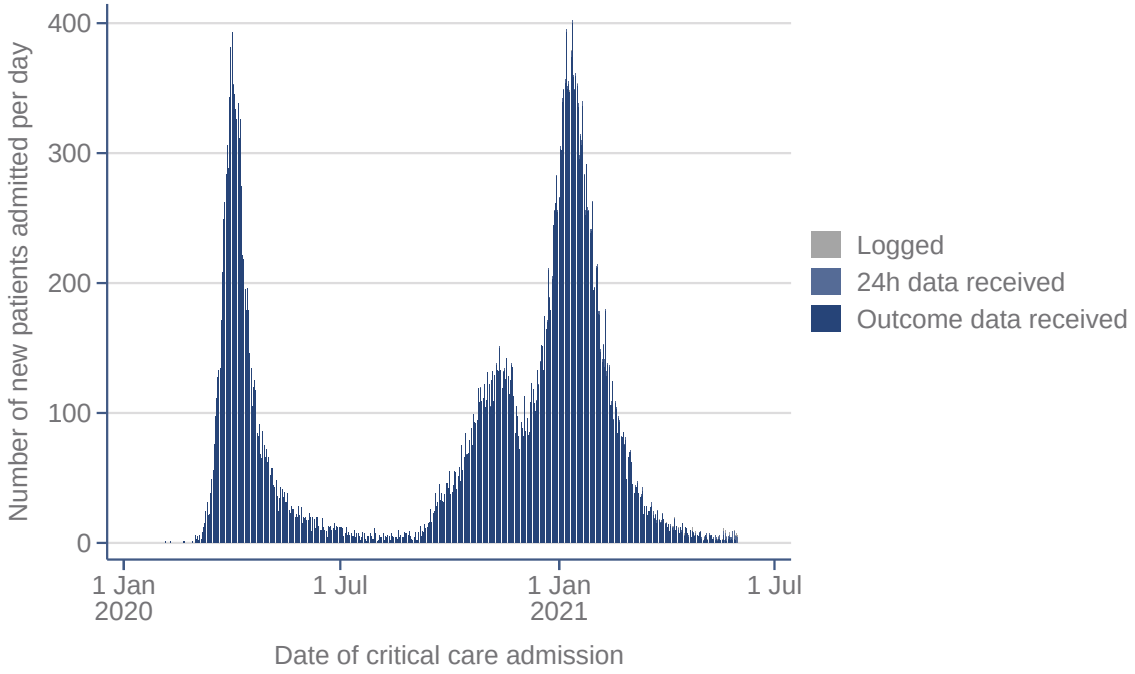


Figure 4. Number of new patients by date of admission to critical care

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

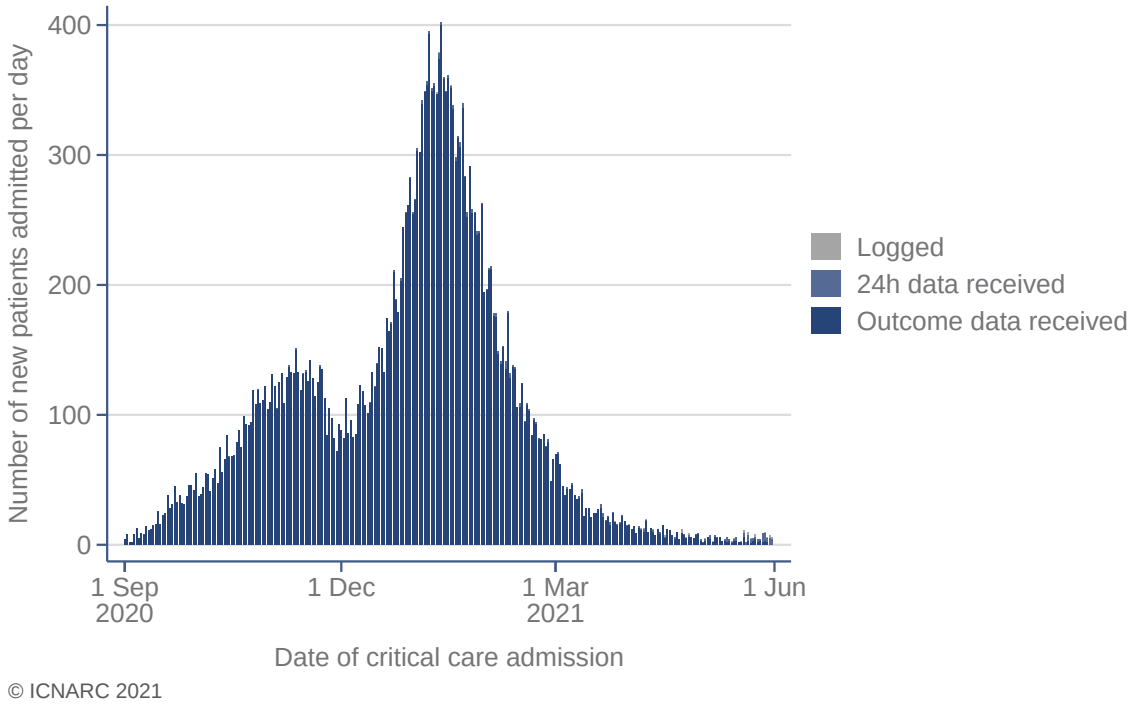


Figure 5. Number of new patients admitted from 1 September 2020 by date of admission to critical care

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

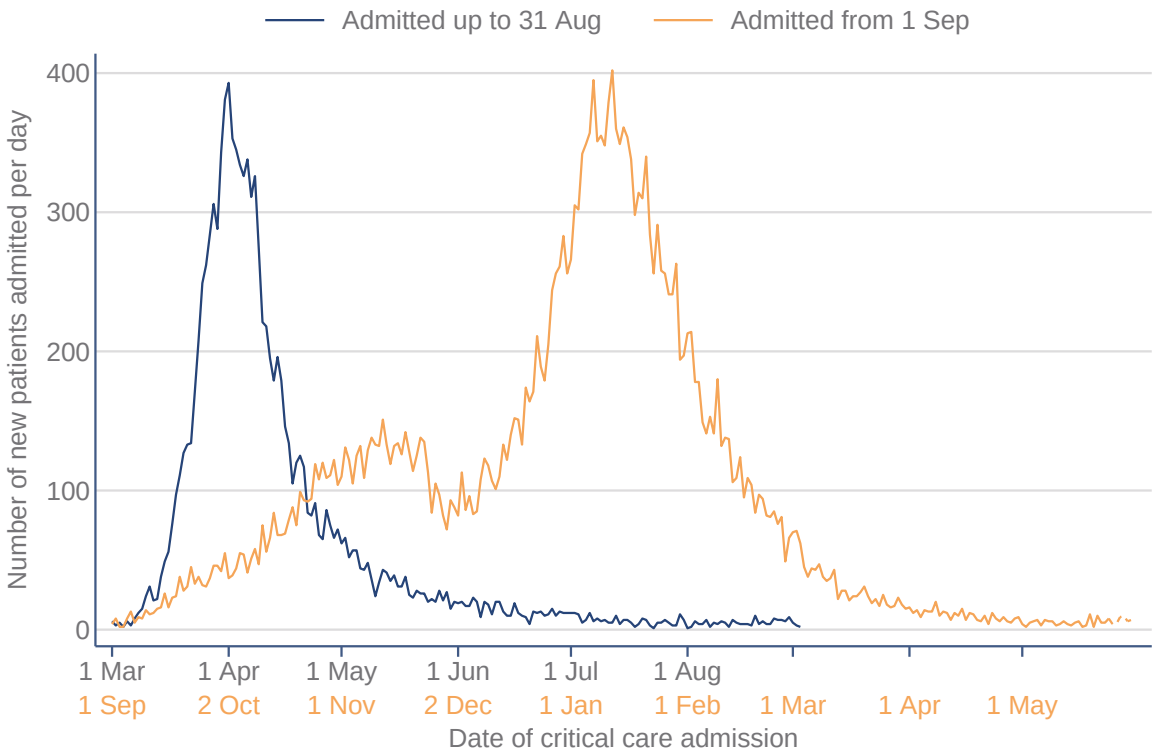


Figure 6. Number of new patients admitted from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date *

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.

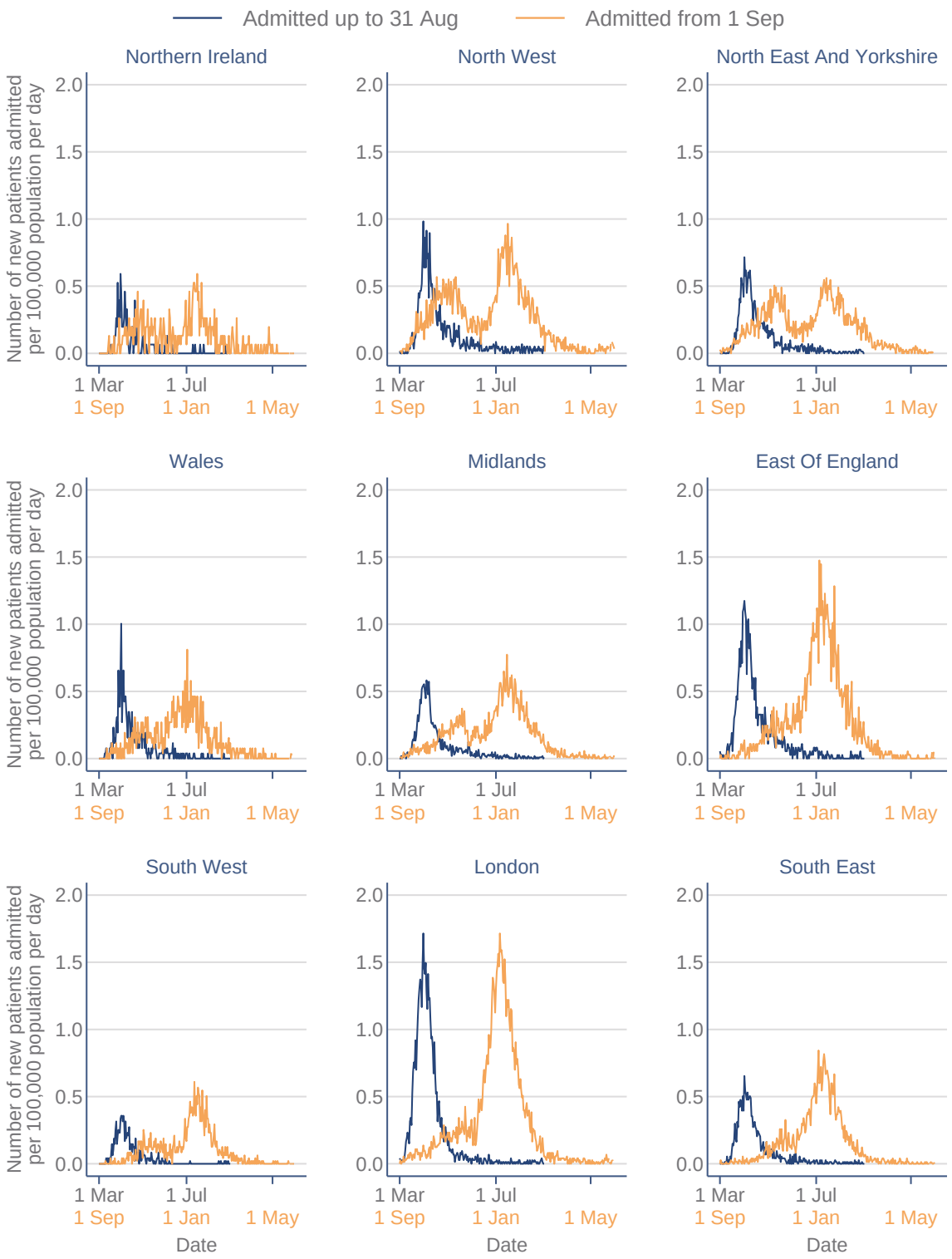


Figure 7. Number of new patients admitted from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region *

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.

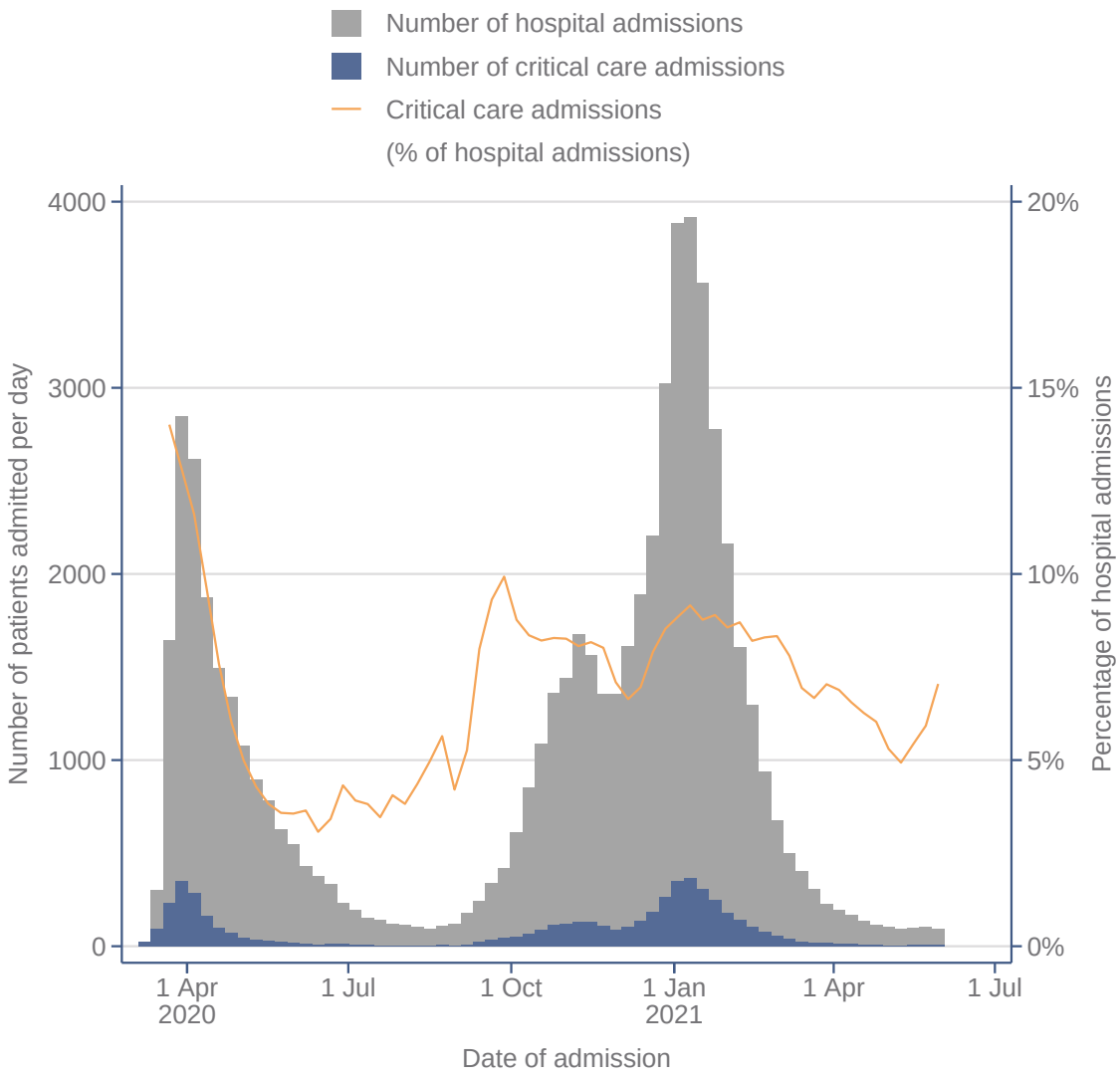


Figure 8. Number of new patients admitted to critical care compared with hospital admissions

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).

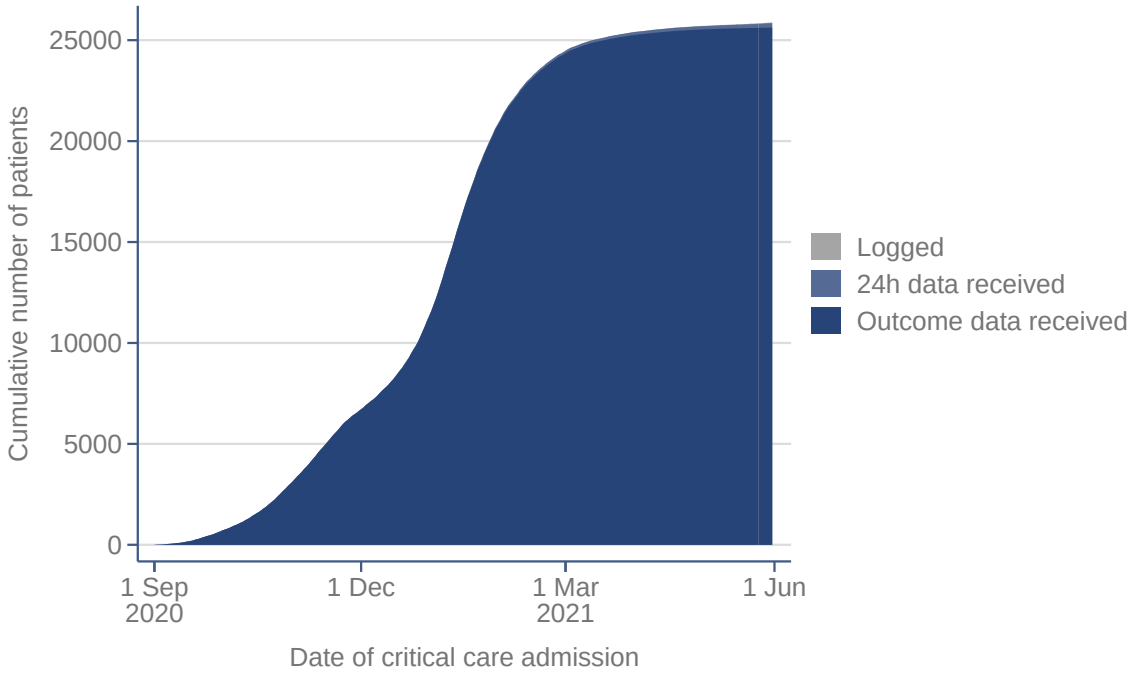


Figure 9. Cumulative number of patients

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

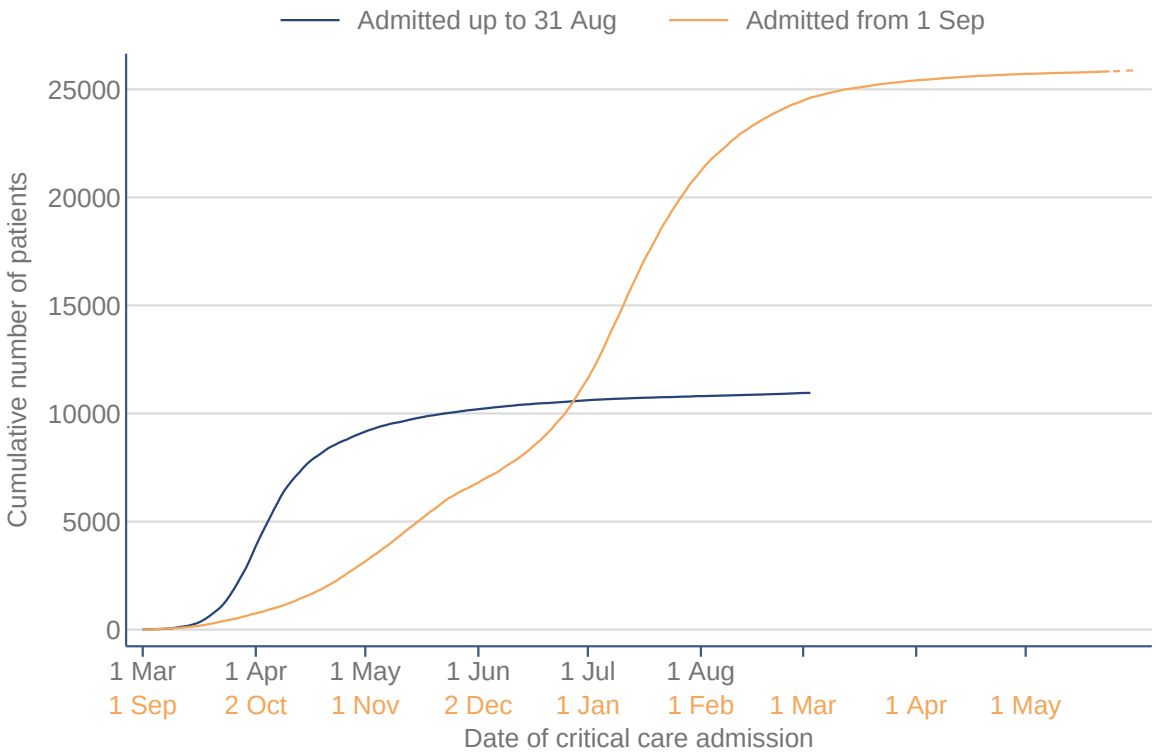


Figure 10. Cumulative number of patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date *

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.

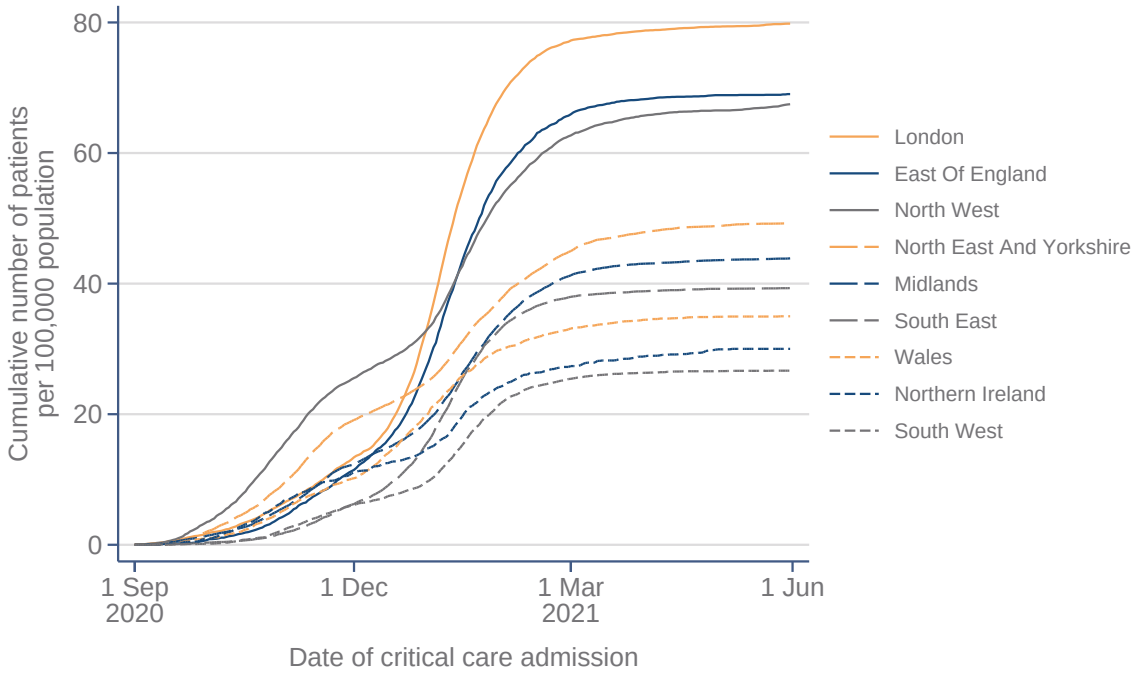


Figure 11. Cumulative number of patients per 100,000 adult population by region

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

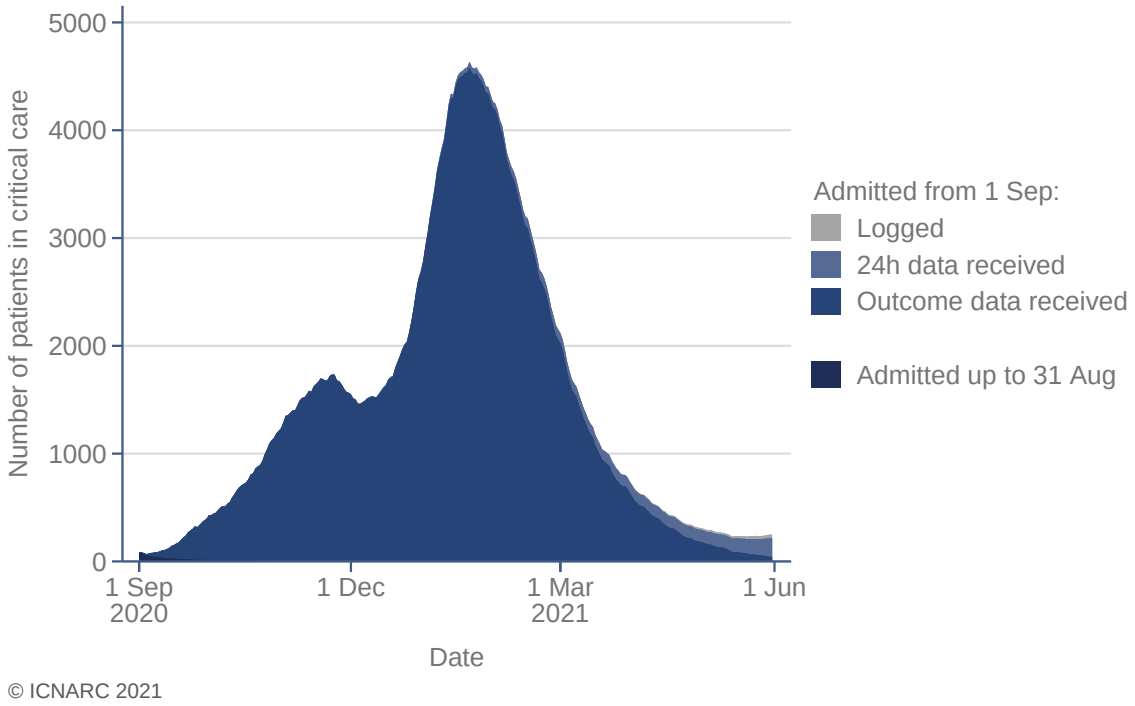


Figure 12. Number of patients in critical care *

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 31 May 2021.

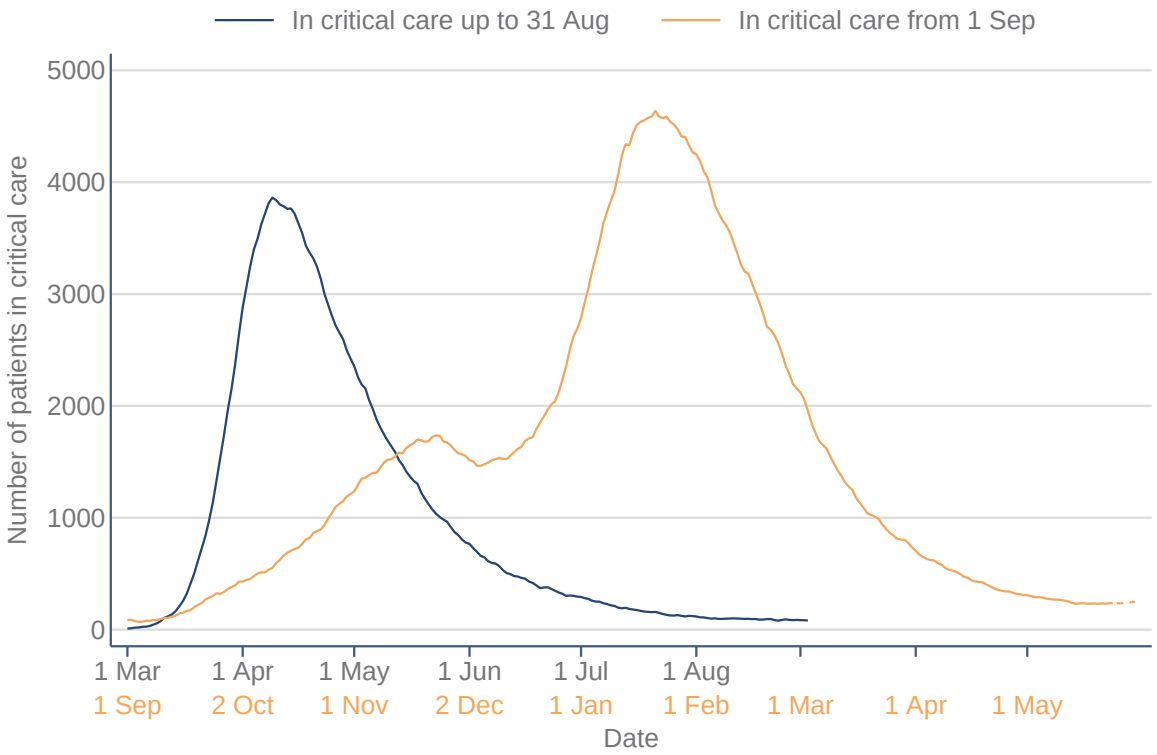


Figure 13. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date

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 31 May 2021. Dashed line indicates lag in data submission.

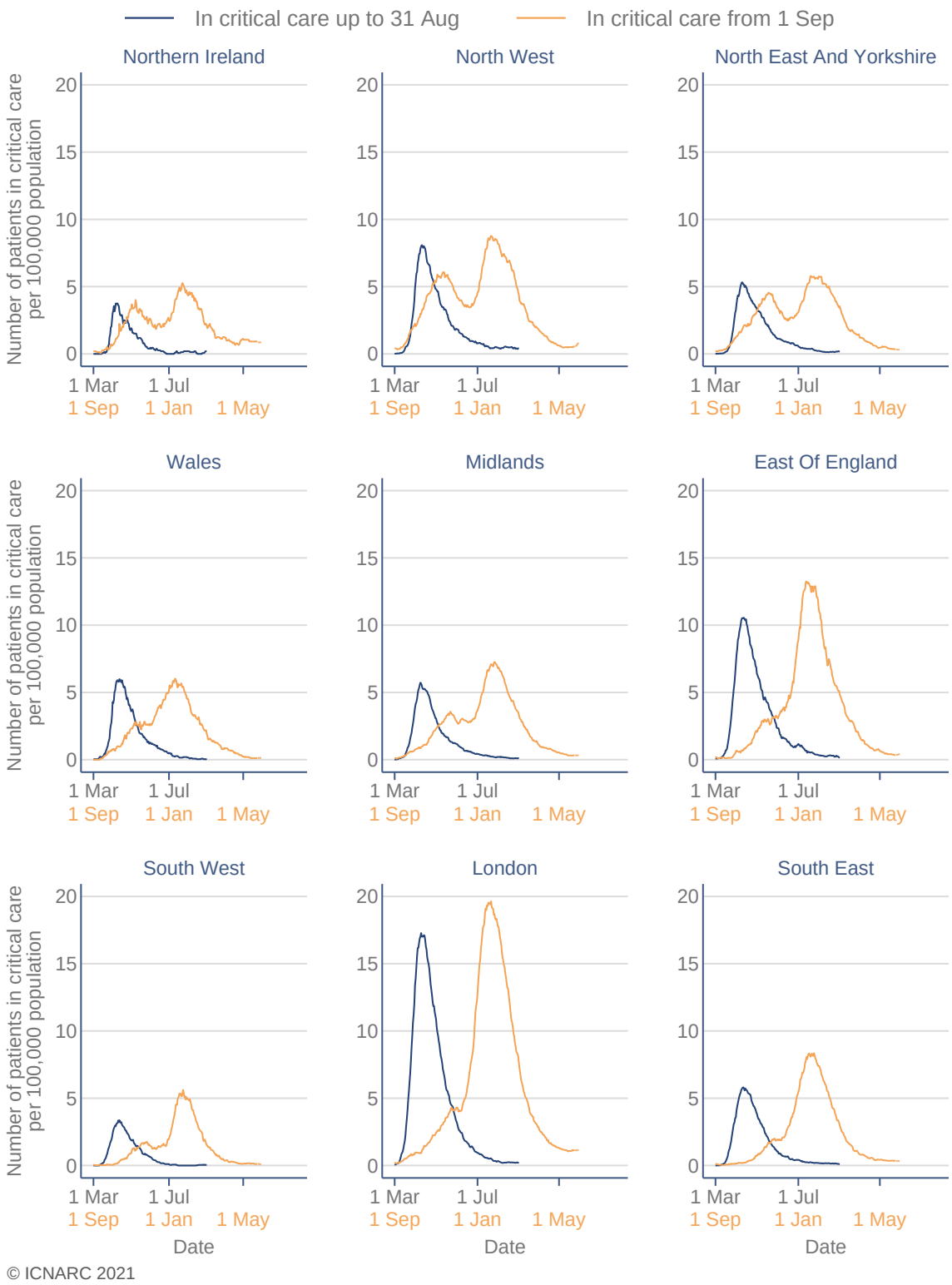


Figure 14. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region

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 31 May 2021. Dashed line indicates lag in data submission.

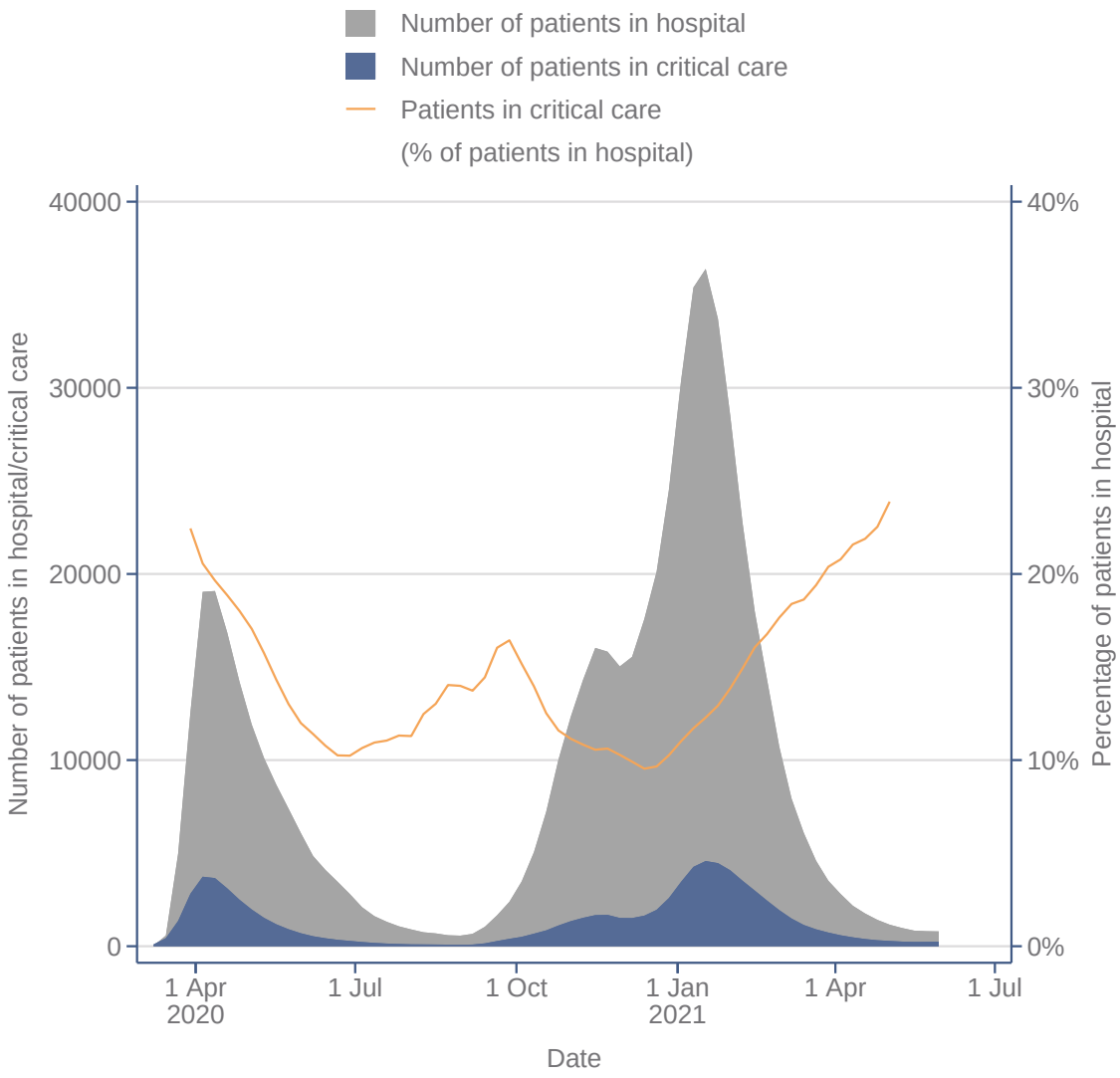


Figure 15. Number of patients in critical care compared with number in hospital

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 31 May 2021.

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

Figure 16 shows the average daily number of patients in critical care for each month over the past five years. For 2020-21, 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.

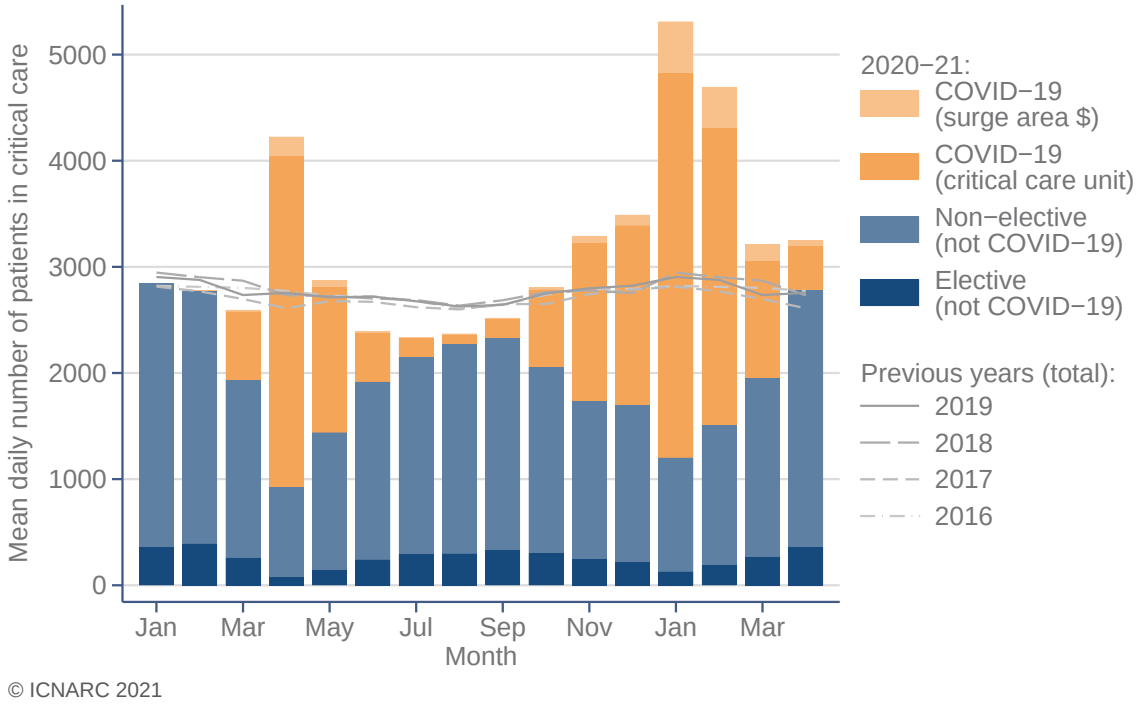


Figure 16. Average daily number of patients in critical care by month, 2016-2020 *

* 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.

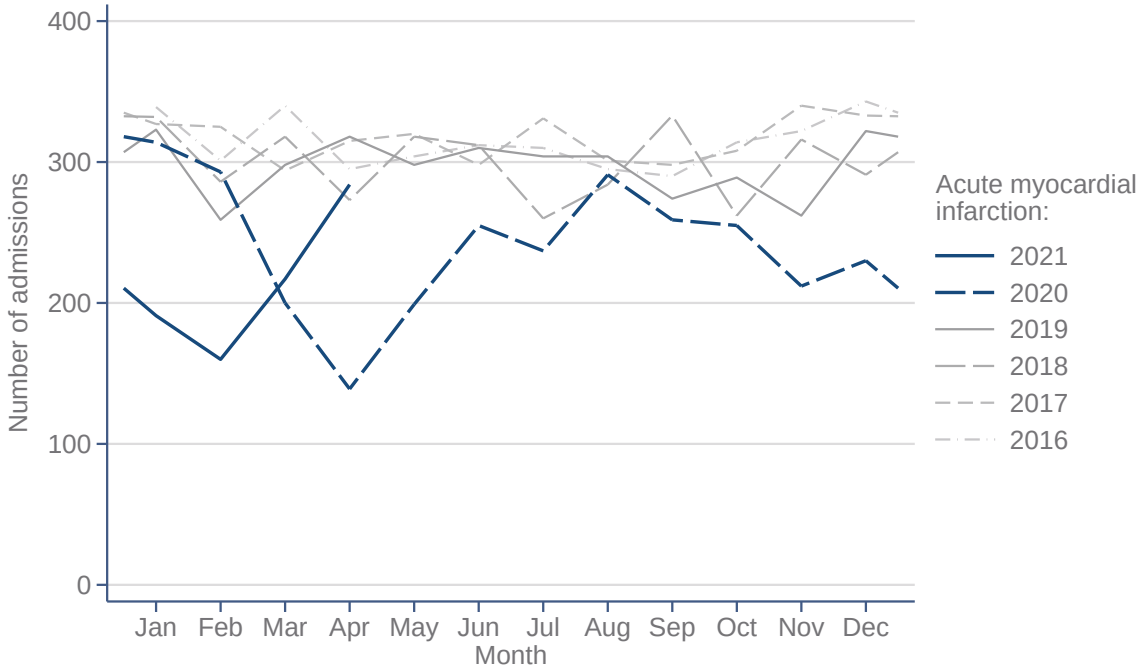


Figure 17. Number of admissions with acute myocardial infarction by month, 2016-2020 *

* 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.

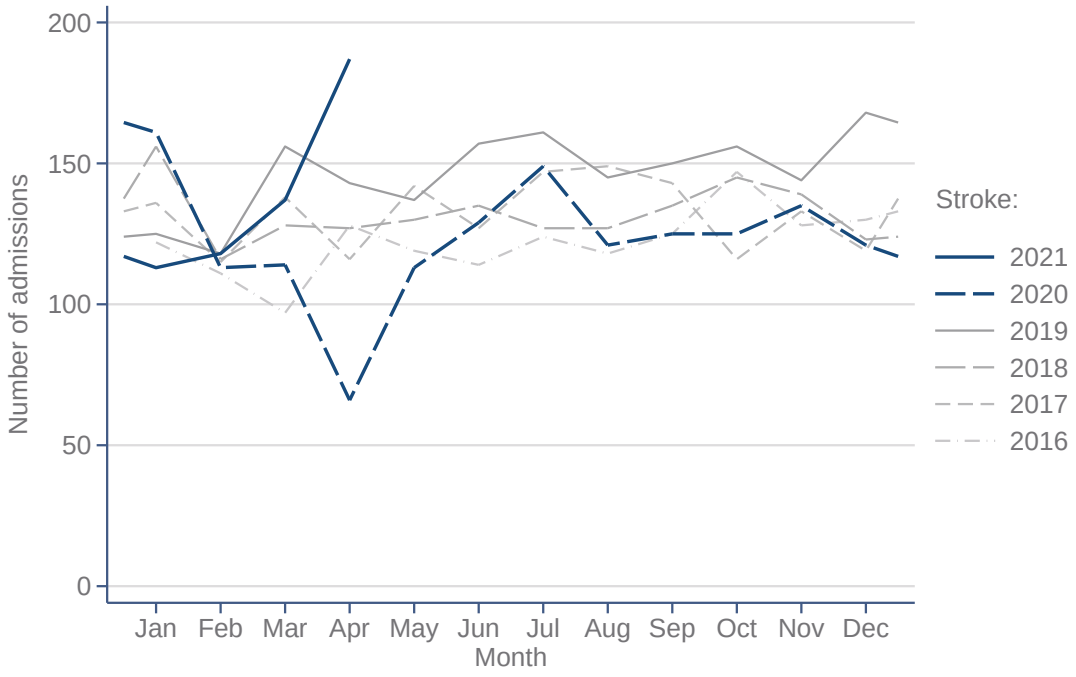


Figure 18. Number of admissions with stroke by month, 2016-2020 *

* 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.

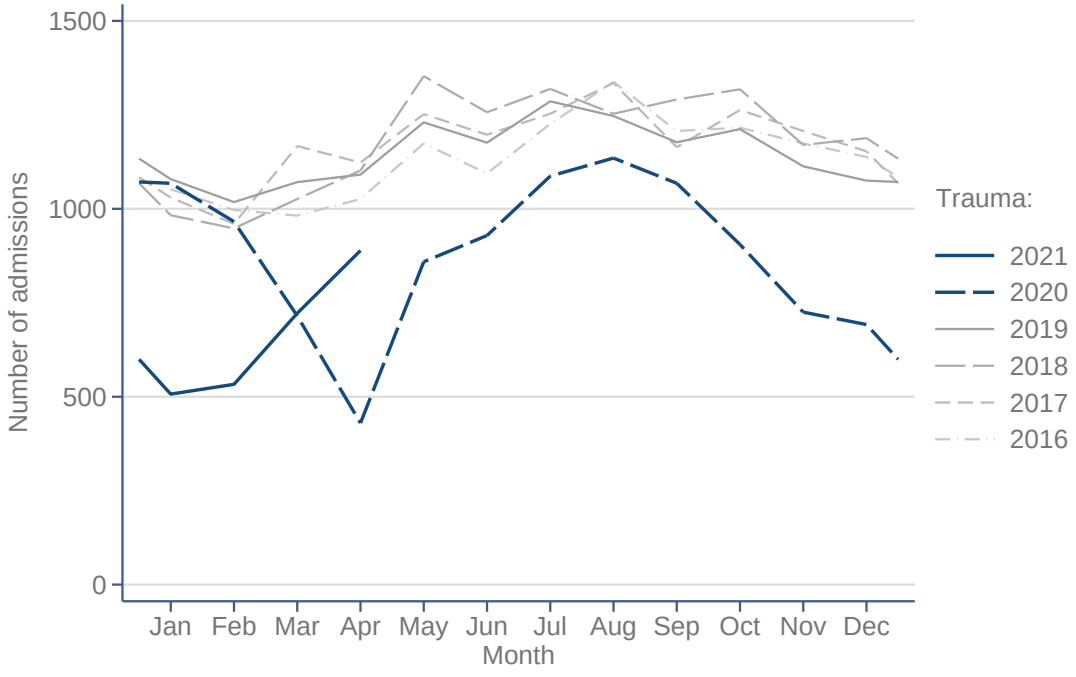


Figure 19. Number of admissions with trauma by month, 2016-2020 *

* 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.

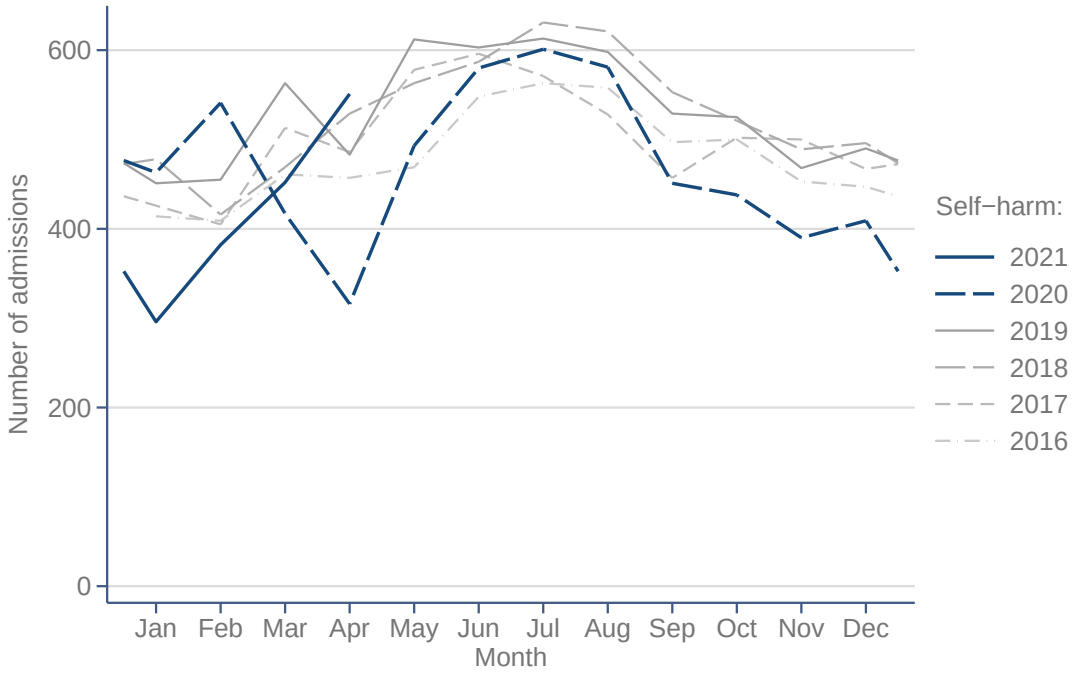


Figure 20. Number of admissions with self-harm (drugs or other substances) by month, 2016-2020 *

* 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).

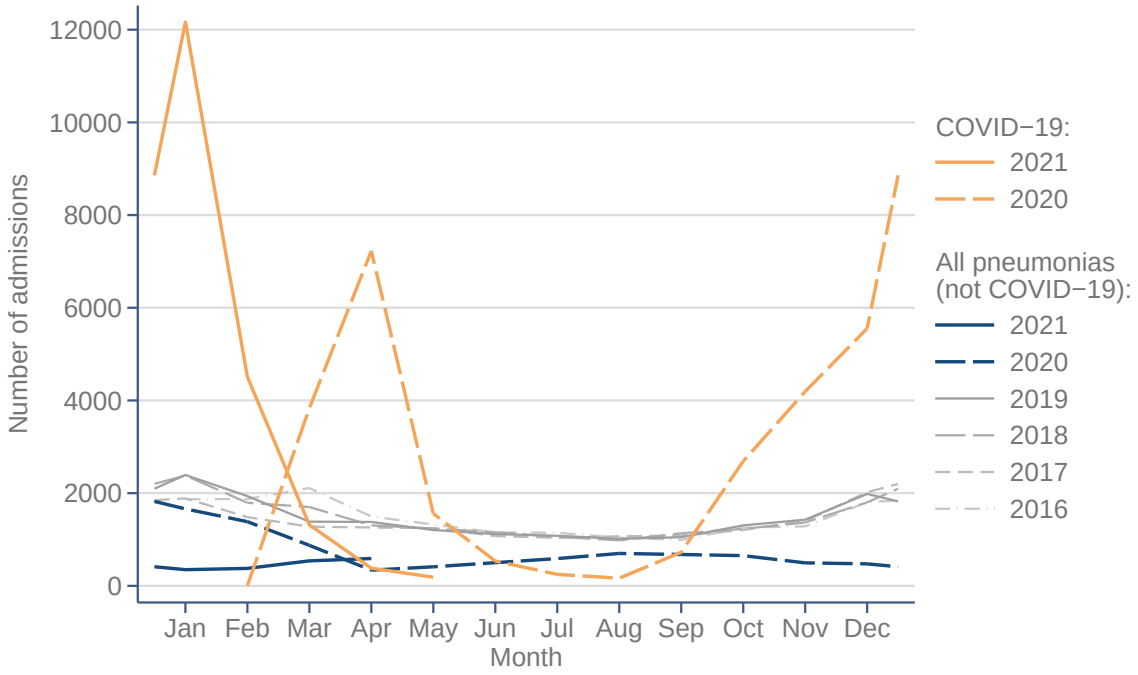


Figure 21. Number of admissions with pneumonia (not COVID-19) by month, 2016-2020 *, compared with confirmed COVID-19 during 2020

* 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.

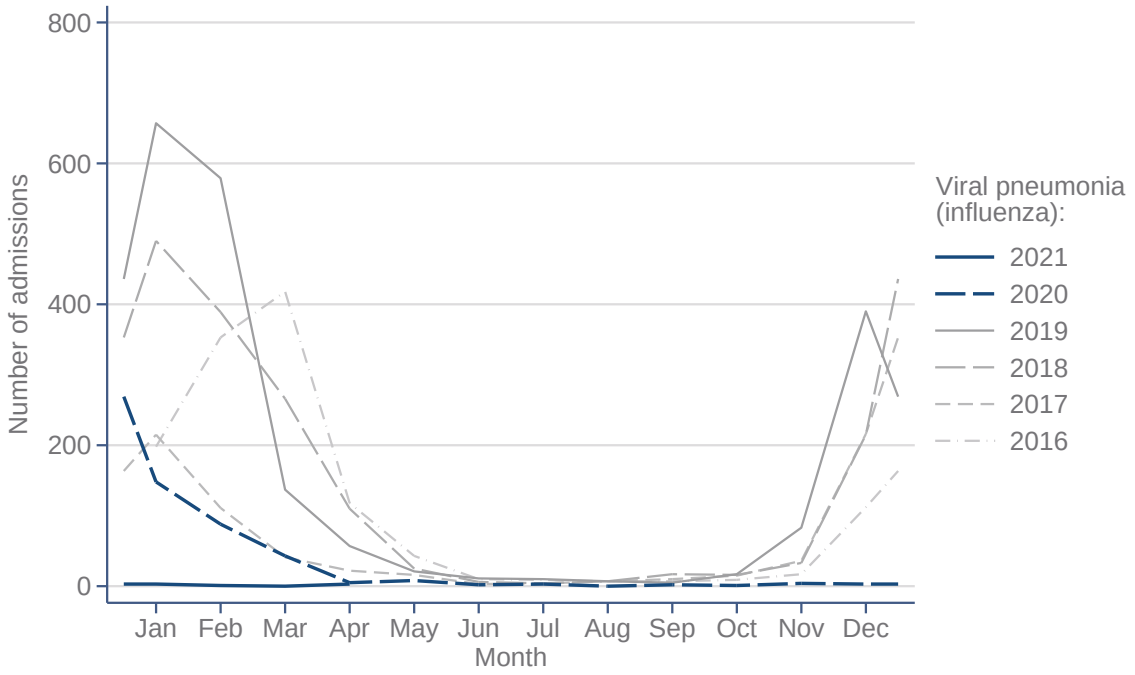


Figure 22. Number of admissions with viral pneumonia (influenza) by month, 2016-2020 *

* 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.

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=25,879)	Admitted up to 31 Aug (N=10,954)
Age at admission (years) [N=25864]		
Mean (SD)	59.1 (13.3)	58.8 (12.7)
Median (IQR)	60 (51, 69)	60 (51, 68)
Sex, n (%) [N=25863]		
Female	8865 (34.3)	3280 (30.0)
Male	16998 (65.7)	7669 (70.0)
Ethnicity, n (%) [N=24563]		
White	17638 (71.8)	6953 (66.0)
Mixed	361 (1.5)	191 (1.8)
Asian	3992 (16.3)	1682 (16.0)
Black	1290 (5.3)	1006 (9.5)
Other	1282 (5.2)	706 (6.7)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=25599]		
1 (least deprived)	3140 (12.3)	1546 (14.3)
2	3908 (15.3)	1741 (16.1)
3	4774 (18.6)	2091 (19.4)
4	6190 (24.2)	2612 (24.2)
5 (most deprived)	7587 (29.6)	2816 (26.1)
Urban/rural classification *, n (%) [N=25290]		
Major conurbation	11342 (44.8)	5251 (48.9)
Minor conurbation	959 (3.8)	336 (3.1)
City and town	10184 (40.3)	3984 (37.1)
Rural	2795 (11.1)	1150 (10.7)

* Please see Definitions on page 102.

Table 2. Patient characteristics: medical history

Medical history	Patients with confirmed COVID-19	
	Admitted from 1 Sep (N=25,879)	Admitted up to 31 Aug (N=10,954)
Dependency prior to admission to acute hospital, n (%) [N=25493]		
Able to live without assistance in daily activities	22400 (87.9)	9699 (89.3)
Some assistance with daily activities	3021 (11.9)	1121 (10.3)
Total assistance with all daily activities	72 (0.3)	40 (0.4)
Very severe comorbidities *, n (%) [N=25454]		
Cardiovascular	179 (0.7)	69 (0.6)
Respiratory	246 (1.0)	124 (1.1)
Renal	417 (1.6)	188 (1.7)
Liver	164 (0.6)	51 (0.5)
Metastatic disease	167 (0.7)	58 (0.5)
Haematological malignancy	427 (1.7)	217 (2.0)
Immunocompromised	910 (3.6)	389 (3.6)
Body mass index *, n (%) [N=24103]		
<18.5	183 (0.8)	80 (0.8)
18.5-<25	4704 (19.5)	2650 (25.4)
25-<30	7467 (31.0)	3584 (34.4)
30-<40	8909 (37.0)	3265 (31.4)
≥40	2840 (11.8)	834 (8.0)
CPR within previous 24h, n (%) [N=25715]		
In the community	165 (0.6)	50 (0.5)
In hospital	270 (1.0)	77 (0.7)
Prior hospital length of stay [N=25858]		
Mean (SD)	3.2 (7.2)	2.5 (6.2)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=2309]		
Currently pregnant	171 (7.4)	29 (3.6)
Recently pregnant (within 6 weeks)	149 (6.5)	41 (5.2)
Not known to be pregnant	1989 (86.1)	726 (91.2)

* Please see Definitions on page 102.

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=25,844)**	**Admitted up to 31 Aug (N=10,954)**
Invasively ventilated within first 24h *, n (%) [N=25589]	7790 (30.4)	5869 (54.1)
APACHE II Score [N=25717]		
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=23722]	13.1 (9.6, 18.5)	15.8 (11.3, 22.0)
PaO_2 /FiO_2 ratio †, n (%) [N=23722]		
$<$ 13.3 kPa ($<$ 100 mmHg)	12130 (51.1)	3788 (36.9)
13.3-26.6 kPa (100-200 mmHg)	9053 (38.2)	4911 (47.9)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	2539 (10.7)	1554 (15.2)
FiO_2 †, median (IQR) [N=23942]	0.60 (0.45, 0.80)	0.50 (0.40, 0.70)

* Please see Definitions on page 102. 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.

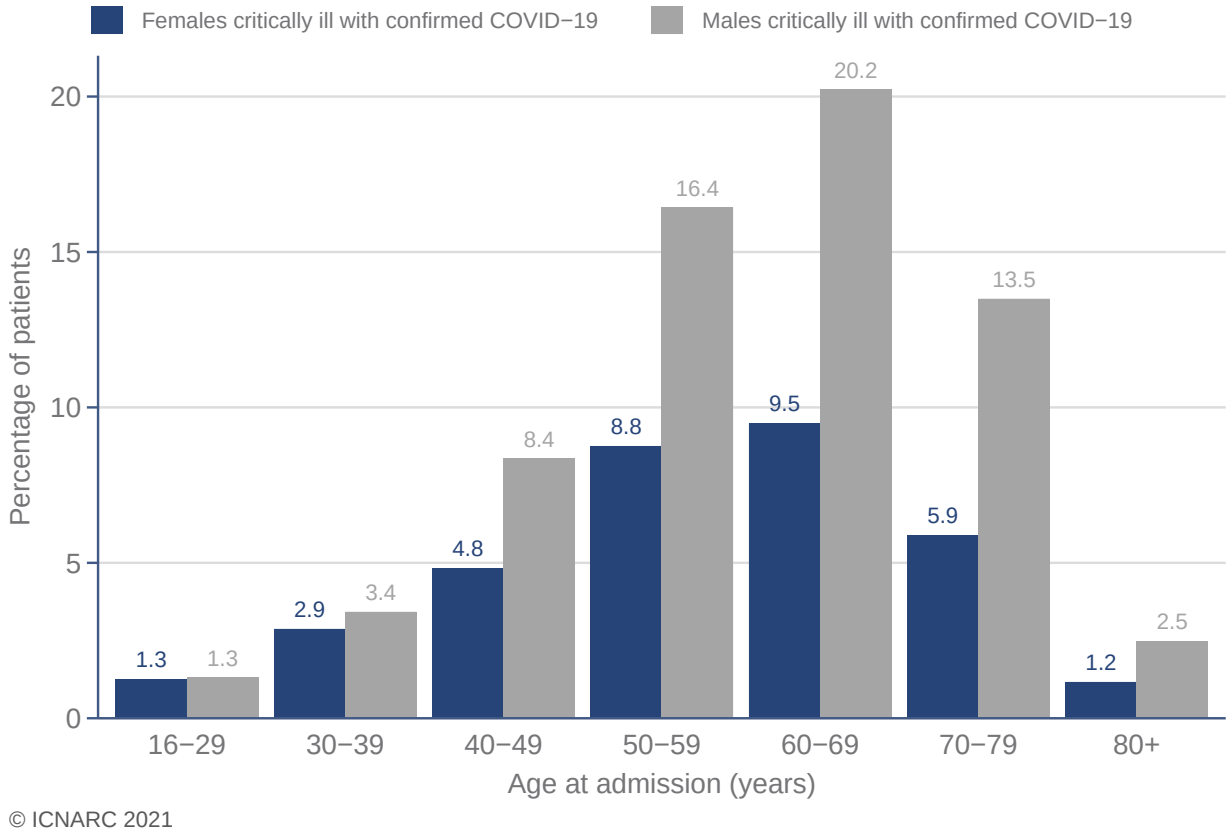


Figure 23. Age and sex distribution

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.

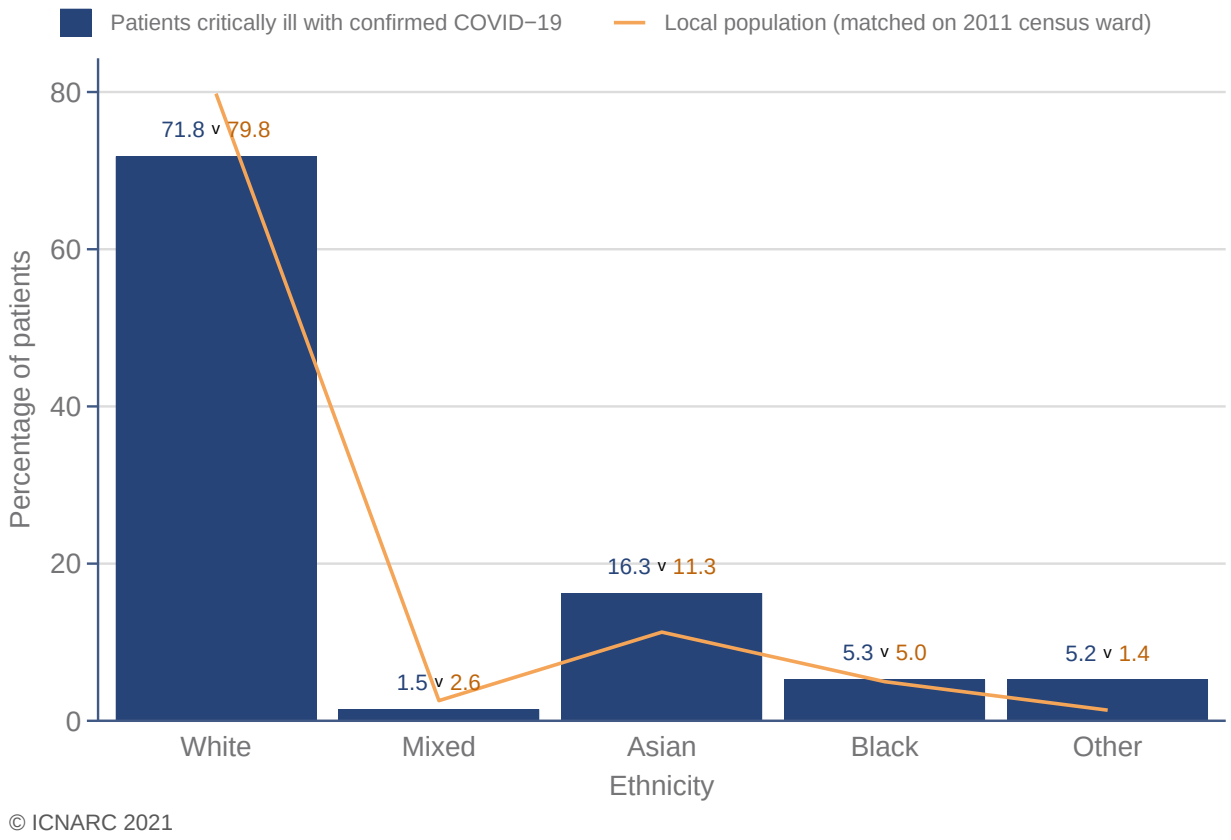


Figure 24. Ethnicity distribution compared with the local population

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.

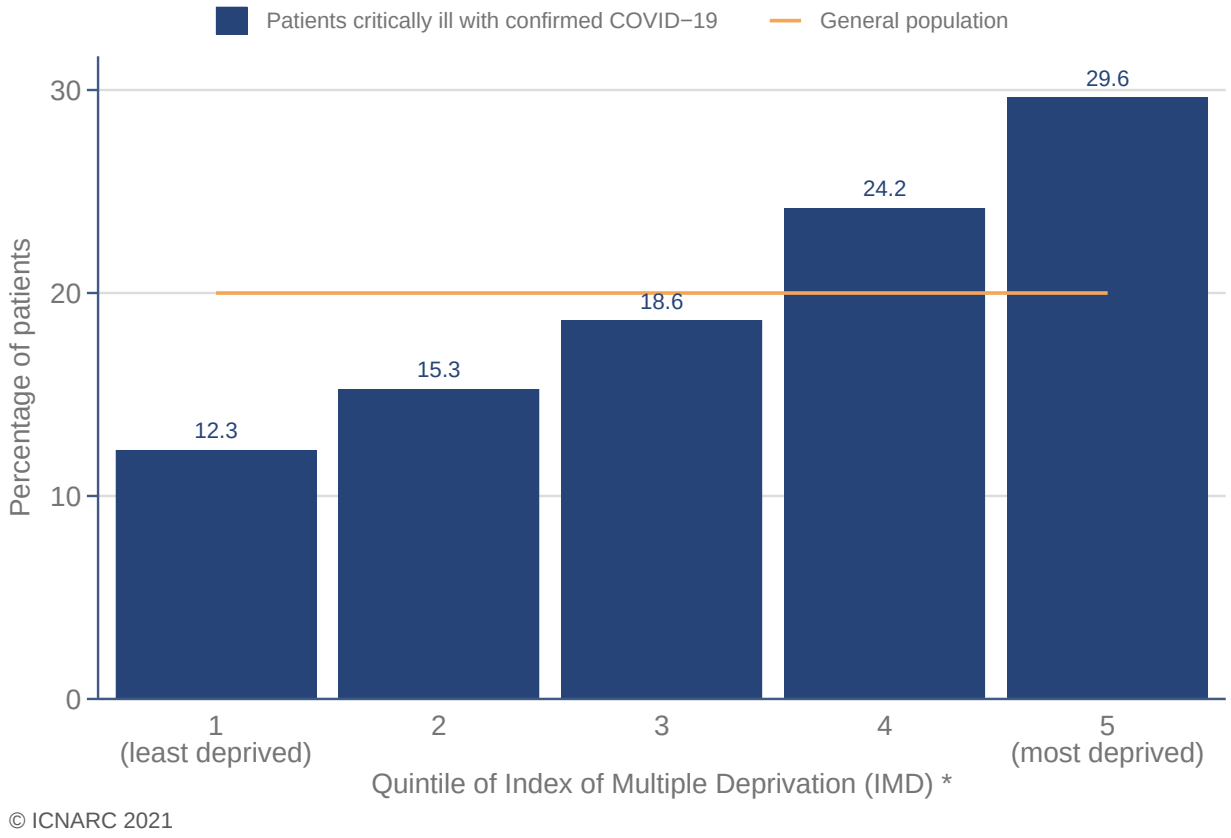


Figure 25. Index of Multiple Deprivation * distribution compared with the general population

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 102.

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.

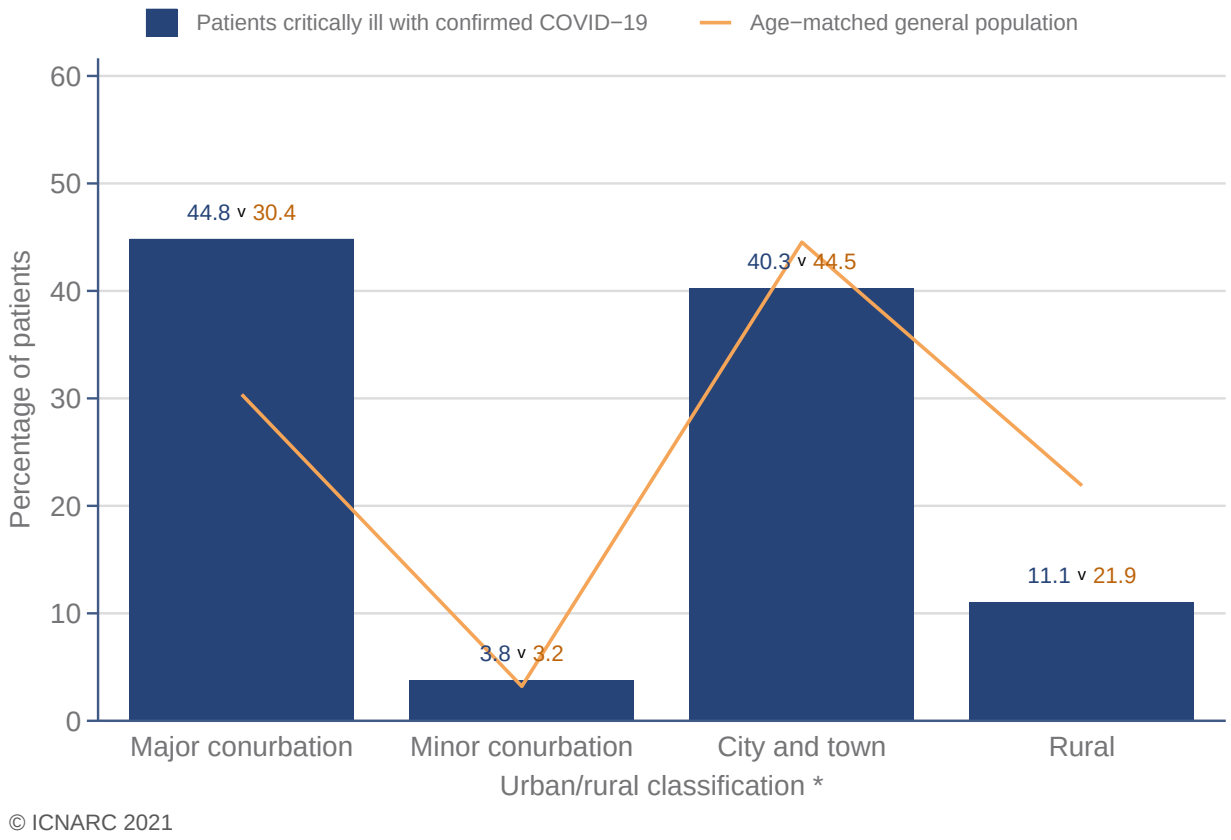


Figure 26. Urban/rural * distribution compared with the age-matched general population

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 102.

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.

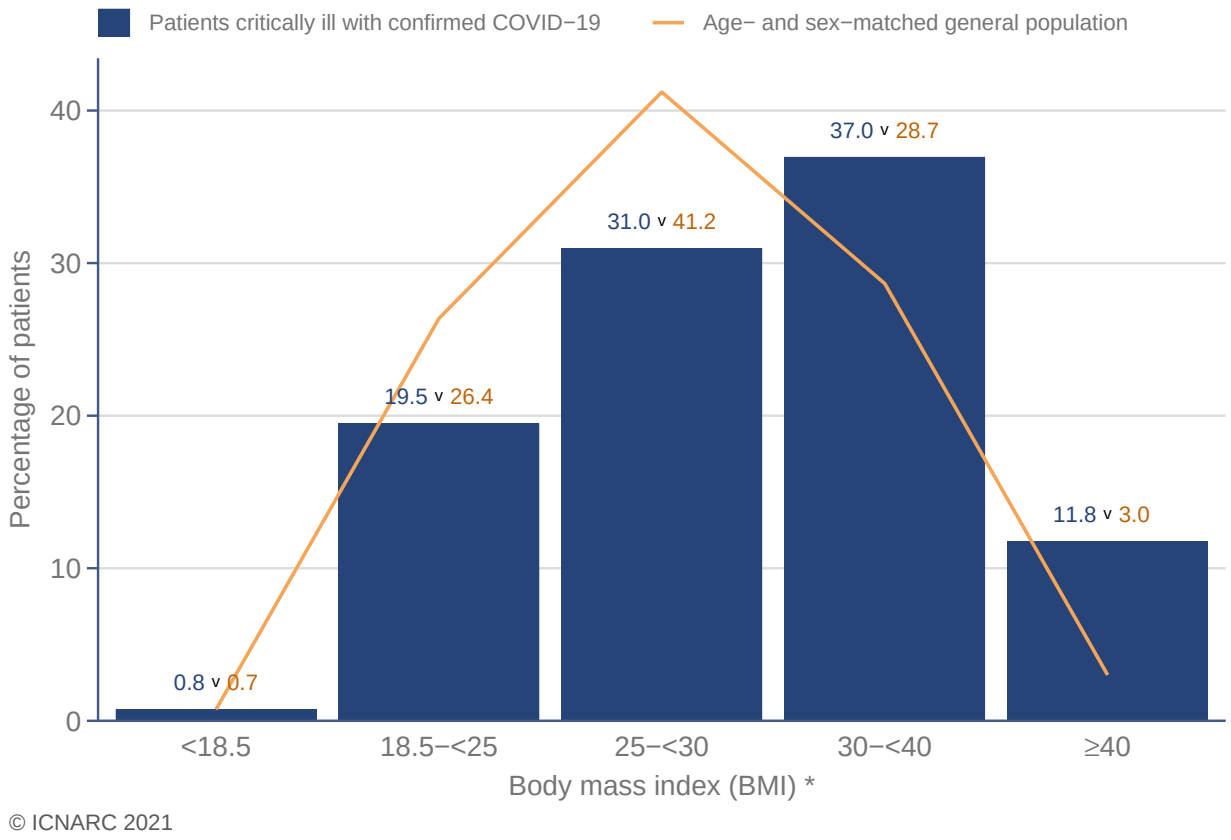


Figure 27. Body mass index * distribution compared with the age- and sex-matched general population

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 102.

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=7790)**	**Admitted up to 31 Aug (N=5869)**
Age at admission (years) [N=7781]		
Mean (SD)	58.5 (12.9)	58.5 (12.0)
Median (IQR)	60 (51, 68)	59 (51, 67)
Sex, n (%) [N=7785]		
Female	2713 (34.8)	1608 (27.4)
Male	5072 (65.2)	4256 (72.6)
Ethnicity, n (%) [N=7328]		
White	4930 (67.3)	3469 (61.5)
Mixed	123 (1.7)	115 (2.0)
Asian	1347 (18.4)	965 (17.1)
Black	476 (6.5)	651 (11.5)
Other	452 (6.2)	442 (7.8)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=7702]		
1 (least deprived)	887 (11.5)	785 (13.5)
2	1107 (14.4)	926 (16.0)
3	1413 (18.3)	1152 (19.9)
4	1944 (25.2)	1488 (25.7)
5 (most deprived)	2351 (30.5)	1450 (25.0)
Urban/rural classification *, n (%) [N=7500]		
Major conurbation	3934 (52.5)	3137 (54.7)
Minor conurbation	196 (2.6)	119 (2.1)
City and town	2668 (35.6)	1906 (33.3)
Rural	700 (9.3)	565 (9.9)

* Please see Definitions on page 102.

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=7790)**	**Admitted up to 31 Aug (N=5869)**
Dependency prior to admission to acute hospital, n (%) [N=7710]		
Able to live without assistance in daily activities	6806 (88.3)	5363 (92.2)
Some assistance with daily activities	883 (11.5)	442 (7.6)
Total assistance with all daily activities	21 (0.3)	10 (0.2)
Very severe comorbidities *, n (%) [N=7706]		
Cardiovascular	61 (0.8)	20 (0.3)
Respiratory	58 (0.8)	33 (0.6)
Renal	103 (1.3)	79 (1.4)
Liver	75 (1.0)	23 (0.4)
Metastatic disease	29 (0.4)	20 (0.3)
Haematological malignancy	112 (1.5)	77 (1.3)
Immunocompromised	268 (3.5)	162 (2.8)
Body mass index *, n (%) [N=7436]		
<18.5	66 (0.9)	30 (0.5)
18.5-<25	1535 (20.6)	1415 (24.8)
25-<30	2295 (30.9)	1983 (34.8)
30-<40	2661 (35.8)	1852 (32.5)
≥40	879 (11.8)	424 (7.4)
CPR within previous 24h, n (%) [N=7788]		
In the community	128 (1.6)	38 (0.6)
In hospital	206 (2.6)	58 (1.0)
Prior hospital length of stay [N=7787]		
Mean (SD)	3.6 (6.6)	2.2 (5.3)
Median (IQR)	1 (0, 5)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=748]		
Currently pregnant	35 (4.7)	9 (2.4)
Recently pregnant (within 6 weeks)	64 (8.6)	22 (5.9)
Not known to be pregnant	649 (86.8)	345 (91.8)

* Please see Definitions on page 102.

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=7790)**	**Admitted up to 31 Aug (N=5869)**
APACHE II Score [N=7789]		
Mean (SD)	16.3 (5.4)	15.5 (5.2)
Median (IQR)	16 (13, 19)	15 (12, 19)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=7691]	12.7 (8.6, 19.4)	15.5 (10.9, 21.6)
PaO_2 /FiO_2 ratio †, n (%) [N=7691]		
$<$ 13.3 kPa ($<$ 100 mmHg)	4061 (52.8)	2257 (38.9)
13.3-26.6 kPa (100-200 mmHg)	2701 (35.1)	2762 (47.6)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	929 (12.1)	782 (13.5)
FiO_2 †, median (IQR) [N=7766]	0.65 (0.45, 0.90)	0.55 (0.40, 0.75)

* Please see Definitions on page 102. 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 – advanced respiratory support

Characteristics of patients critically ill with confirmed COVID-19 that received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to date are summarised in Tables 7-9 and compared with 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=14,045)**	**Admitted up to 31 Aug (N=7877)**
Age at admission (years) [N=14033]		
Mean (SD)	59.2 (12.3)	58.6 (11.9)
Median (IQR)	61 (52, 68)	60 (51, 67)
Sex, n (%) [N=14033]		
Female	4580 (32.6)	2201 (28.0)
Male	9453 (67.4)	5671 (72.0)
Ethnicity, n (%) [N=13319]		
White	9189 (69.0)	4750 (62.6)
Mixed	206 (1.5)	148 (2.0)
Asian	2430 (18.2)	1299 (17.1)
Black	756 (5.7)	823 (10.9)
Other	738 (5.5)	564 (7.4)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=13892]		
1 (least deprived)	1641 (11.8)	1062 (13.6)
2	2043 (14.7)	1231 (15.8)
3	2568 (18.5)	1554 (20.0)
4	3420 (24.6)	1940 (24.9)
5 (most deprived)	4220 (30.4)	1998 (25.7)
Urban/rural classification *, n (%) [N=13650]		
Major conurbation	6539 (47.9)	4026 (52.2)
Minor conurbation	427 (3.1)	204 (2.6)
City and town	5208 (38.2)	2672 (34.7)
Rural	1470 (10.8)	801 (10.4)

* Please see Definitions on page 102.

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=14,045)**	**Admitted up to 31 Aug (N=7877)**
Dependency prior to admission to acute hospital, n (%) [N=13879]		
Able to live without assistance in daily activities	12466 (89.8)	7181 (92.0)
Some assistance with daily activities	1380 (9.9)	615 (7.9)
Total assistance with all daily activities	33 (0.2)	11 (0.1)
Very severe comorbidities *, n (%) [N=13867]		
Cardiovascular	79 (0.6)	26 (0.3)
Respiratory	103 (0.7)	48 (0.6)
Renal	198 (1.4)	95 (1.2)
Liver	109 (0.8)	31 (0.4)
Metastatic disease	54 (0.4)	24 (0.3)
Haematological malignancy	235 (1.7)	130 (1.7)
Immunocompromised	501 (3.6)	234 (3.0)
Body mass index *, n (%) [N=13301]		
<18.5	86 (0.6)	41 (0.5)
18.5-<25	2572 (19.3)	1888 (24.8)
25-<30	4164 (31.3)	2634 (34.7)
30-<40	4975 (37.4)	2468 (32.5)
≥40	1504 (11.3)	567 (7.5)
CPR within previous 24h, n (%) [N=14028]		
In the community	145 (1.0)	44 (0.6)
In hospital	238 (1.7)	71 (0.9)
Prior hospital length of stay [N=14041]		
Mean (SD)	3.4 (7.1)	2.2 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=1145]		
Currently pregnant	79 (6.9)	15 (2.9)
Recently pregnant (within 6 weeks)	76 (6.6)	27 (5.2)
Not known to be pregnant	990 (86.5)	481 (92.0)

* Please see Definitions on page 102.

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=14,045)**	**Admitted up to 31 Aug (N=7877)**
APACHE II Score [N=14001]		
Mean (SD)	15.5 (5.1)	15.4 (5.1)
Median (IQR)	15 (12, 18)	15 (12, 18)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=13482]	12.1 (8.9, 17.1)	15.0 (10.8, 21.0)
PaO_2 /FiO_2 ratio †, n (%) [N=13482]		
$<$ 13.3 kPa ($<$ 100 mmHg)	7801 (57.9)	3080 (40.3)
13.3-26.6 kPa (100-200 mmHg)	4452 (33.0)	3603 (47.1)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	1229 (9.1)	964 (12.6)
FiO_2 †, median (IQR) [N=13621]	0.65 (0.50, 0.85)	0.55 (0.40, 0.70)

* Please see Definitions on page 102. 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=10,883)**	**Admitted up to 31 Aug (N=2809)**
Age at admission (years) [N=10882]		
Mean (SD)	59.1 (14.3)	59.4 (14.4)
Median (IQR)	60 (50, 70)	60 (50, 70)
Sex, n (%) [N=10882]		
Female	3919 (36.0)	968 (34.5)
Male	6963 (64.0)	1841 (65.5)
Ethnicity, n (%) [N=10374]		
White	7850 (75.7)	2024 (74.8)
Mixed	144 (1.4)	41 (1.5)
Asian	1419 (13.7)	352 (13.0)
Black	481 (4.6)	164 (6.1)
Other	480 (4.6)	124 (4.6)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=10771]		
1 (least deprived)	1389 (12.9)	443 (16.0)
2	1719 (16.0)	468 (16.9)
3	2018 (18.7)	493 (17.8)
4	2536 (23.5)	602 (21.8)
5 (most deprived)	3109 (28.9)	756 (27.4)
Urban/rural classification *, n (%) [N=10746]		
Major conurbation	4343 (40.4)	1069 (38.7)
Minor conurbation	503 (4.7)	128 (4.6)
City and town	4669 (43.4)	1240 (44.9)
Rural	1228 (11.4)	323 (11.7)

* Please see Definitions on page 102.

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=10,883)**	**Admitted up to 31 Aug (N=2809)**
Dependency prior to admission to acute hospital, n (%) [N=10783]		
Able to live without assistance in daily activities	9264 (85.9)	2311 (82.9)
Some assistance with daily activities	1483 (13.8)	452 (16.2)
Total assistance with all daily activities	36 (0.3)	24 (0.9)
Very severe comorbidities *, n (%) [N=10751]		
Cardiovascular	90 (0.8)	39 (1.4)
Respiratory	140 (1.3)	73 (2.6)
Renal	182 (1.7)	76 (2.7)
Liver	47 (0.4)	17 (0.6)
Metastatic disease	102 (0.9)	25 (0.9)
Haematological malignancy	174 (1.6)	79 (2.9)
Immunocompromised	374 (3.5)	139 (5.0)
Body mass index *, n (%) [N=10014]		
<18.5	76 (0.8)	29 (1.1)
18.5-<25	1865 (18.6)	672 (26.3)
25-<30	3064 (30.6)	869 (34.0)
30-<40	3736 (37.3)	733 (28.7)
≥40	1273 (12.7)	252 (9.9)
CPR within previous 24h, n (%) [N=10843]		
In the community	13 (0.1)	6 (0.2)
In hospital	21 (0.2)	4 (0.1)
Prior hospital length of stay [N=10880]		
Mean (SD)	2.8 (7.0)	3.0 (7.3)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=1038]		
Currently pregnant	81 (7.8)	11 (4.5)
Recently pregnant (within 6 weeks)	62 (6.0)	11 (4.5)
Not known to be pregnant	895 (86.2)	223 (91.0)

* Please see Definitions on page 102.

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=10,883)**	**Admitted up to 31 Aug (N=2809)**
APACHE II Score [N=10843]		
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=9555]	14.2 (10.8, 19.2)	17.5 (12.5, 23.9)
PaO_2 /FiO_2 ratio †, n (%) [N=9555]		
$<$ 13.3 kPa ($<$ 100 mmHg)	4177 (43.7)	703 (29.2)
13.3-26.6 kPa (100-200 mmHg)	4452 (46.6)	1271 (52.8)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	926 (9.7)	435 (18.1)
FiO_2 †, median (IQR) [N=9628]	0.60 (0.45, 0.70)	0.50 (0.35, 0.60)

* Please see Definitions on page 102. 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=4182)	Admitted up to 31 Aug (N=2928)
Age at admission (years) [N=4179]		
Mean (SD)	60.3 (11.5)	59.1 (11.0)
Median (IQR)	61 (54, 69)	60 (52, 67)
Sex, n (%) [N=4180]		
Female	1114 (26.7)	671 (22.9)
Male	3066 (73.3)	2255 (77.1)
Ethnicity, n (%) [N=3970]		
White	2582 (65.0)	1662 (59.0)
Mixed	69 (1.7)	49 (1.7)
Asian	781 (19.7)	484 (17.2)
Black	315 (7.9)	419 (14.9)
Other	223 (5.6)	205 (7.3)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=4142]		
1 (least deprived)	458 (11.1)	368 (12.7)
2	629 (15.2)	443 (15.3)
3	737 (17.8)	611 (21.1)
4	1100 (26.6)	730 (25.2)
5 (most deprived)	1218 (29.4)	747 (25.8)
Urban/rural classification *, n (%) [N=4076]		
Major conurbation	2103 (51.6)	1578 (55.1)
Minor conurbation	94 (2.3)	61 (2.1)
City and town	1465 (35.9)	952 (33.2)
Rural	412 (10.1)	274 (9.6)

* Please see Definitions on page 102.

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=4182)**	**Admitted up to 31 Aug (N=2928)**
Dependency prior to admission to acute hospital, n (%) [N=4139]		
Able to live without assistance in daily activities	3592 (86.8)	2669 (91.7)
Some assistance with daily activities	540 (13.0)	236 (8.1)
Total assistance with all daily activities	7 (0.2)	6 (0.2)
Very severe comorbidities *, n (%) [N=4133]		
Cardiovascular	41 (1.0)	15 (0.5)
Respiratory	32 (0.8)	17 (0.6)
Renal	346 (8.4)	151 (5.2)
Liver	43 (1.0)	6 (0.2)
Metastatic disease	25 (0.6)	13 (0.4)
Haematological malignancy	83 (2.0)	52 (1.8)
Immunocompromised	190 (4.6)	93 (3.2)
Body mass index *, n (%) [N=3961]		
<18.5	22 (0.6)	16 (0.6)
18.5-<25	784 (19.8)	653 (23.0)
25-<30	1314 (33.2)	971 (34.1)
30-<40	1439 (36.3)	984 (34.6)
≥40	402 (10.1)	221 (7.8)
CPR within previous 24h, n (%) [N=4175]		
In the community	27 (0.6)	10 (0.3)
In hospital	79 (1.9)	18 (0.6)
Prior hospital length of stay [N=4181]		
Mean (SD)	3.8 (6.8)	2.3 (5.4)
Median (IQR)	1 (0, 5)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=236]		
Currently pregnant	8 (3.4)	3 (1.9)
Recently pregnant (within 6 weeks)	8 (3.4)	4 (2.5)
Not known to be pregnant	220 (93.2)	152 (95.6)

* Please see Definitions on page 102.

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=4182)**	**Admitted up to 31 Aug (N=2928)**
Invasively ventilated within first 24h *, n (%) [N=4161]	2064 (49.6)	2120 (73.0)
APACHE II Score [N=4173]		
Mean (SD)	17.7 (5.9)	16.9 (5.6)
Median (IQR)	17 (14, 21)	16 (13, 20)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=3969]	12.2 (8.9, 17.6)	14.4 (10.5, 20.0)
PaO_2 /FiO_2 ratio †, n (%) [N=3969]		
$<$ 13.3 kPa ($<$ 100 mmHg)	2246 (56.6)	1239 (43.9)
13.3-26.6 kPa (100-200 mmHg)	1338 (33.7)	1276 (45.2)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	385 (9.7)	309 (10.9)
FiO_2 †, median (IQR) [N=4027]	0.65 (0.50, 0.80)	0.60 (0.44, 0.75)

* Please see Definitions on page 102. 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 3406 inter-hospital critical care transfers of 2964 patients with confirmed COVID-19, of which 2627 transfers of 2476 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.

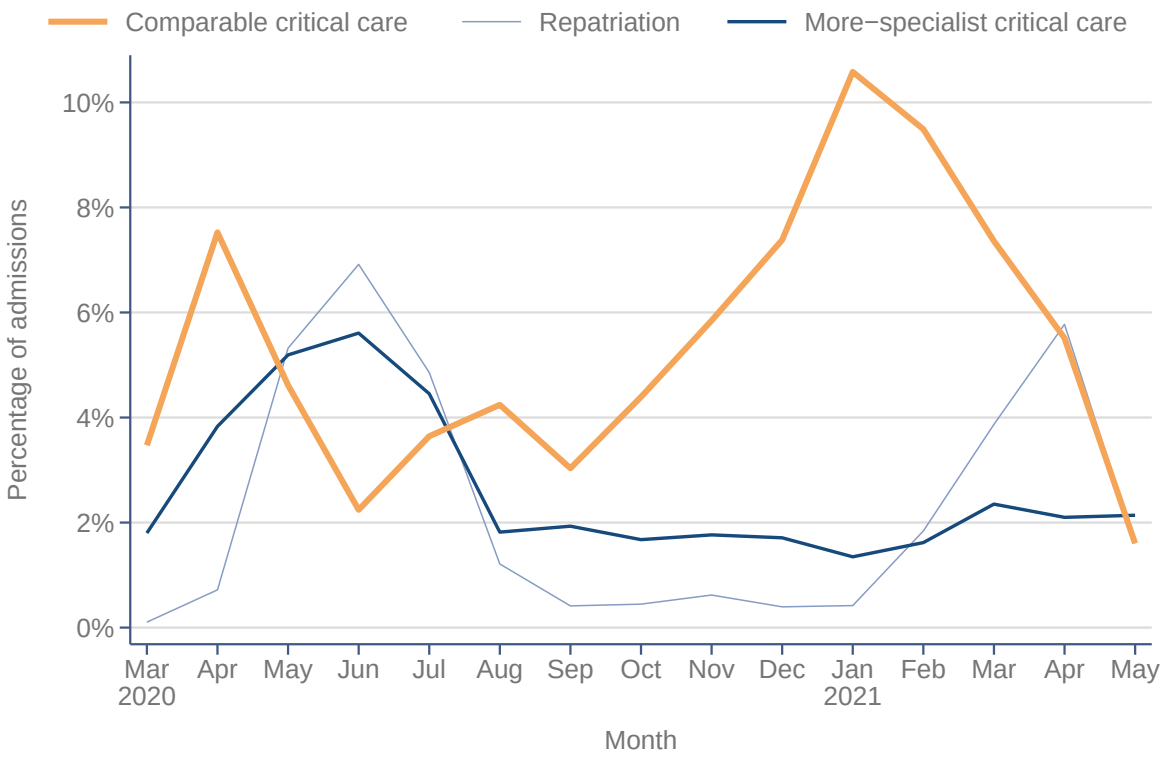


Figure 28. Inter-hospital critical care transfers

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 102. Dashed line indicates incomplete month.

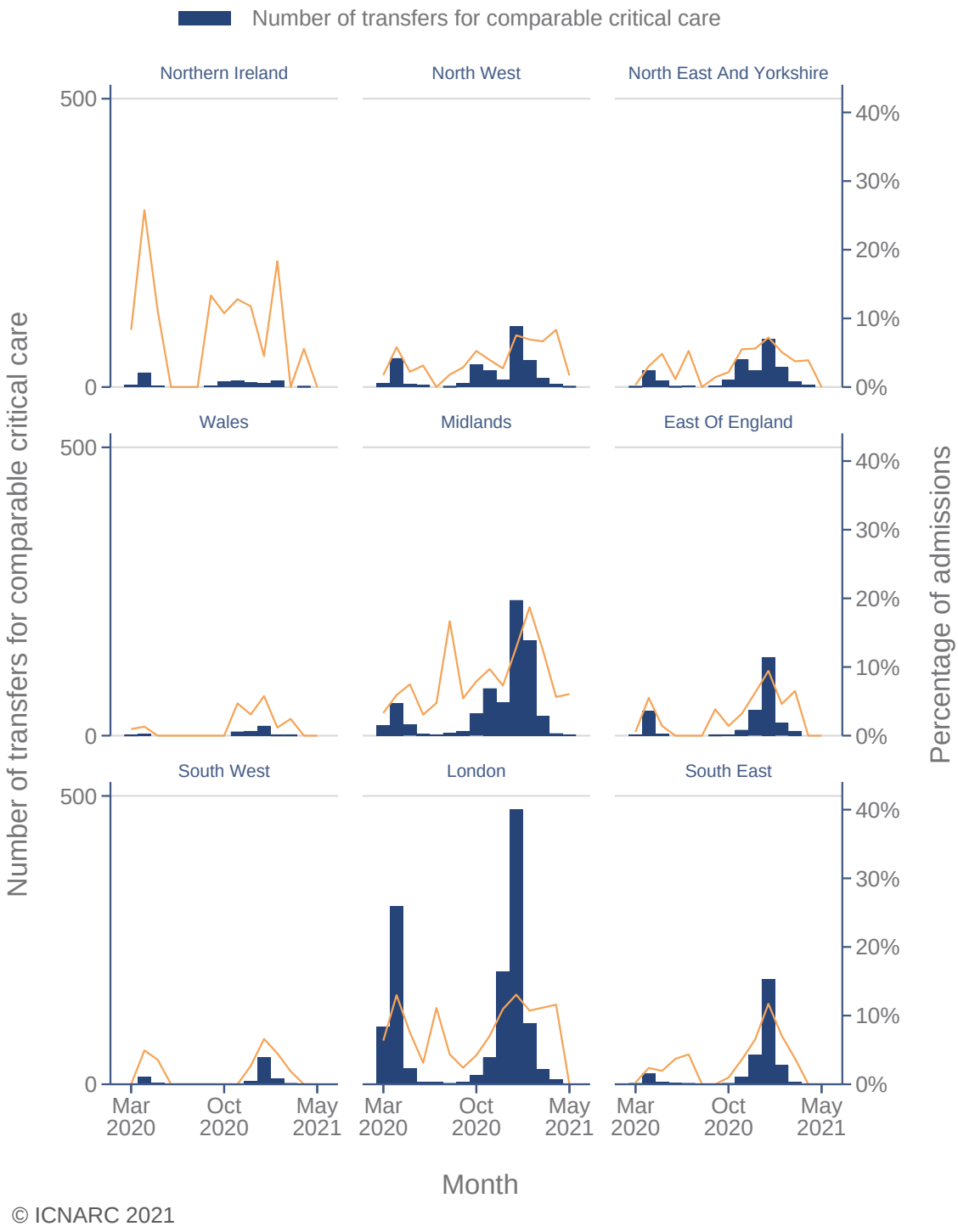


Figure 29. Inter-hospital critical care transfers for comparable critical care by region

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 102. 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.

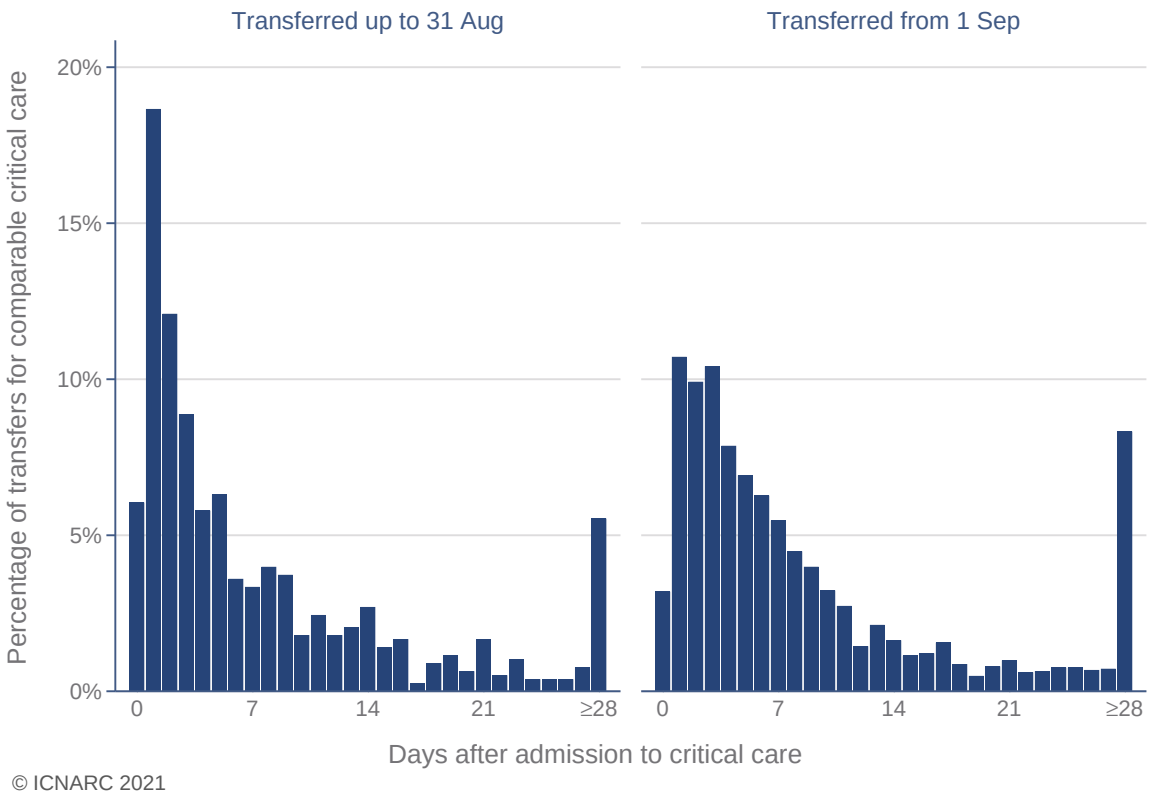


Figure 30. Timing of inter-hospital critical care transfers for comparable critical care *

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 102.

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.

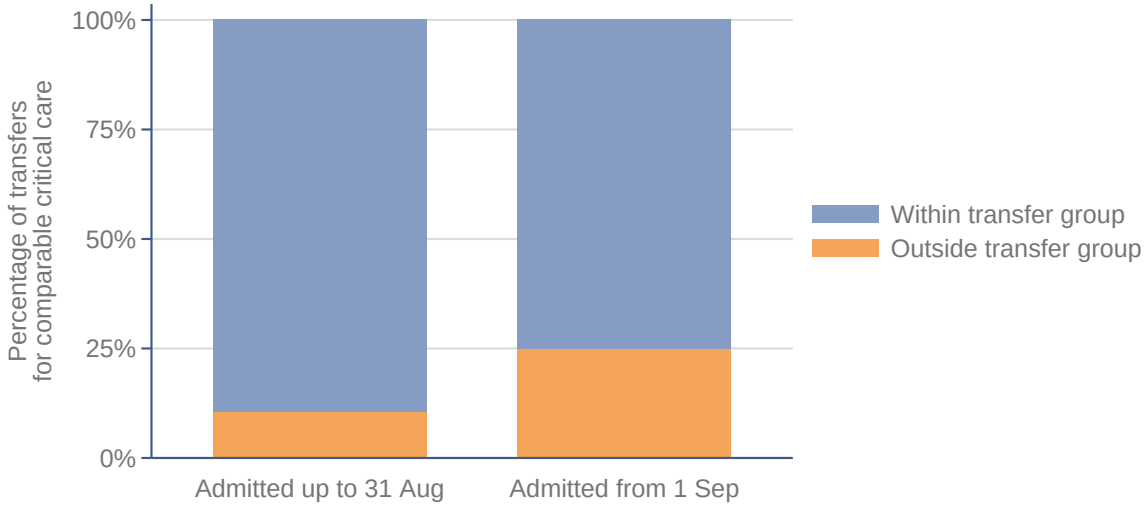


Figure 31. Inter-hospital critical care transfers for comparable critical care within and outside transfer group *

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 102.

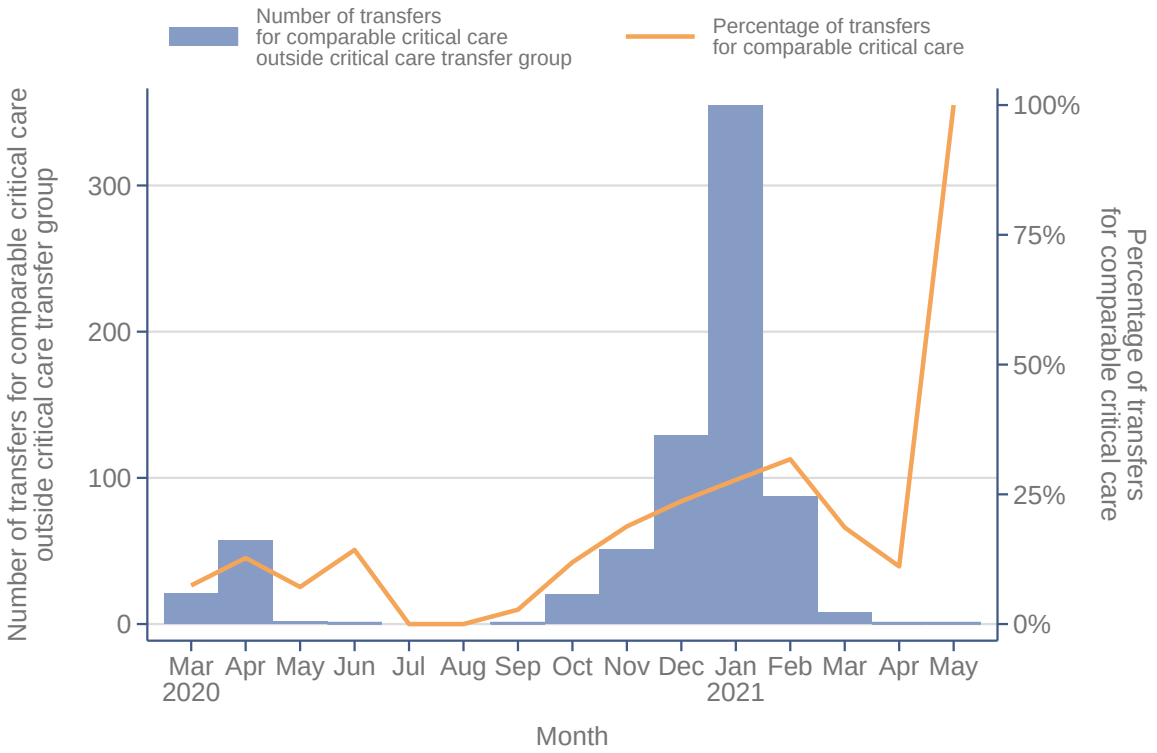


Figure 32. Inter-hospital critical care transfers for comparable critical care outside transfer group * by month

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 102. 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=2476)**	**Admitted up to 31 Aug (N=744)**
Age at admission (years) [N=2468]		
Mean (SD)	59.2 (11.8)	57.8 (11.2)
Median (IQR)	61 (53, 68)	59 (52, 66)
Sex, n (%) [N=2465]		
Female	812 (32.9)	173 (23.3)
Male	1653 (67.1)	569 (76.7)
Ethnicity, n (%) [N=2406]		
White	1507 (62.6)	357 (49.0)
Mixed	31 (1.3)	18 (2.5)
Asian	536 (22.3)	195 (26.7)
Black	166 (6.9)	86 (11.8)
Other	166 (6.9)	73 (10.0)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=2459]		
1 (least deprived)	267 (10.9)	94 (12.7)
2	346 (14.1)	89 (12.0)
3	456 (18.5)	149 (20.2)
4	585 (23.8)	216 (29.2)
5 (most deprived)	805 (32.7)	191 (25.8)
Urban/rural classification *, n (%) [N=2411]		
Major conurbation	1476 (61.2)	529 (74.2)
Minor conurbation	68 (2.8)	27 (3.8)
City and town	694 (28.8)	124 (17.4)
Rural	173 (7.2)	33 (4.6)

* Please see Definitions on page 102.

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=2476)**	**Admitted up to 31 Aug (N=744)**
Dependency prior to admission to acute hospital, n (%) [N=2427]		
Able to live without assistance in daily activities	2231 (91.9)	698 (95.4)
Some assistance with daily activities	190 (7.8)	32 (4.4)
Total assistance with all daily activities	6 (0.2)	2 (0.3)
Very severe comorbidities *, n (%) [N=2427]		
Cardiovascular	5 (0.2)	0 (0.0)
Respiratory	12 (0.5)	4 (0.5)
Renal	14 (0.6)	6 (0.8)
Liver	6 (0.2)	0 (0.0)
Metastatic disease	2 (0.1)	1 (0.1)
Haematological malignancy	21 (0.9)	5 (0.7)
Immunocompromised	47 (1.9)	14 (1.9)
Body mass index *, n (%) [N=2317]		
<18.5	15 (0.6)	5 (0.7)
18.5-<25	396 (17.1)	170 (23.4)
25-<30	806 (34.8)	286 (39.3)
30-<40	903 (39.0)	232 (31.9)
≥40	197 (8.5)	35 (4.8)
CPR within previous 24h, n (%) [N=2468]		
In the community	5 (0.2)	0 (0.0)
In hospital	15 (0.6)	6 (0.8)
Prior hospital length of stay [N=2476]		
Mean (SD)	2.5 (4.0)	1.9 (3.7)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=202]		
Currently pregnant	11 (5.4)	1 (3.3)
Recently pregnant (within 6 weeks)	8 (4.0)	1 (3.3)
Not known to be pregnant	183 (90.6)	28 (93.3)

* Please see Definitions on page 102.

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=2476)**	**Admitted up to 31 Aug (N=744)**
Invasively ventilated within first 24h *, n (%) [N=2449]	1471 (60.1)	596 (81.8)
APACHE II Score [N=2463]		
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=2322]	12.3 (9.0, 16.8)	15.2 (11.0, 19.9)
PaO_2 /FiO_2 ratio †, n (%) [N=2322]		
$<$ 13.3 kPa ($<$ 100 mmHg)	1340 (57.7)	266 (38.2)
13.3-26.6 kPa (100-200 mmHg)	824 (35.5)	361 (51.9)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	158 (6.8)	69 (9.9)
FiO_2 †, median (IQR) [N=2373]	0.65 (0.50, 0.80)	0.60 (0.45, 0.75)

* Please see Definitions on page 102. 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 25,623 (of 25,879) patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date. Of these, 9807 have died and 15,816 have been discharged from critical care (Figures 33 and 34). The remaining 256 were last reported to still be receiving critical care.

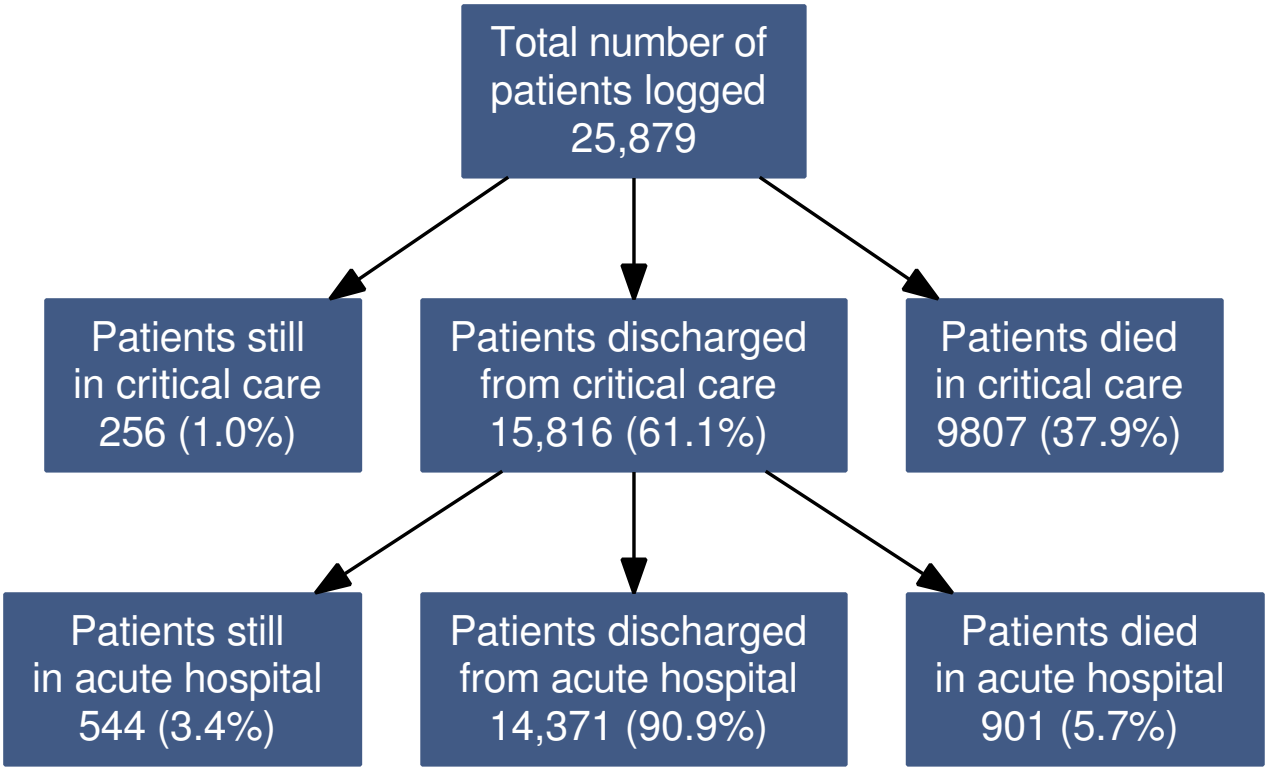


Figure 33. Critical care and acute hospital outcomes

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

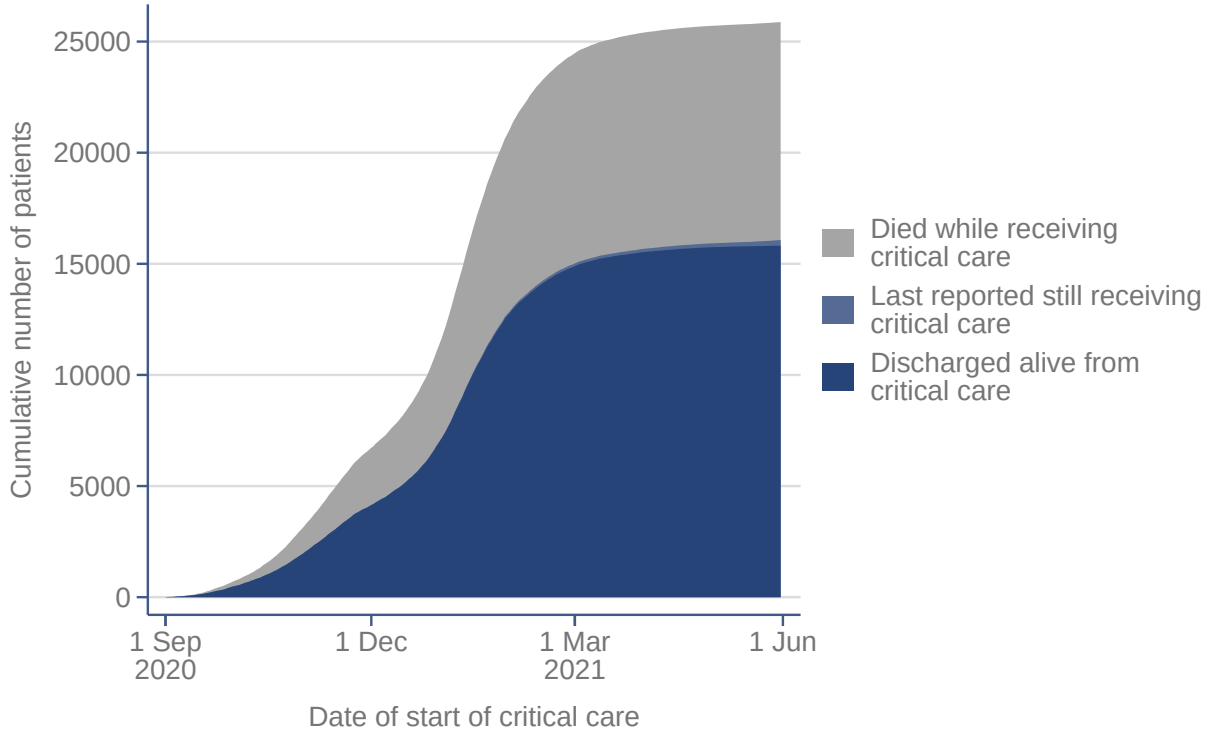


Figure 34. Cumulative outcomes *

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 31 May 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=25,879)**	**Admitted up to 31 Aug (N=10,954)**
Outcome at end of critical care, n (%)		
Discharged	15816 (61.1)	6640 (60.6)
Died	9807 (37.9)	4313 (39.4)
Last reported still in critical care	256 (1.0)	1 (0.0)
Duration of critical care	**(N=25,585)**	**(N=10,947)**
Duration of critical care (days) †, median (IQR)		
Survivors	7 (4, 16)	12 (5, 28)
Non-survivors	12 (6, 19)	9 (5, 16)
Organ support (Critical Care Minimum Dataset) *	**(N=25,562)**	**(N=10,952)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	14045 (55.1)	7877 (72.0)
Basic respiratory support only	10883 (42.7)	2809 (25.7)
No respiratory support	574 (2.3)	261 (2.4)
Advanced cardiovascular support	5867 (23.0)	3365 (30.7)
Basic cardiovascular support only	18399 (72.1)	7102 (64.9)
No cardiovascular support	1236 (4.8)	480 (4.4)
Renal support	4182 (16.4)	2928 (26.7)
Liver support	214 (0.8)	114 (1.0)
Neurological support	1752 (6.9)	995 (9.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	12 (6, 23)	14 (7, 24)
Total (advanced + basic) respiratory support	9 (5, 18)	11 (5, 22)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	9 (5, 18)	11 (5, 22)
Renal support	6 (3, 13)	8 (3, 15)

* Please see Definitions on page 102.

† 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=7790)**	**Admitted up to 31 Aug (N=5869)**
Outcome at end of critical care, n (%)		
Discharged	3889 (49.9)	3138 (53.5)
Died	3825 (49.1)	2731 (46.5)
Last reported still in critical care	76 (1.0)	0 (0.0)
Duration of critical care	**(N=7708)**	**(N=5867)**
Duration of critical care (days) †, median (IQR)		
Survivors	16 (8, 36)	22 (12, 35)
Non-survivors	12 (6, 19)	10 (5, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=7698)**	**(N=5868)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	3089 (40.1)	2390 (40.7)
Basic cardiovascular support only	4602 (59.8)	3465 (59.0)
No cardiovascular support	7 (0.1)	13 (0.2)
Renal support	2064 (26.8)	2120 (36.1)
Liver support	132 (1.7)	80 (1.4)
Neurological support	1058 (13.7)	719 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	12 (6, 23)	14 (7, 24)
Total (advanced + basic) respiratory support	14 (8, 25)	15 (8, 26)
Advanced cardiovascular support	3 (2, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	14 (8, 25)	15 (8, 26)
Renal support	7 (3, 14)	8 (4, 16)

* Please see Definitions on page 102.

† 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=14,360 ‡)**	**Admitted up to 31 Aug (N=7877)**
Outcome at end of critical care, n (%)		
Discharged	6190 (43.1)	4123 (52.3)
Died	7855 (54.7)	3754 (47.7)
Last reported still in critical care ‡	315 (2.2)	0 (0.0)
Duration of critical care	**(N=14,032)**	**(N=7873)**
Duration of critical care (days) †, median (IQR)		
Survivors	20 (9, 40)	23 (12, 37)
Non-survivors	14 (8, 21)	10 (6, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=14,045)**	**(N=7877)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	5621 (40.0)	3295 (41.8)
Basic cardiovascular support only	8405 (59.8)	4566 (58.0)
No cardiovascular support	19 (0.1)	16 (0.2)
Renal support	3771 (26.9)	2778 (35.3)
Liver support	200 (1.4)	110 (1.4)
Neurological support	1675 (11.9)	969 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	12 (6, 23)	14 (7, 24)
Total (advanced + basic) respiratory support	16 (9, 28)	15 (8, 27)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	16 (9, 27)	16 (9, 27)
Renal support	6 (3, 14)	8 (4, 15)

* Please see Definitions on page 102.

† 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=10,945 ‡)**	**Admitted up to 31 Aug (N=2809)**
Outcome at end of critical care, n (%)		
Discharged	8983 (82.1)	2264 (80.6)
Died	1900 (17.4)	545 (19.4)
Last reported still in critical care ‡	62 (0.6)	0 (0.0)
Duration of critical care	**(N=10,870)**	**(N=2807)**
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=10,883)**	**(N=2809)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	209 (1.9)	53 (1.9)
Basic cardiovascular support only	9532 (87.6)	2324 (82.7)
No cardiovascular support	1142 (10.5)	432 (15.4)
Renal support	333 (3.1)	115 (4.1)
Liver support	10 (0.1)	3 (0.1)
Neurological support	69 (0.6)	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, 7)	3 (2, 5)

* Please see Definitions on page 102.

† 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=4253 ‡)**	**Admitted up to 31 Aug (N=2928)**
Outcome at end of critical care, n (%)		
Discharged	1289 (30.3)	1278 (43.6)
Died	2893 (68.0)	1650 (56.4)
Last reported still in critical care ‡	71 (1.7)	0 (0.0)
Duration of critical care	**(N=4175)**	**(N=2928)**
Duration of critical care (days) †, median (IQR)		
Survivors	32 (11, 52)	32 (19, 46)
Non-survivors	15 (9, 23)	13 (7, 20)
Organ support (Critical Care Minimum Dataset) *	**(N=4182)**	**(N=2928)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	3771 (90.2)	2778 (94.9)
Basic respiratory support only	333 (8.0)	115 (3.9)
No respiratory support	78 (1.9)	35 (1.2)
Advanced cardiovascular support	2295 (54.9)	1587 (54.2)
Basic cardiovascular support only	1859 (44.5)	1332 (45.5)
No cardiovascular support	28 (0.7)	9 (0.3)
Liver support	124 (3.0)	78 (2.7)
Neurological support	521 (12.5)	413 (14.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	16 (9, 29)	18 (11, 30)
Total (advanced + basic) respiratory support	18 (10, 31)	19 (11, 33)
Advanced cardiovascular support	3 (2, 6)	4 (2, 7)
Total (advanced + basic) cardiovascular support	18 (10, 31)	19 (11, 32)
Renal support	6 (3, 13)	8 (3, 15)

* Please see Definitions on page 102.

† 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 29 April 2021 (to allow for almost complete outcomes) are summarised in Table 24.

Table 24. Critical care outcome by patient characteristics, admitted up to 29 April 2021

Patient subgroup	Patients with confirmed COVID-19 and outcome received (N=25,521)	
	Discharged alive from critical care n (%)	Died in critical care n (%)
Age at admission to critical care		
16-49	4540 (81.6)	1022 (18.4)
50-69	8516 (60.7)	5519 (39.3)
70+	2678 (45.2)	3243 (54.8)
Sex		
Female	5757 (65.8)	2988 (34.2)
Male	9982 (59.5)	6794 (40.5)
BMI		
<25	2794 (58.0)	2023 (42.0)
25-<30	4323 (58.5)	3069 (41.5)
≥30	7620 (65.6)	3993 (34.4)
Assistance required with daily activities		
No	13931 (62.9)	8215 (37.1)
Yes	1621 (53.1)	1434 (46.9)
Any very severe comorbidities *		
No	14571 (63.0)	8575 (37.0)
Yes	939 (46.8)	1067 (53.2)
Any respiratory support *		
Basic only	8930 (82.5)	1893 (17.5)
Advanced	6179 (44.1)	7844 (55.9)
Any renal support *	1289 (30.9)	2889 (69.1)

* Please see Definitions on page 102.

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 29 April 2021 (to allow for almost complete outcomes) are summarised in Table 25.

Table 25. Critical care outcome by patient characteristics, admitted up to 29 April 2021 (invasively ventilated first 24 hours)

	Patients with confirmed COVID-19 invasively ventilated first 24 hours * (N=7697)	
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	1226 (71.8)	481 (28.2)
50-69	2154 (49.2)	2228 (50.8)
70+	493 (30.8)	1108 (69.2)
Sex		
Female	1475 (55.0)	1206 (45.0)
Male	2401 (47.9)	2613 (52.1)
BMI		
<25	727 (46.0)	852 (54.0)
25-<30	1038 (45.7)	1233 (54.3)
≥30	1964 (56.1)	1536 (43.9)
Assistance required with daily activities		
No	3443 (51.1)	3291 (48.9)
Yes	401 (45.1)	489 (54.9)
Any very severe comorbidities *		
No	3624 (51.5)	3413 (48.5)
Yes	217 (37.3)	364 (62.7)
Any renal support *	635 (30.8)	1428 (69.2)

* Please see Definitions on page 102.

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 29 April 2021 (to allow for almost complete outcomes) are summarised in Table 26.

Table 26. Critical care outcome by patient characteristics, admitted up to 29 April 2021 (any advanced respiratory support)

Patients with confirmed COVID-19 and any advanced respiratory support * (N=14,019)		
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	1873 (67.0)	923 (33.0)
50-69	3509 (42.4)	4765 (57.6)
70+	788 (26.8)	2151 (73.2)
Sex		
Female	2247 (49.1)	2328 (50.9)
Male	3927 (41.6)	5509 (58.4)
BMI		
<25	1075 (40.6)	1575 (59.4)
25-<30	1664 (40.0)	2496 (60.0)
≥30	3163 (48.9)	3308 (51.1)
Assistance required with daily activities		
No	5545 (44.6)	6900 (55.4)
Yes	573 (40.6)	839 (59.4)
Any very severe comorbidities *		
No	5769 (45.1)	7029 (54.9)
Yes	341 (32.6)	706 (67.4)
Any renal support *	1031 (27.4)	2736 (72.6)

* Please see Definitions on page 102.

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 29 April 2021 (to allow for almost complete outcomes) are summarised in Table 27.

Table 27. Critical care outcome by patient characteristics, admitted up to 29 April 2021 (basic respiratory support only)

	Patients with confirmed COVID-19 and basic respiratory support only * (N=10,813)	
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	2482 (96.4)	93 (3.6)
50-69	4721 (86.5)	735 (13.5)
70+	1725 (61.8)	1065 (38.2)
Sex		
Female	3251 (83.5)	644 (16.5)
Male	5678 (82.0)	1249 (18.0)
BMI		
<25	1495 (77.4)	436 (22.6)
25-<30	2492 (81.7)	559 (18.3)
≥30	4295 (86.3)	681 (13.7)
Assistance required with daily activities		
No	7928 (86.0)	1288 (14.0)
Yes	924 (61.2)	586 (38.8)
Any very severe comorbidities *		
No	8301 (84.5)	1518 (15.5)
Yes	522 (59.7)	352 (40.3)
Any renal support *	189 (56.8)	144 (43.2)

* Please see Definitions on page 102.

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 29 April 2021 (to allow for almost complete outcomes) are summarised in Table 28.

Table 28. Critical care outcome by patient characteristics, admitted up to 29 April 2021 (any renal support)

	Patients with confirmed COVID-19 and any renal support * (N=4178)	
Patient subgroup	**Discharged alive from critical care n (%)**	**Died in critical care n (%)**
Age at admission to critical care		
16-49	313 (46.0)	367 (54.0)
50-69	785 (30.7)	1773 (69.3)
70+	189 (20.2)	748 (79.8)
Sex		
Female	392 (35.2)	721 (64.8)
Male	897 (29.3)	2166 (70.7)
BMI		
<25	237 (29.4)	569 (70.6)
25-<30	347 (26.4)	966 (73.6)
≥30	646 (35.1)	1193 (64.9)
Assistance required with daily activities		
No	1087 (30.3)	2501 (69.7)
Yes	192 (35.1)	355 (64.9)
Any very severe comorbidities *		
No	1041 (29.8)	2454 (70.2)
Yes	237 (37.4)	397 (62.6)
Any respiratory support *		
Basic only	189 (56.8)	144 (43.2)
Advanced	1031 (27.4)	2736 (72.6)

* Please see Definitions on page 102.

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 were offered a first dose of vaccine by 15 April 2021); and Phase 2 (the rest of the population). Figure 36 shows the same data for the time period when numbers of new patients were decreasing with the Y-axis on a log scale. On this scale, a straight line represents the numbers decreasing by a constant proportion from week to week. Figure 37 shows the percentage of patients critically ill with confirmed COVID-19 by week of admission, split into the same categories.

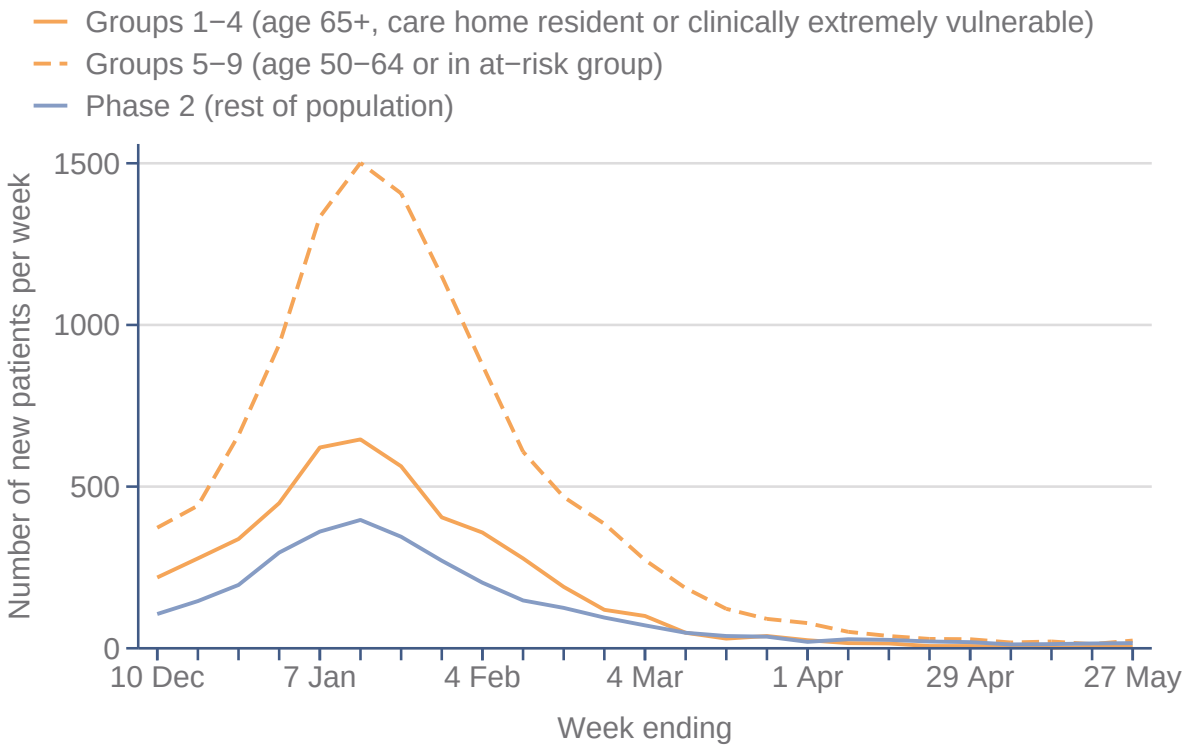


Figure 35. Weekly admissions by vaccine priority groups

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.

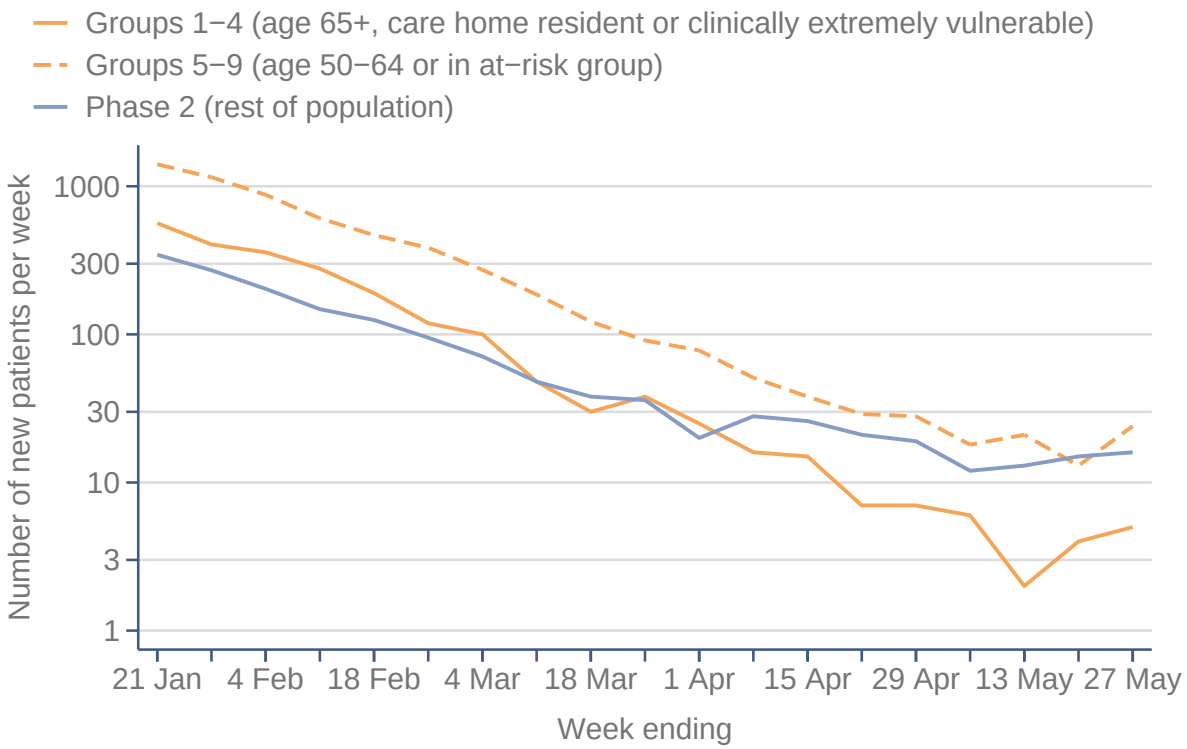


Figure 36. Weekly admissions by vaccine priority groups - log scale

Weekly trend in the numbers of patients critically ill with confirmed COVID-19 (presented on a log scale) by vaccine priority group from the week ending 21 January 2021 (after the most recent peak in patients) to date. Please note that some priority groups were unable to be mapped, for example due to absence of occupation data.

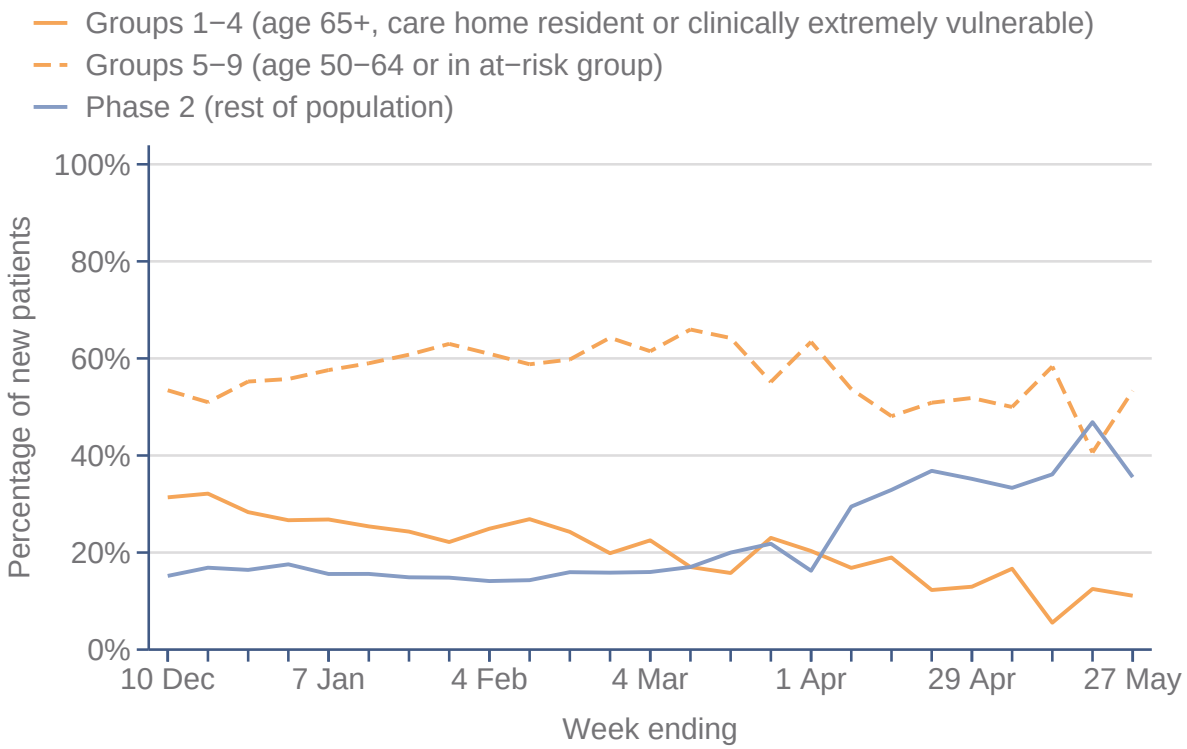


Figure 37. Percentage of weekly admissions by vaccine priority groups

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 38 and, as a percentage of women aged 16-49 years, in Figure 39. 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.

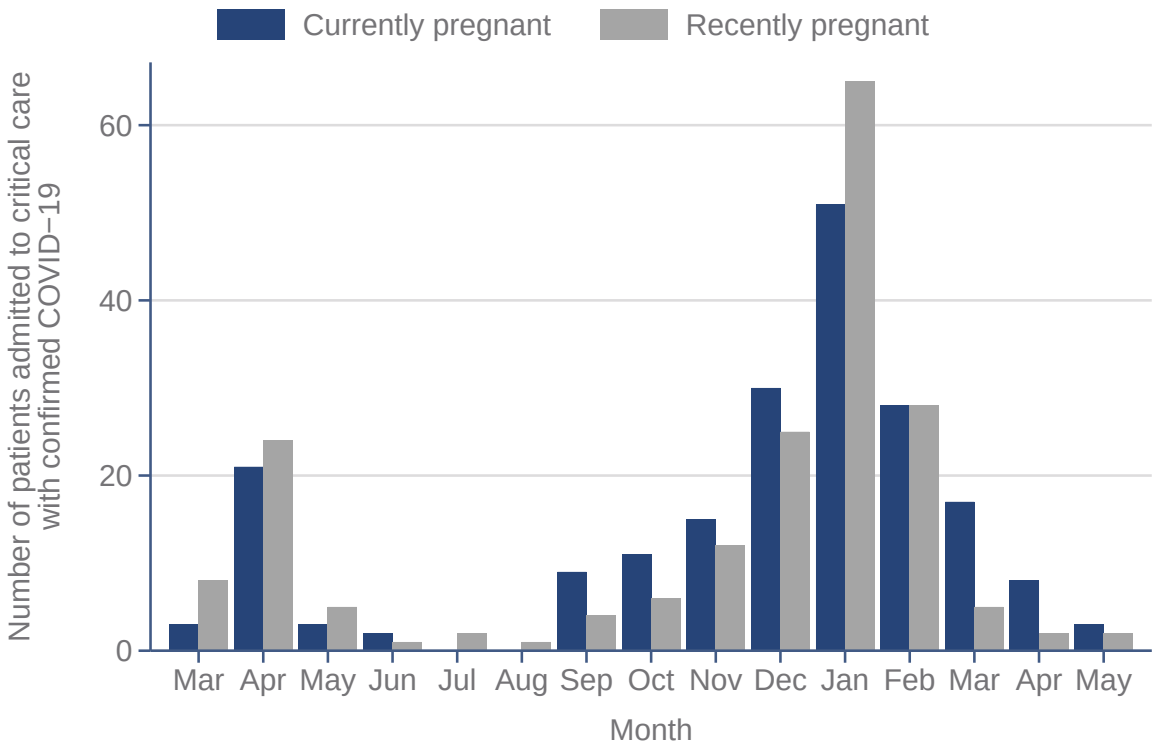


Figure 38. Numbers currently and recently pregnant

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

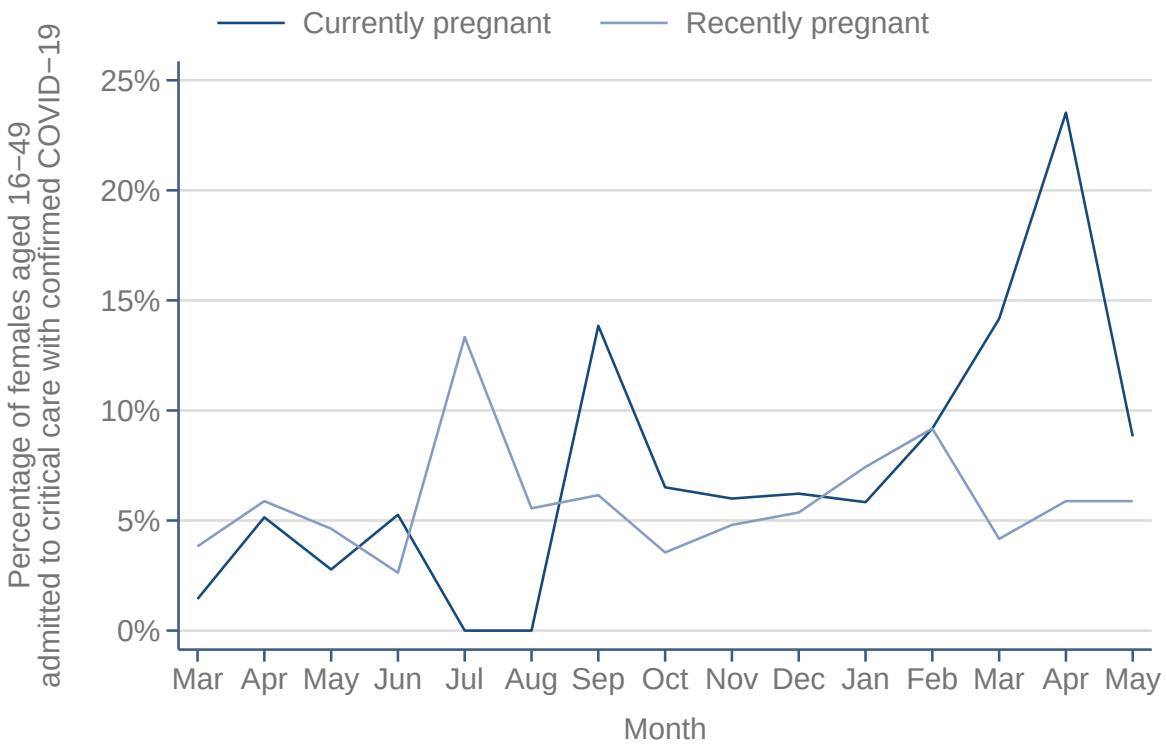


Figure 39. Percentages currently and recently pregnant

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=171)	Recently pregnant (N=149)	Not known to be pregnant (N=1989)
Age at admission (years)			
Mean (SD)	32.6 (5.6)	32.8 (5.7)	40.1 (7.7)
Median (IQR)	33 (29, 37)	33 (29, 37)	42 (35, 46)
Ethnicity, n (%)			
White	66 (40.0)	75 (52.4)	1271 (66.6)
Mixed	5 (3.0)	9 (6.3)	38 (2.0)
Asian	60 (36.4)	37 (25.9)	362 (19.0)
Black	20 (12.1)	14 (9.8)	128 (6.7)
Other	14 (8.5)	8 (5.6)	108 (5.7)
IMD quintile *, n (%)			
1 (least deprived)	13 (7.8)	14 (9.7)	168 (8.5)
2	13 (7.8)	19 (13.2)	217 (11.0)
3	29 (17.5)	27 (18.8)	336 (17.1)
4	55 (33.1)	30 (20.8)	528 (26.9)
5 (most deprived)	56 (33.7)	54 (37.5)	716 (36.4)
First pregnancy, n (%)	N/A	63 (42.3)	N/A
Invasively ventilated within first 24h *, n (%)	35 (20.5)	64 (43.0)	649 (33.0)
APACHE II Score			
Mean (SD)	11.6 (4.1)	11.3 (4.2)	12.4 (4.9)
Median (IQR)	12 (9, 14)	11 (9, 14)	12 (9, 15)
PaO_2 /FiO_2 ratio † (kPa), median (IQR)	17.4 (11.6, 26.0)	19.3 (12.6, 32.6)	13.8 (9.7, 20.4)
PaO_2 /FiO_2 ratio †, n (%)			
$<$ 13.3 kPa ($<$ 100 mmHg)	48 (31.0)	48 (31.0)	48 (31.0)
13.3-26.6 kPa (100-200 mmHg)	38 (26.8)	38 (26.8)	38 (26.8)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	861 (47.2)	861 (47.2)	861 (47.2)
FiO_2 †, median (IQR)	0.50 (0.35, 0.70)	0.40 (0.30, 0.65)	0.60 (0.40, 0.80)
Outcome at end of critical care, n (%)			
Discharged	163 (95.3)	146 (98.0)	1585 (79.7)
Died	6 (3.5)	2 (1.3)	374 (18.8)
Last reported still in critical care	2 (1.2)	1 (0.7)	30 (1.5)

* Please see Definitions on page 102. 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.

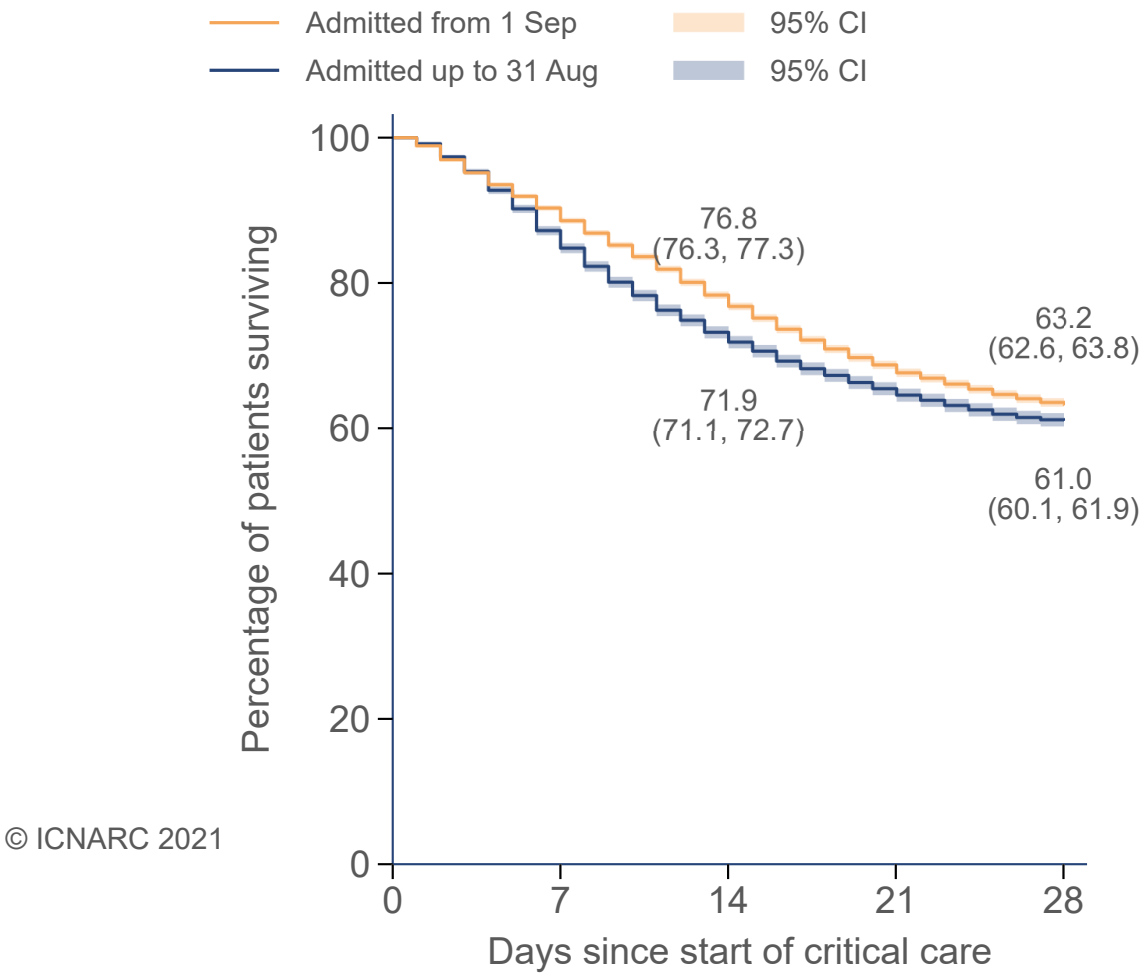
Table 30. Characteristics of females aged 16-49 admitted up to 31 August by pregnancy status

Characteristics	Women with confirmed COVID-19 aged 16-49 years		
	Currently pregnant (N=29)	Recently pregnant (N=41)	Not known to be pregnant (N=726)
Age at admission (years)			
Mean (SD)	34.2 (5.7)	32.3 (5.4)	40.2 (7.6)
Median (IQR)	34 (31, 39)	32 (28, 35)	42 (35, 46)
Ethnicity, n (%)			
White	12 (42.9)	13 (32.5)	416 (59.3)
Mixed	0 (0.0)	1 (2.5)	16 (2.3)
Asian	6 (21.4)	10 (25.0)	135 (19.3)
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 (10.8)
2	4 (13.8)	2 (4.9)	85 (11.9)
3	4 (13.8)	10 (24.4)	127 (17.8)
4	8 (27.6)	12 (29.3)	162 (22.7)
5 (most deprived)	8 (27.6)	15 (36.6)	263 (36.8)
First pregnancy, n (%)	N/A	15 (36.6)	N/A
Invasively ventilated within first 24h *, n (%)	9 (32.1)	22 (53.7)	345 (48.1)
APACHE II Score			
Mean (SD)	11.7 (3.9)	11.7 (4.6)	13.1 (5.5)
Median (IQR)	11 (9, 14)	12 (9, 14)	12 (9, 16)
PaO_2 /FiO_2 ratio † (kPa), median (IQR)	18.7 (14.3, 29.2)	22.0 (15.6, 34.7)	17.2 (12.1, 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)	213 (31.7)	213 (31.7)	213 (31.7)
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)	563 (77.5)
Died	1 (3.4)	4 (9.8)	163 (22.5)
Last reported still in critical care	0 (0.0)	0 (0.0)	0 (0.0)

* Please see Definitions on page 102. 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 40 and compared with those admitted up to 31 August 2020.



Admitted from 1 Sep					
At risk	25844	22828	19727	17352	16147
Died (in hospital)	0	2955	5976	8313	9477
Censored	0	61	141	179	220
Admitted up to 31 Aug					
At risk	10954	9289	7877	7081	6684
Died (in hospital)	0	1665	3077	3873	4269
Censored	0	0	0	0	1

Figure 40. 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 outcome - by patient characteristics

28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by patient characteristics (demographics, medical history and indicators of acute severity) is presented in Figures 41-45 and compared with those admitted up to 31 August 2020.

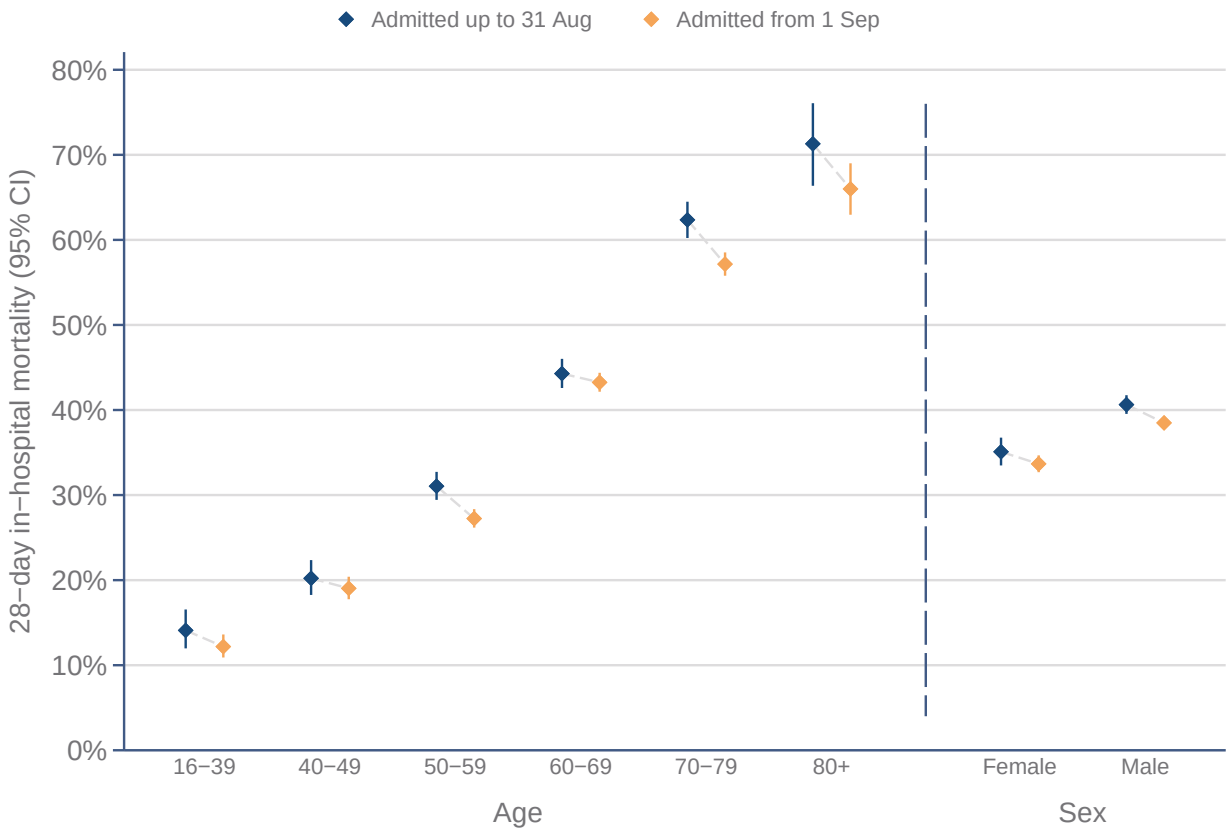


Figure 41. 28-day in-hospital mortality by patient characteristics (demographics)

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).

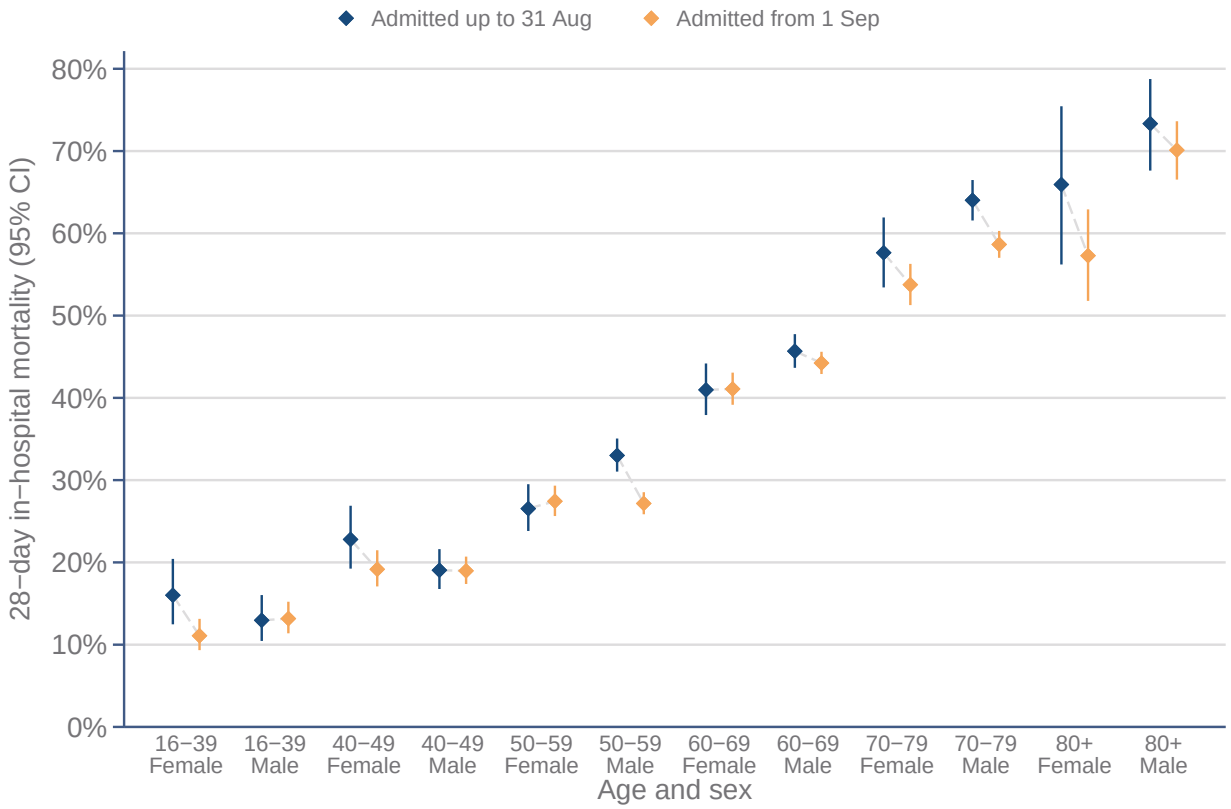


Figure 42. 28-day in-hospital mortality by patient characteristics (demographics continued)

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).

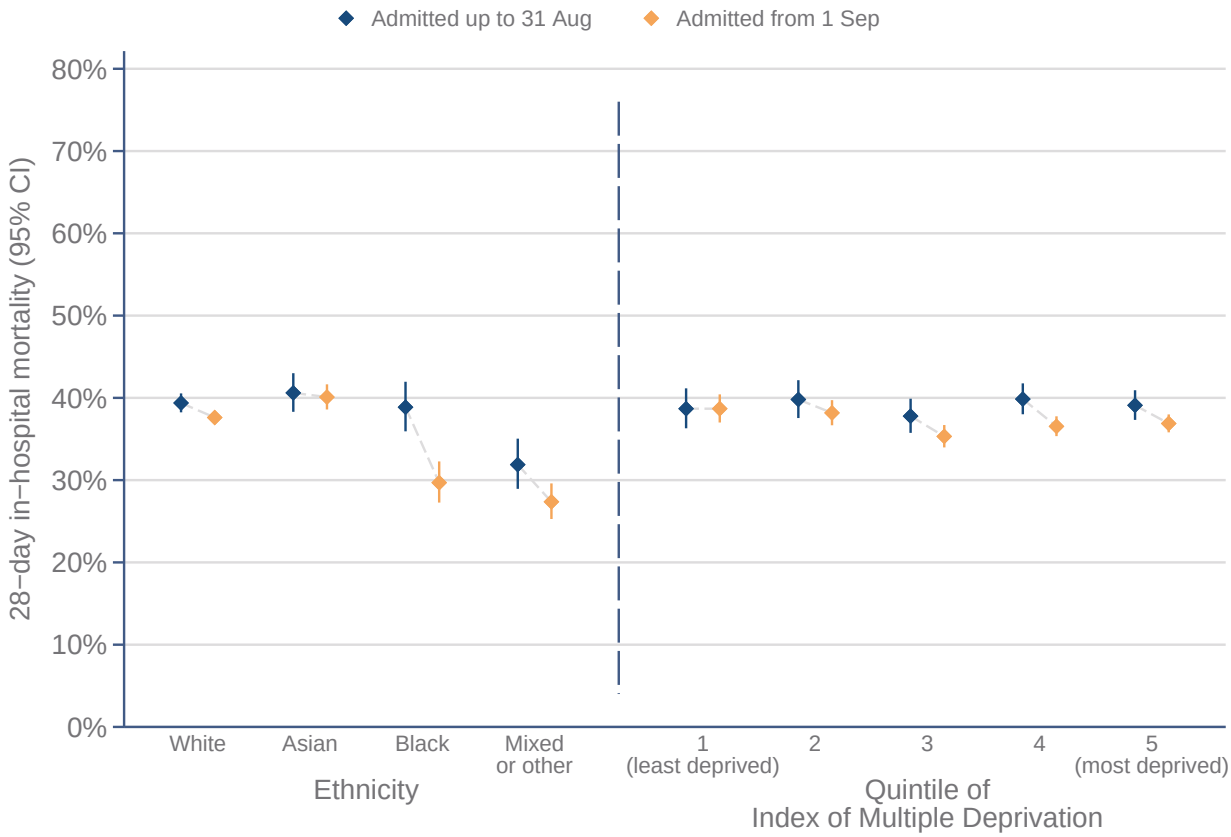


Figure 43. 28-day in-hospital mortality by patient characteristics (demographics continued)

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).

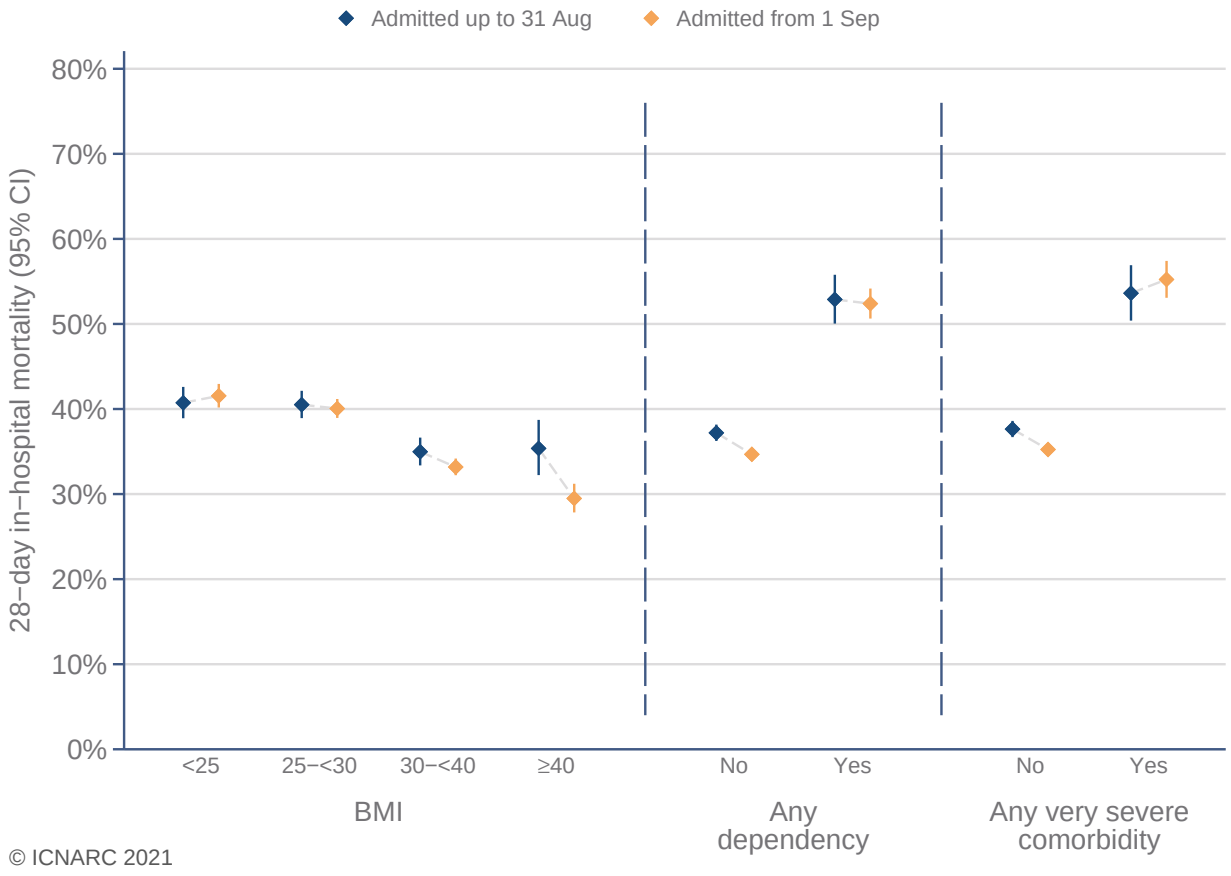


Figure 44. 28-day in-hospital mortality by patient characteristics (medical history)

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).

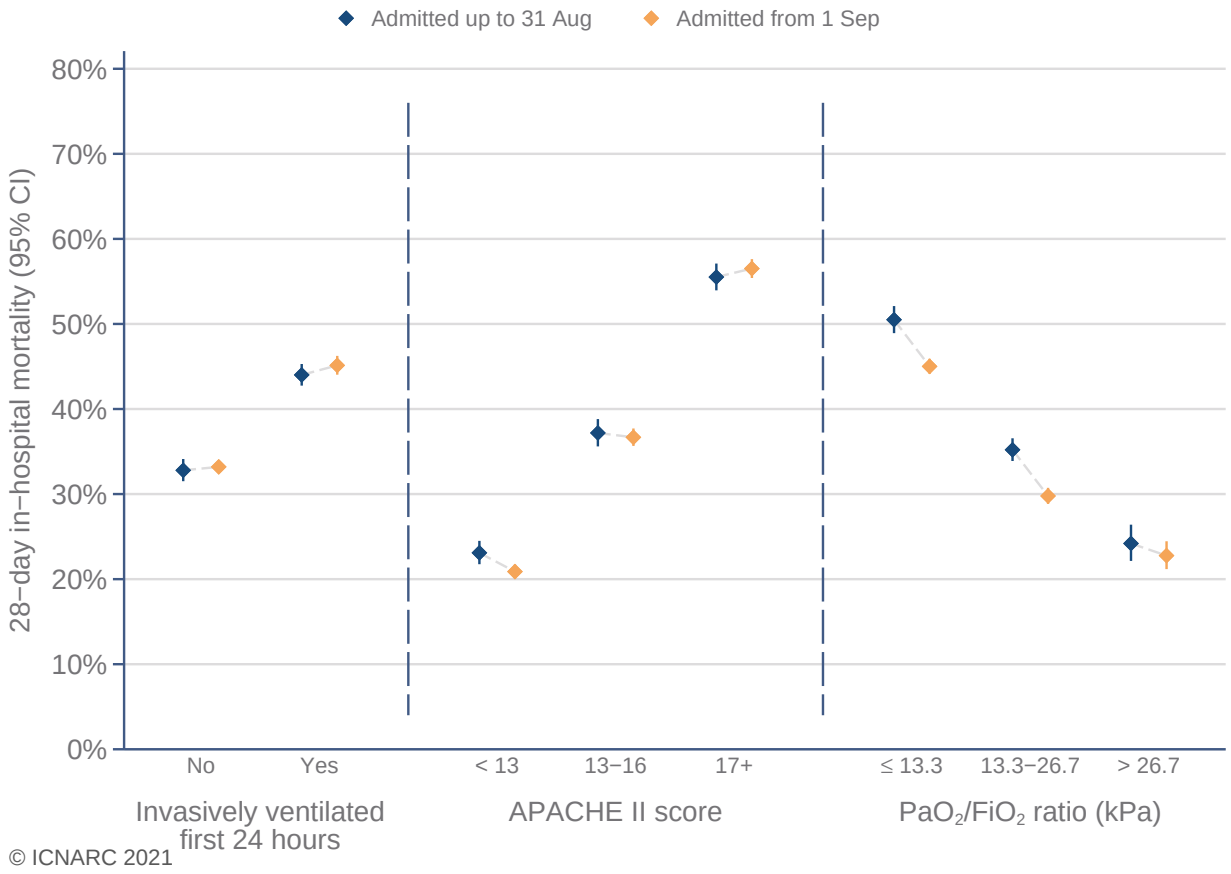


Figure 45. 28-day in-hospital mortality by patient characteristics (indicators of acute severity *)

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 102. 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 46-48 and compared with those admitted up to 31 August 2020.

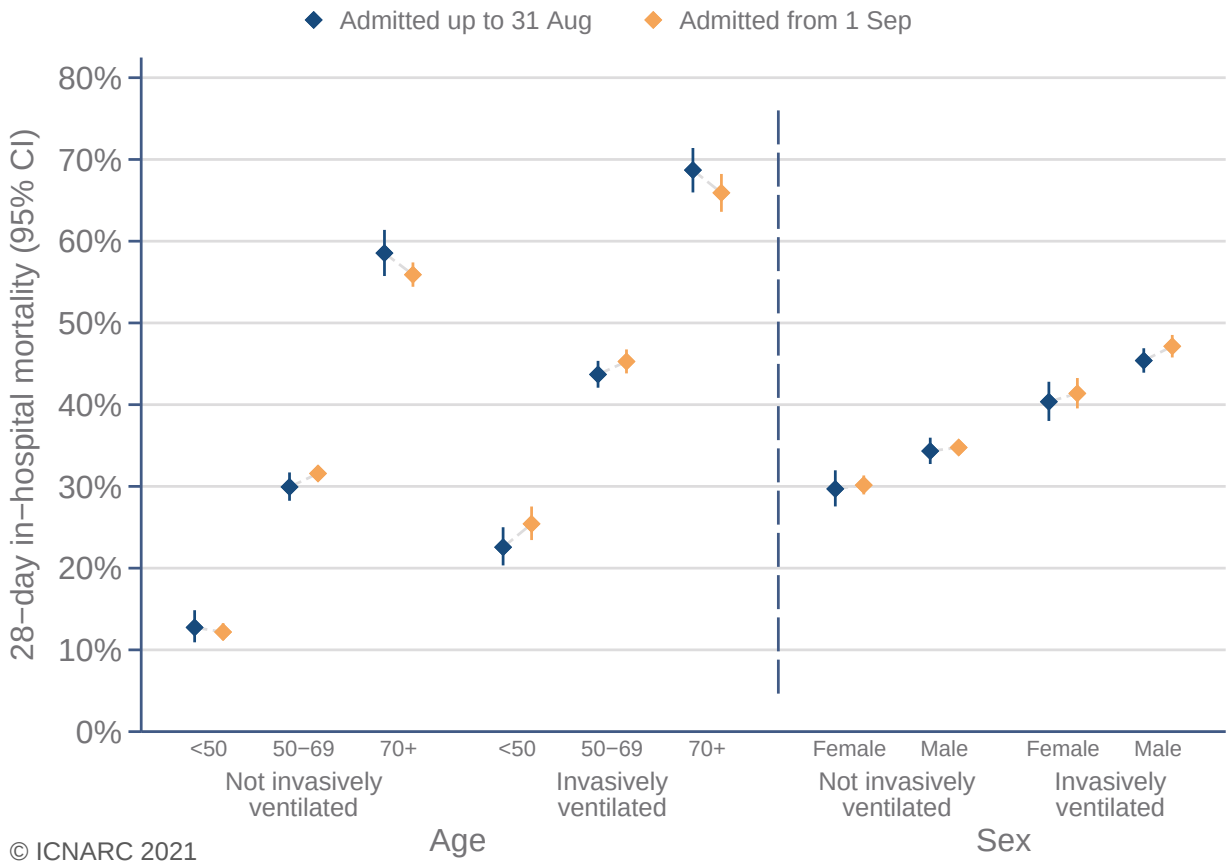


Figure 46. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics)

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).

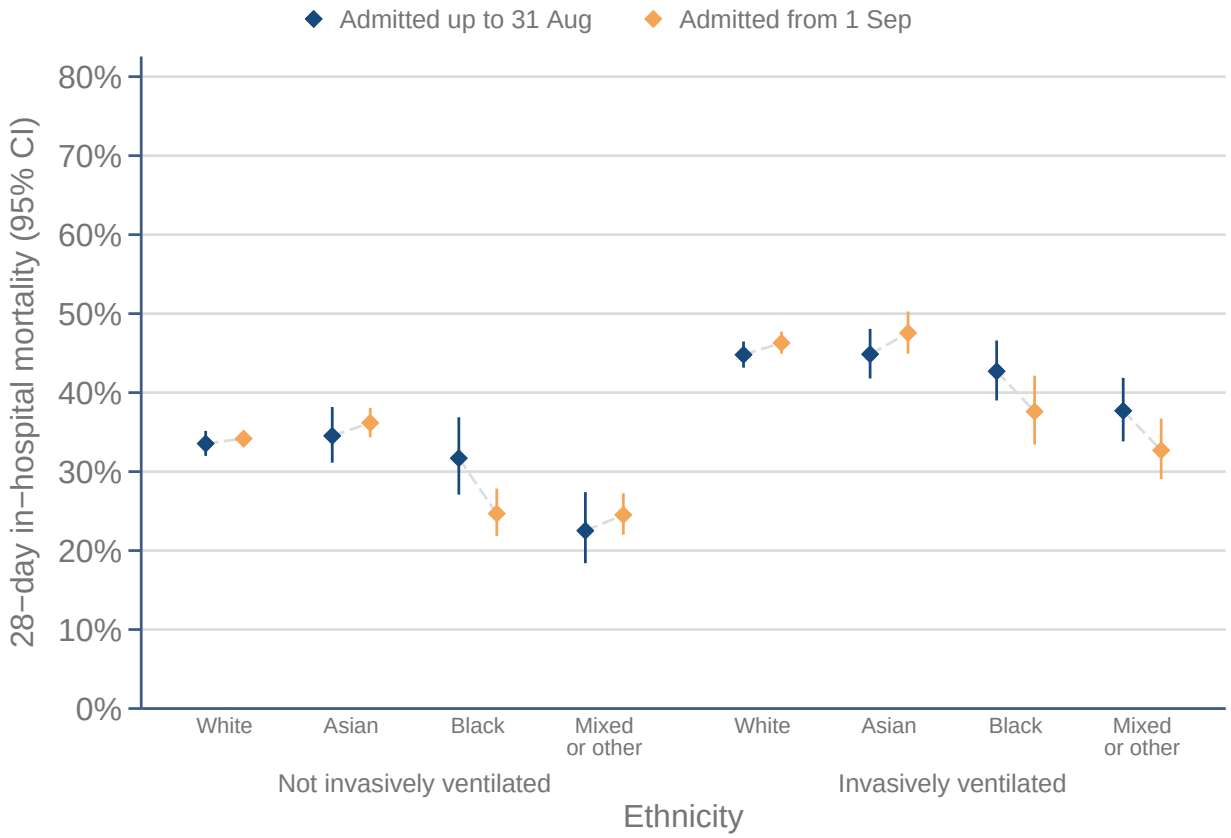


Figure 47. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics continued)

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).

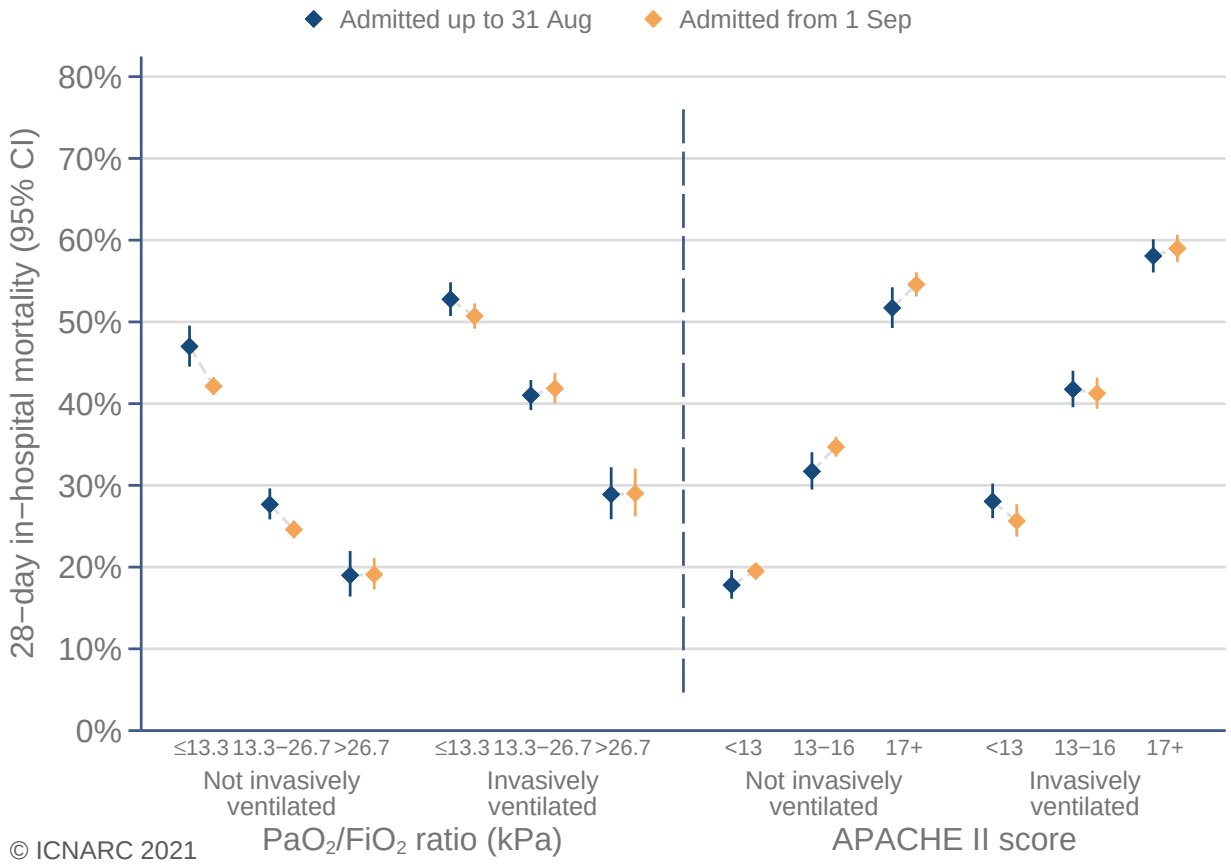


Figure 48. 28-day in-hospital mortality by patient characteristics and invasive ventilation (acute severity)

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 102. 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 49 and compared with those admitted up to 31 August 2020.

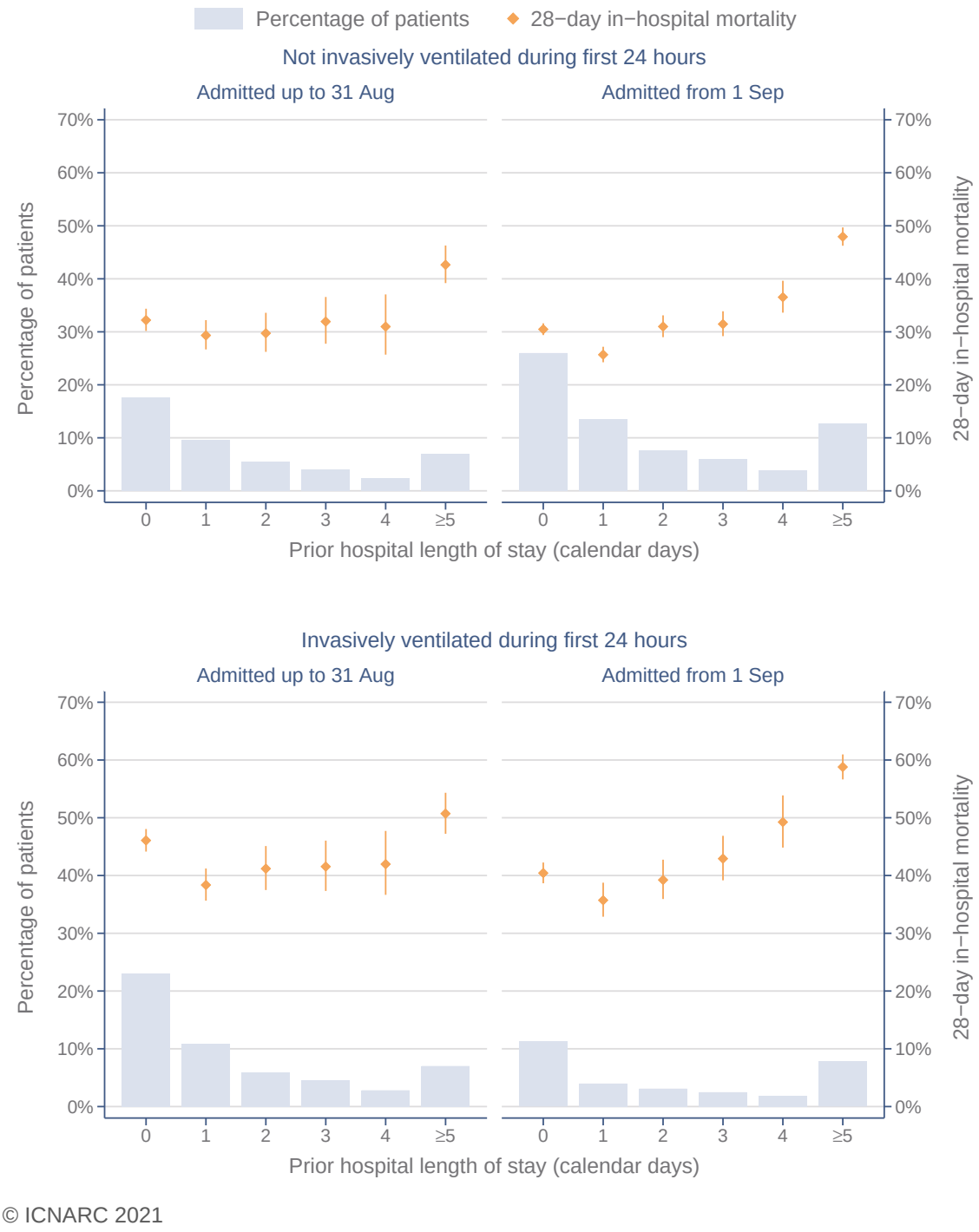


Figure 49. Percentage of patients and 28-day in-hospital mortality by invasive ventilation and prior hospital length of stay

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).

Comparison of adjusted 28-day in-hospital mortality between time periods

Figure 50 shows hazard ratios comparing 28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to 31 March 2021 compared with those admitted up to 31 August 2020 across patient subgroups. Hazard ratios are calculated from Cox proportional hazards models adjusted for all the subgroup variables shown and for physiology measured during the first 24 hours of critical care. Dashed vertical line shows the overall adjusted hazard ratio between the time periods.

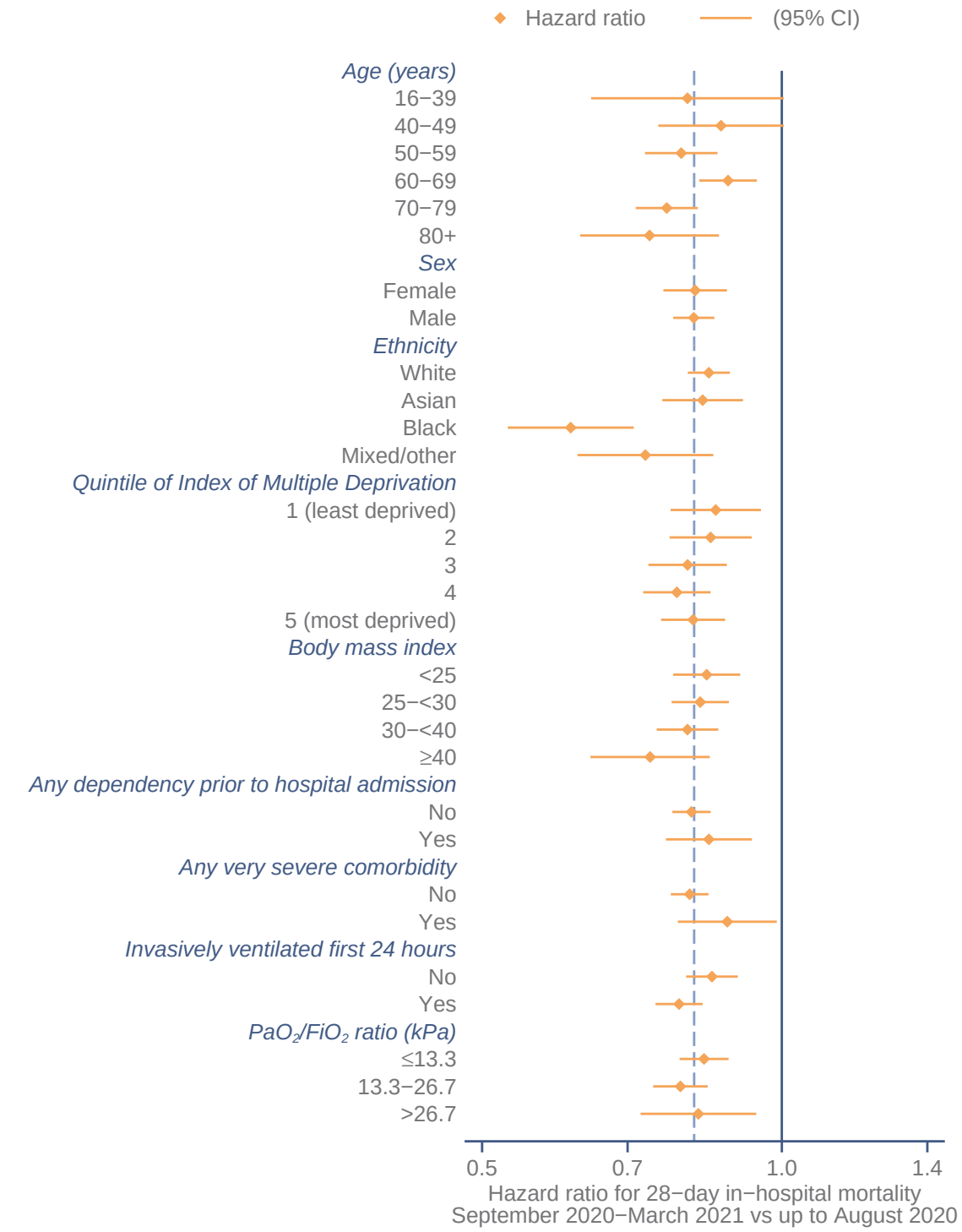
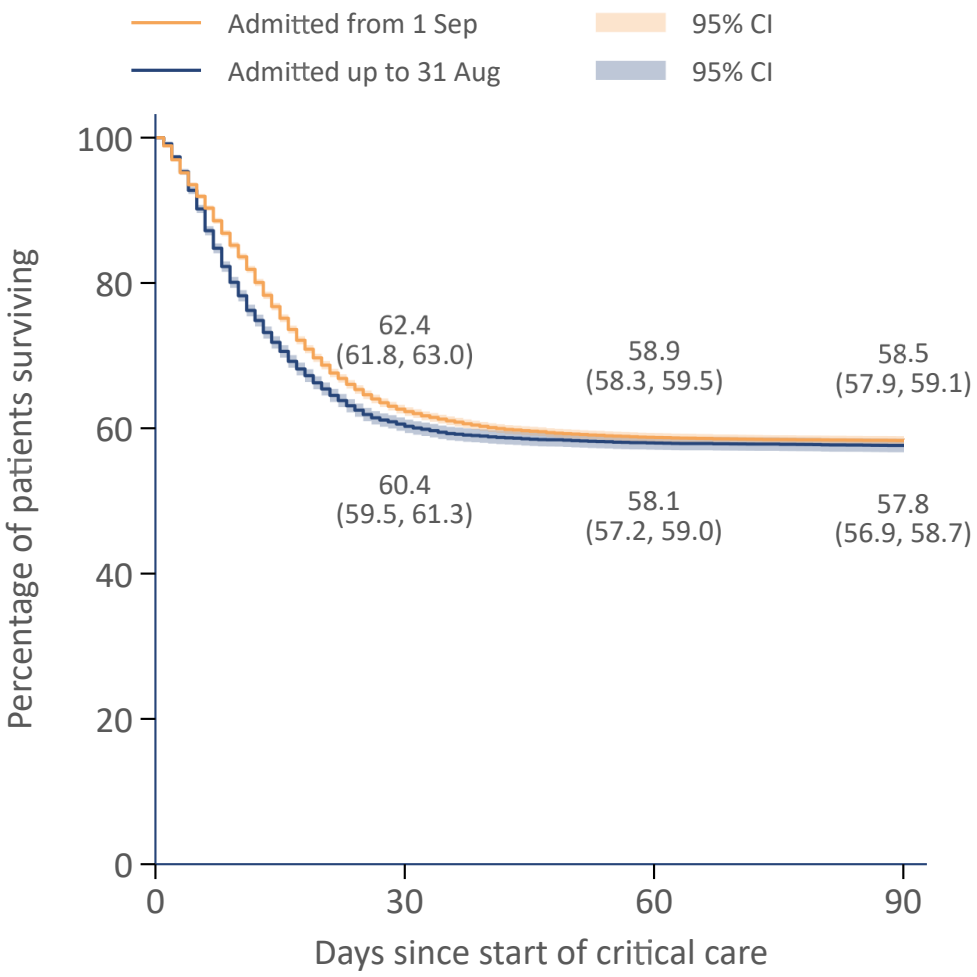


Figure 50. Hazard ratios comparing patients admitted September 2020 to March 2021 vs up to August 2020 by patient subgroup *

Hazard ratios from Cox proportional hazards models adjusted for all subgroup variables plus the following physiological measurements from the first 24 hours of critical care: highest heart rate; highest respiratory rate; highest blood lactate concentration; highest serum creatinine; highest serum urea; lowest platelet count; and neutrophil count associated with the lowest white blood cell count.

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



Admitted from 1 Sep				
At risk	25844	15940	14745	14093
Died (in hospital)	0	9666	10567	10671
Censored	0	238	532	1080
Admitted up to 31 Aug				
At risk	10954	6616	6347	6306
Died (in hospital)	0	4337	4588	4624
Censored	0	1	19	24

Figure 51. 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 52-54 and as full distributions in Figures 55-57.

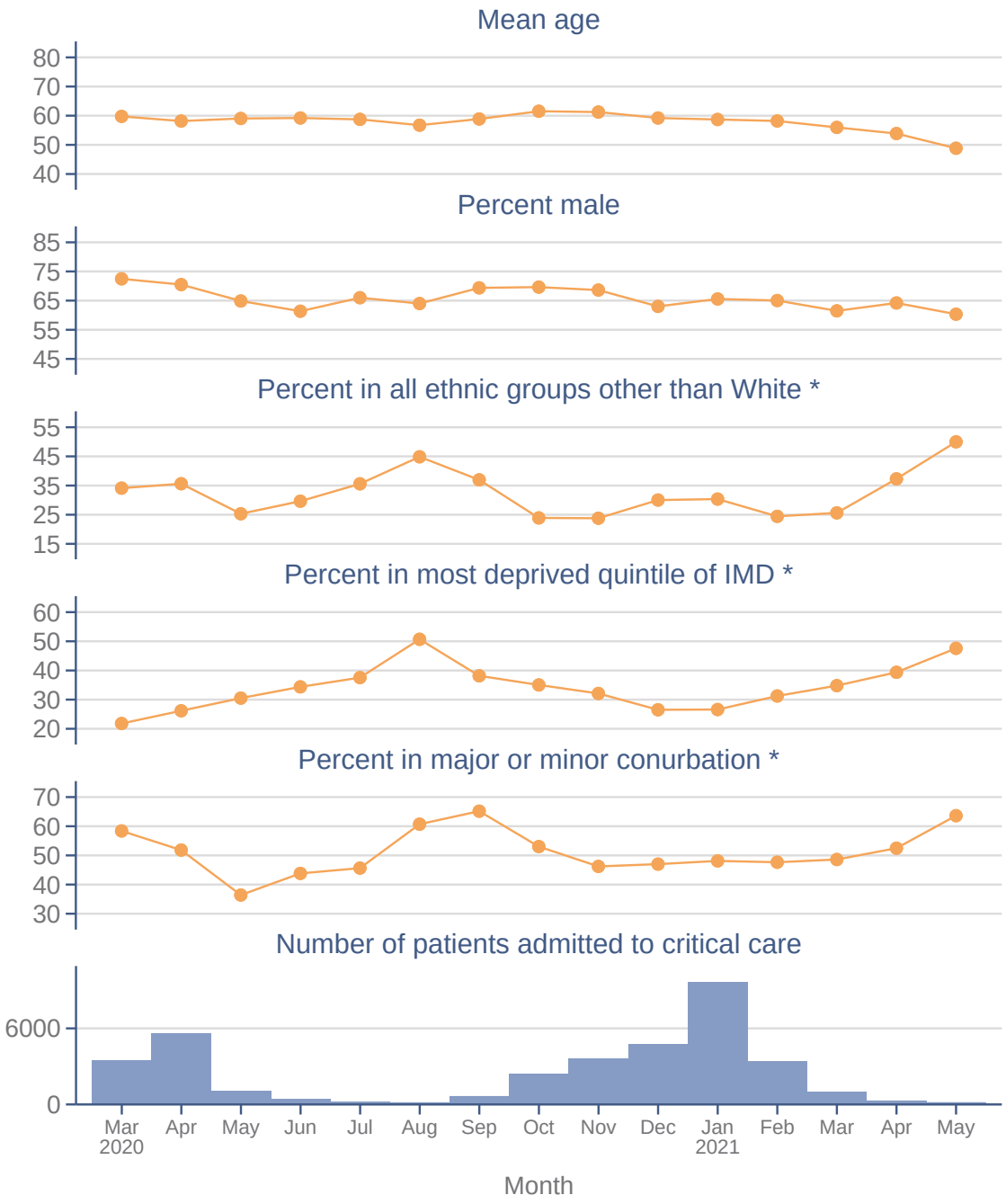


Figure 52. Monthly trend in patient characteristics (demographics)

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

* Please see Definitions on page 102. Dashed line and shading indicates incomplete month.

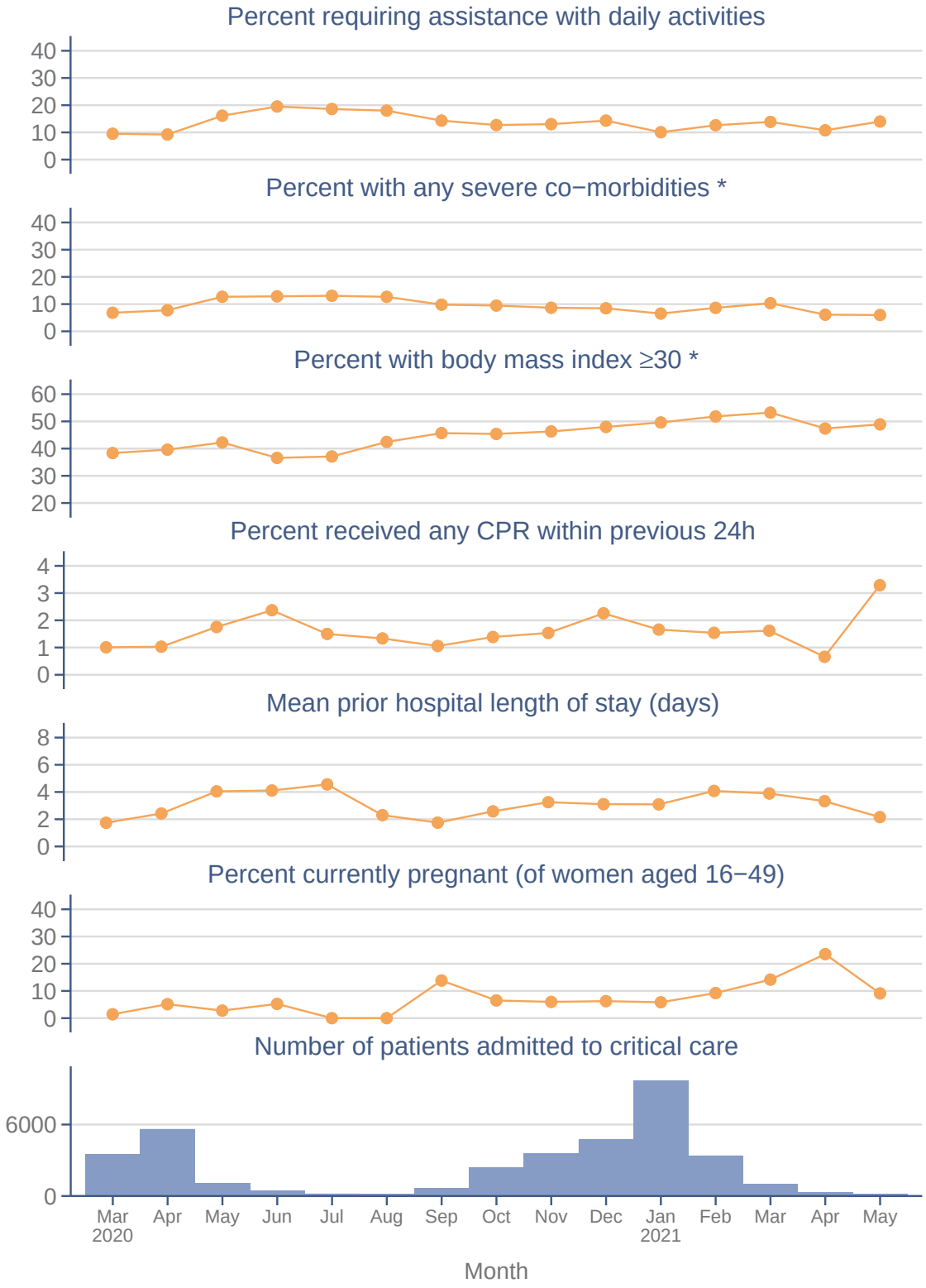


Figure 53. Monthly trend in patient characteristics (medical history)

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

* Please see Definitions on page 102. Dashed line and shading indicates incomplete month.

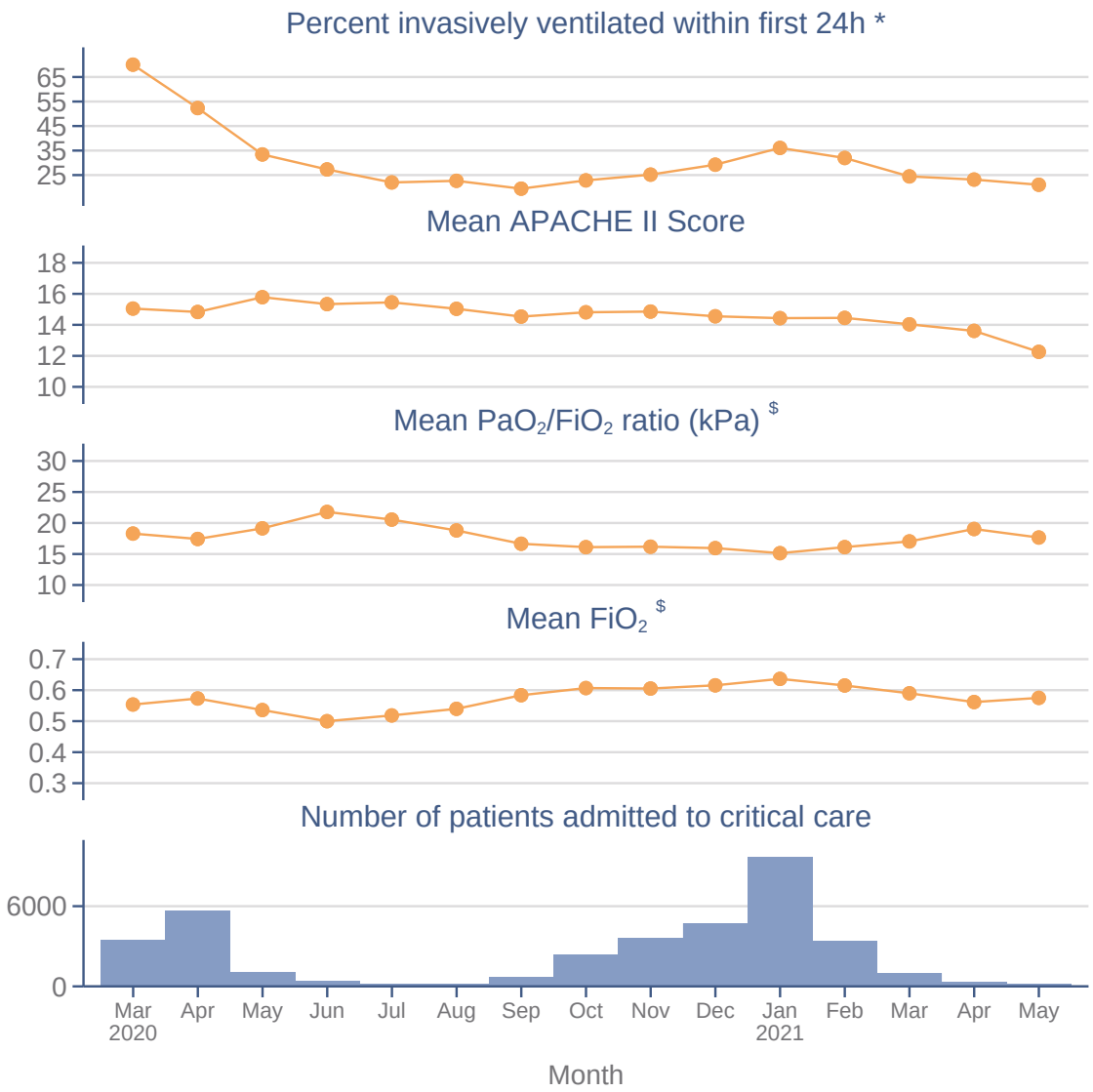


Figure 54. Monthly trend in patient characteristics (indicators of acute severity)

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

* Please see Definitions on page 102. 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.

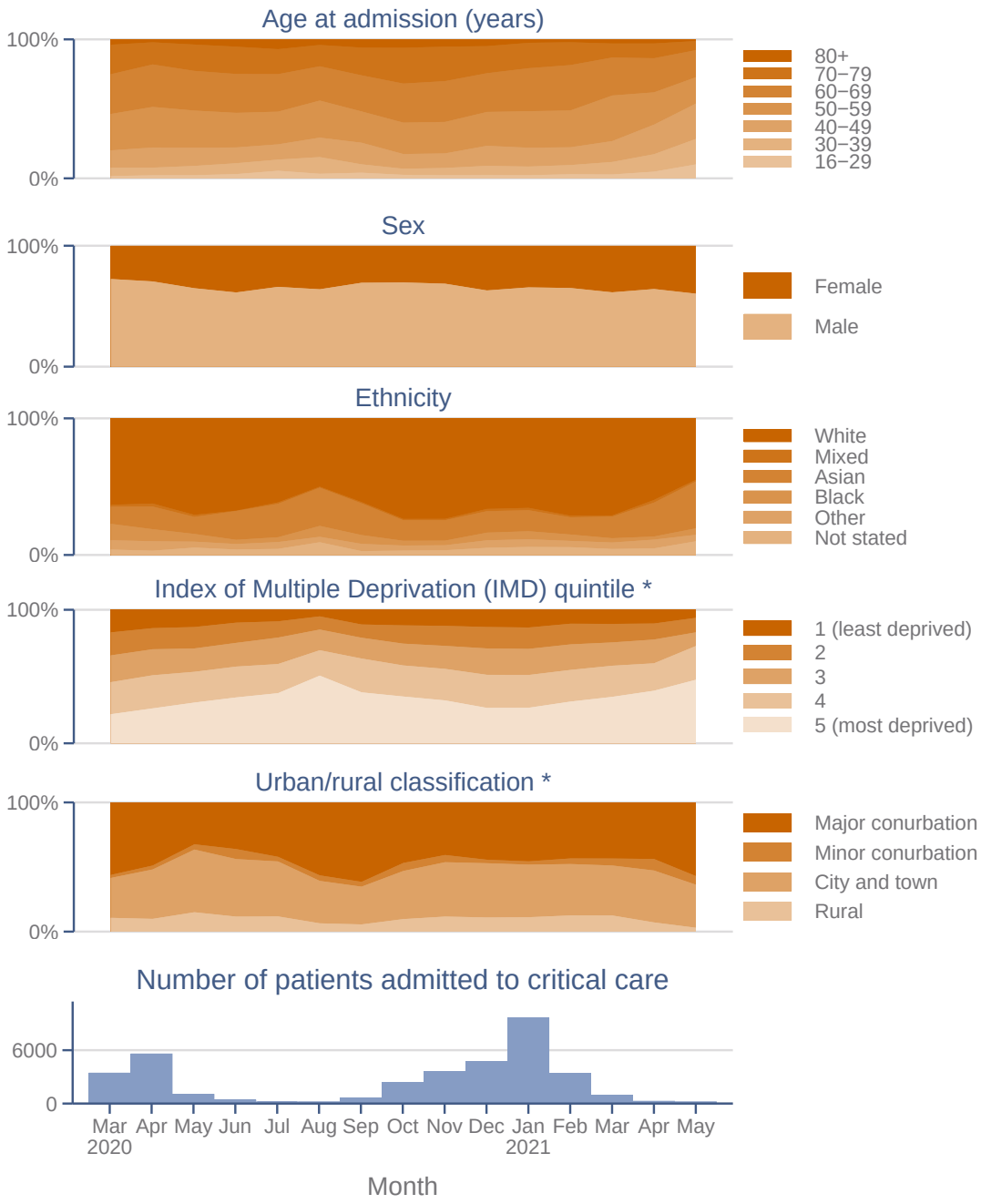


Figure 55. Monthly trend in patient characteristics (demographics) – distributions

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

* Please see Definitions on page 102. Shading indicates incomplete month.

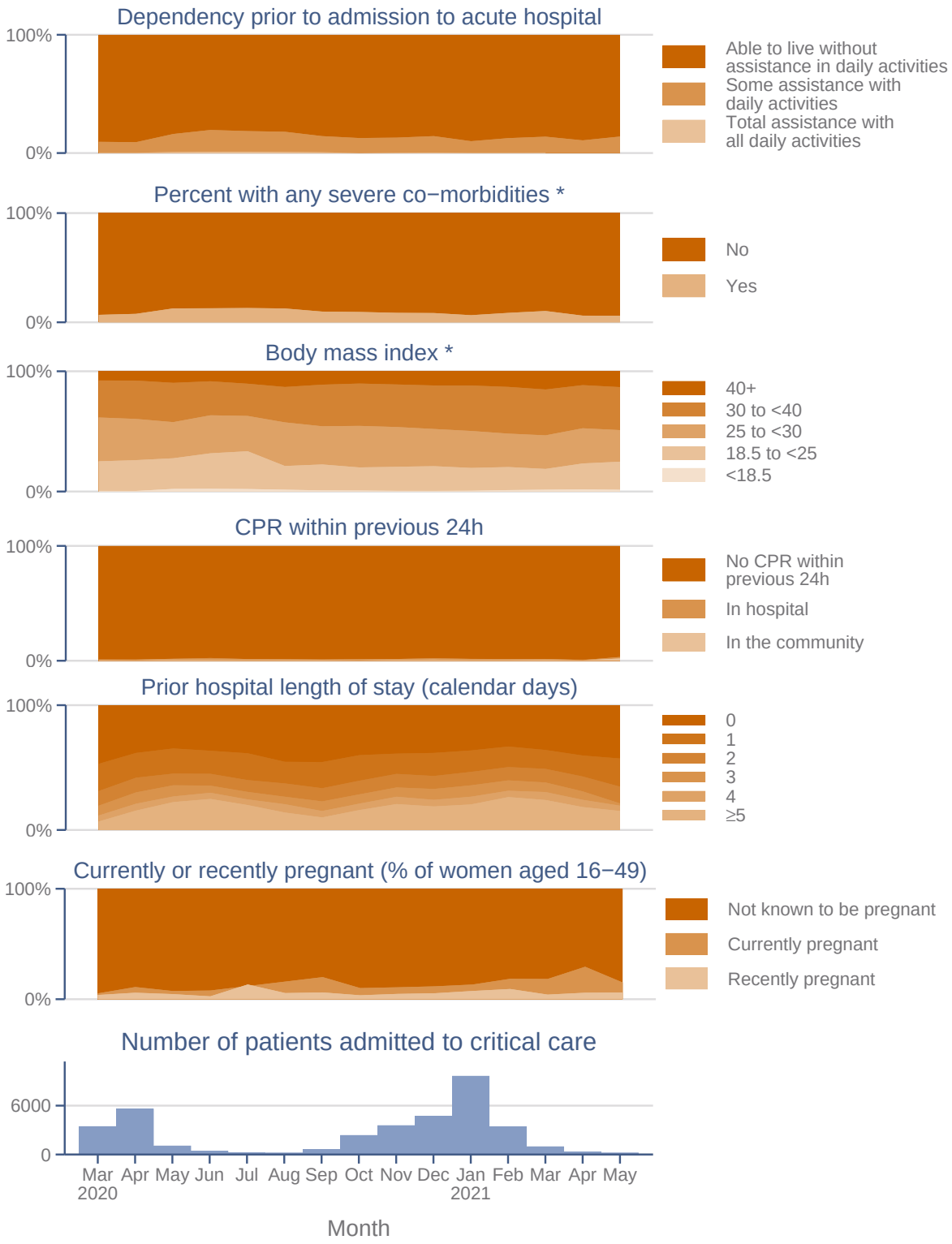


Figure 56. Monthly trend in patient characteristics (medical history) – distributions

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

* Please see Definitions on page 102. Shading indicates incomplete month.

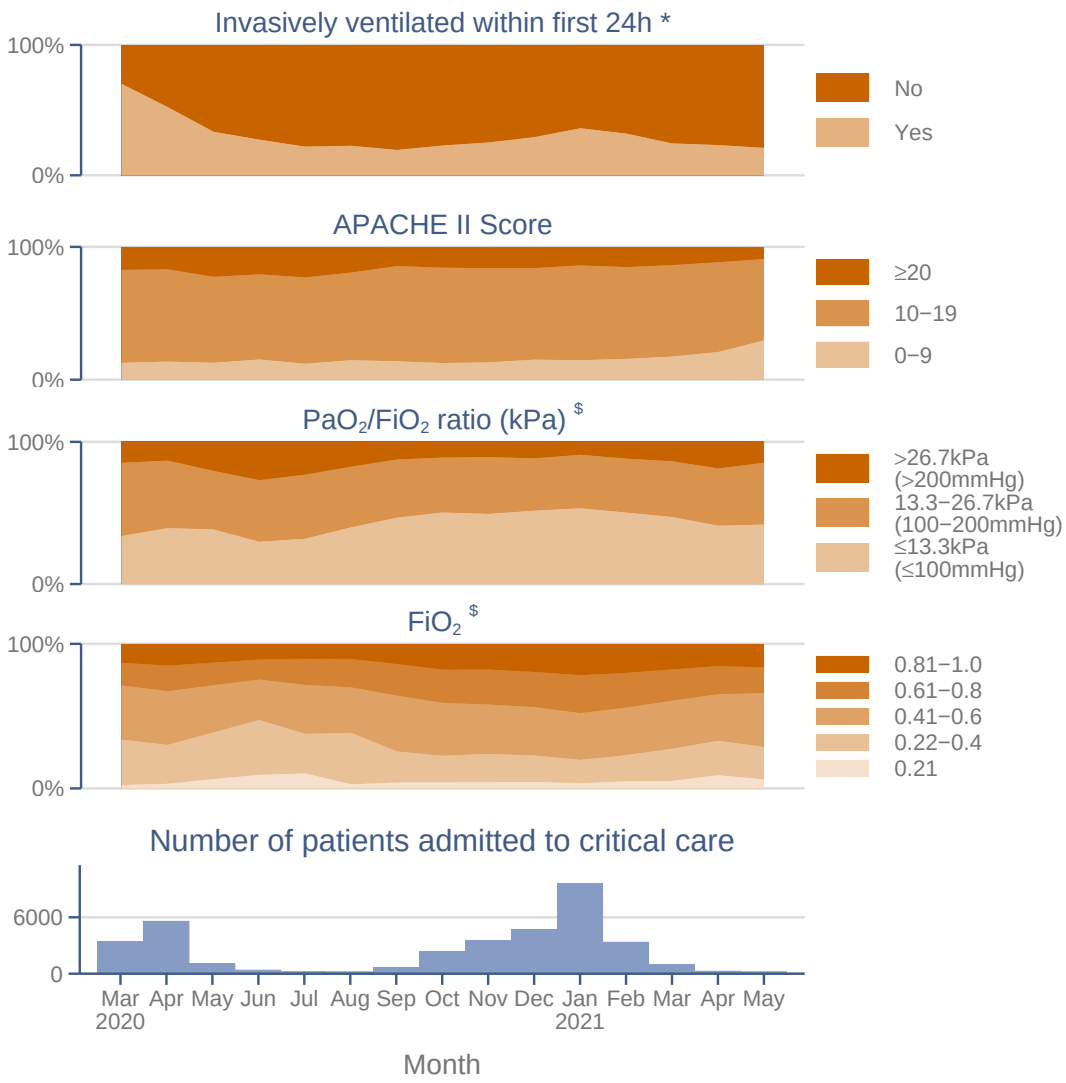


Figure 57. Monthly trend in patient characteristics (indicators of acute severity) – distributions

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 102. Shading indicates incomplete month.

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

Figure 58 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 59-61 show monthly variation in patient characteristics relating to ventilation and timing of critical care compared with the change in mortality.

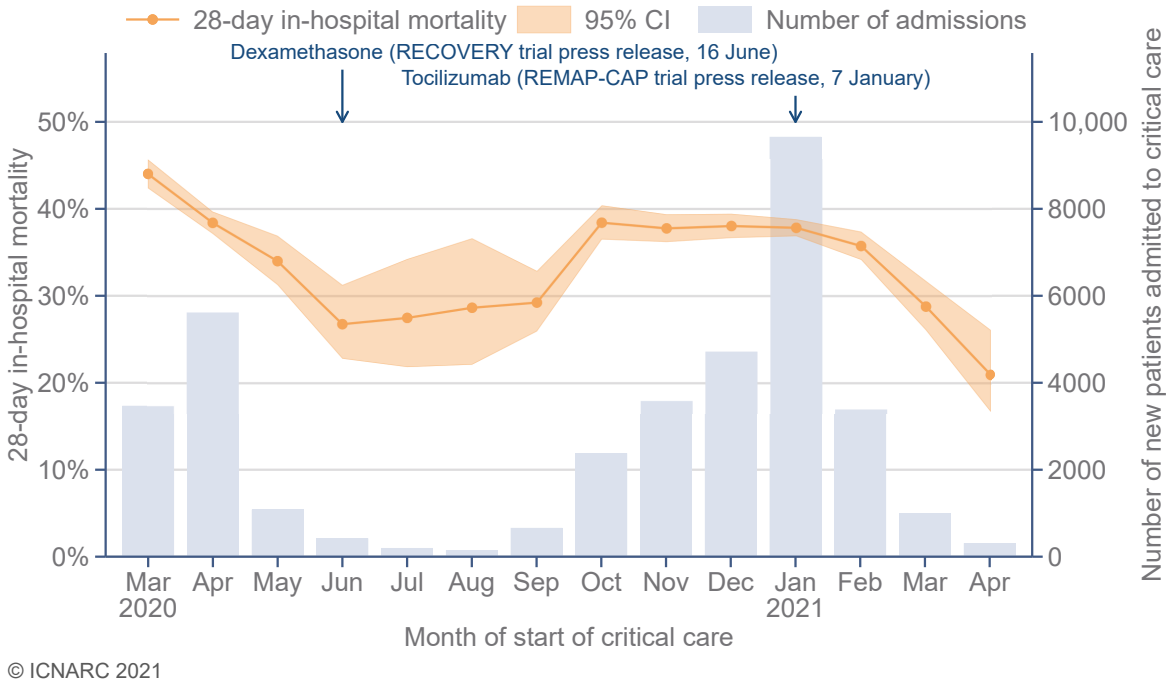


Figure 58. Number of admissions and 28-day in-hospital mortality by month

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).

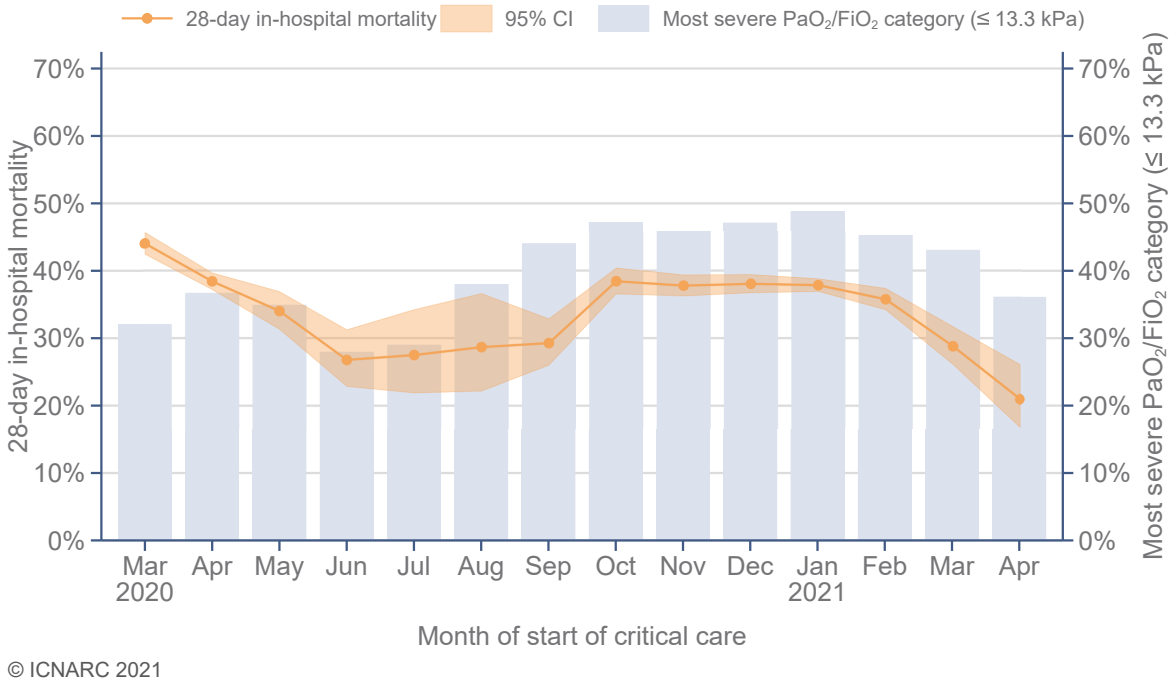


Figure 59. PaO_2/FiO_2 and 28-day in-hospital mortality by month

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).

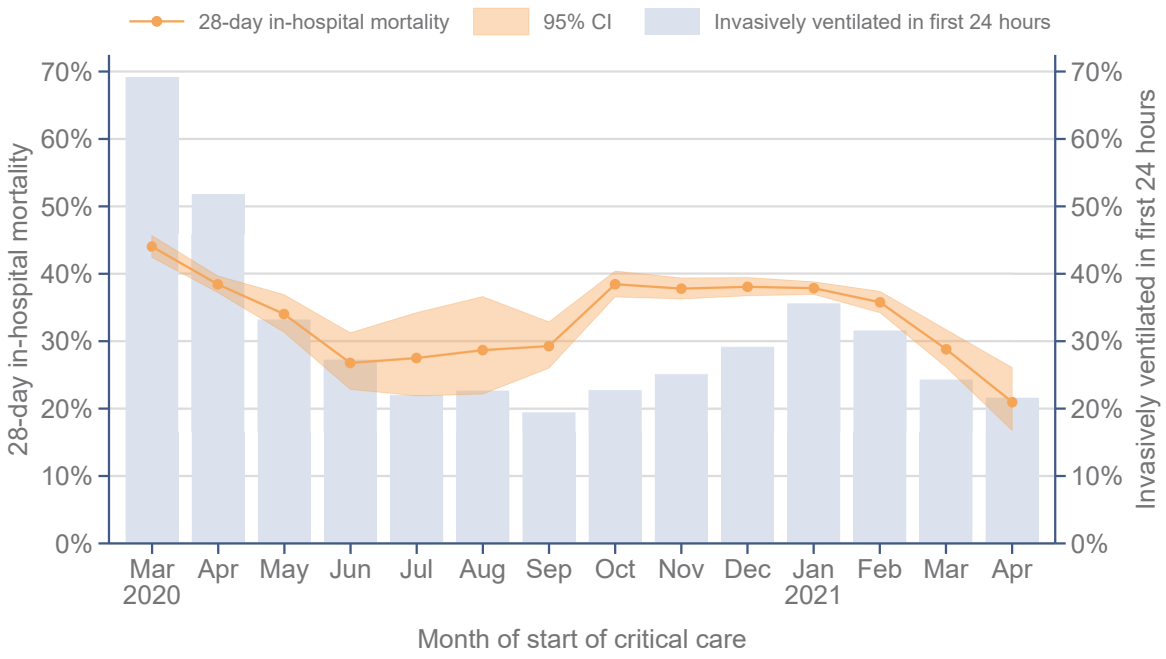


Figure 60. Invasive ventilation first 24 hours and 28-day in-hospital mortality by month

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).

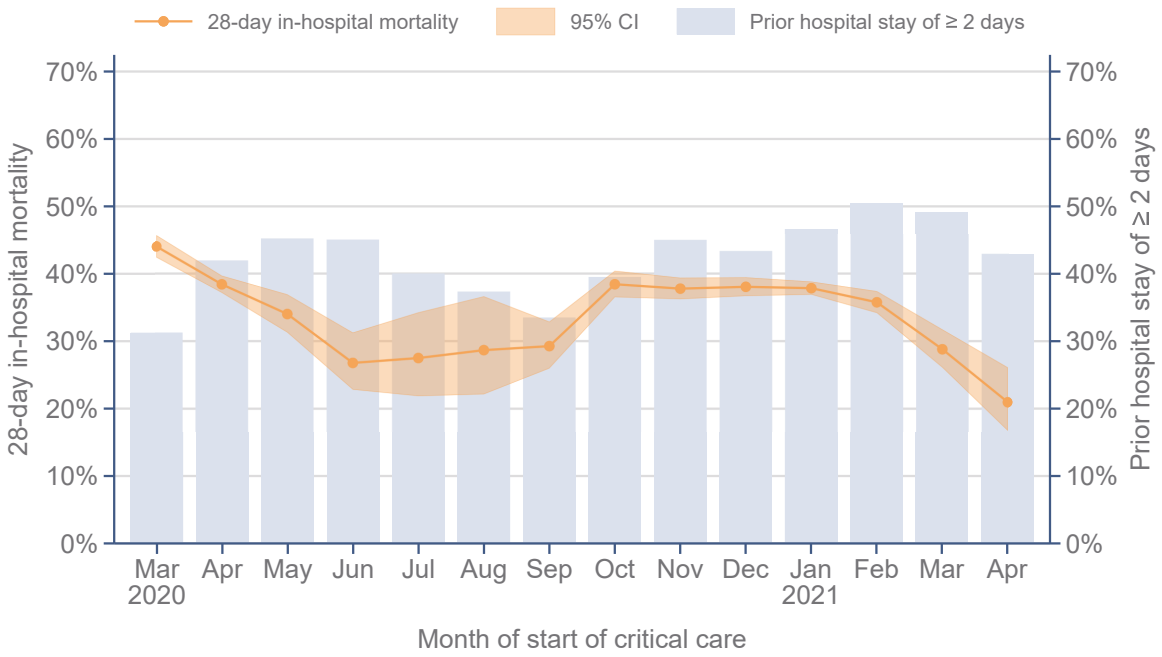


Figure 61. Prior hospital length of stay and 28-day in-hospital mortality by month

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 62 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.

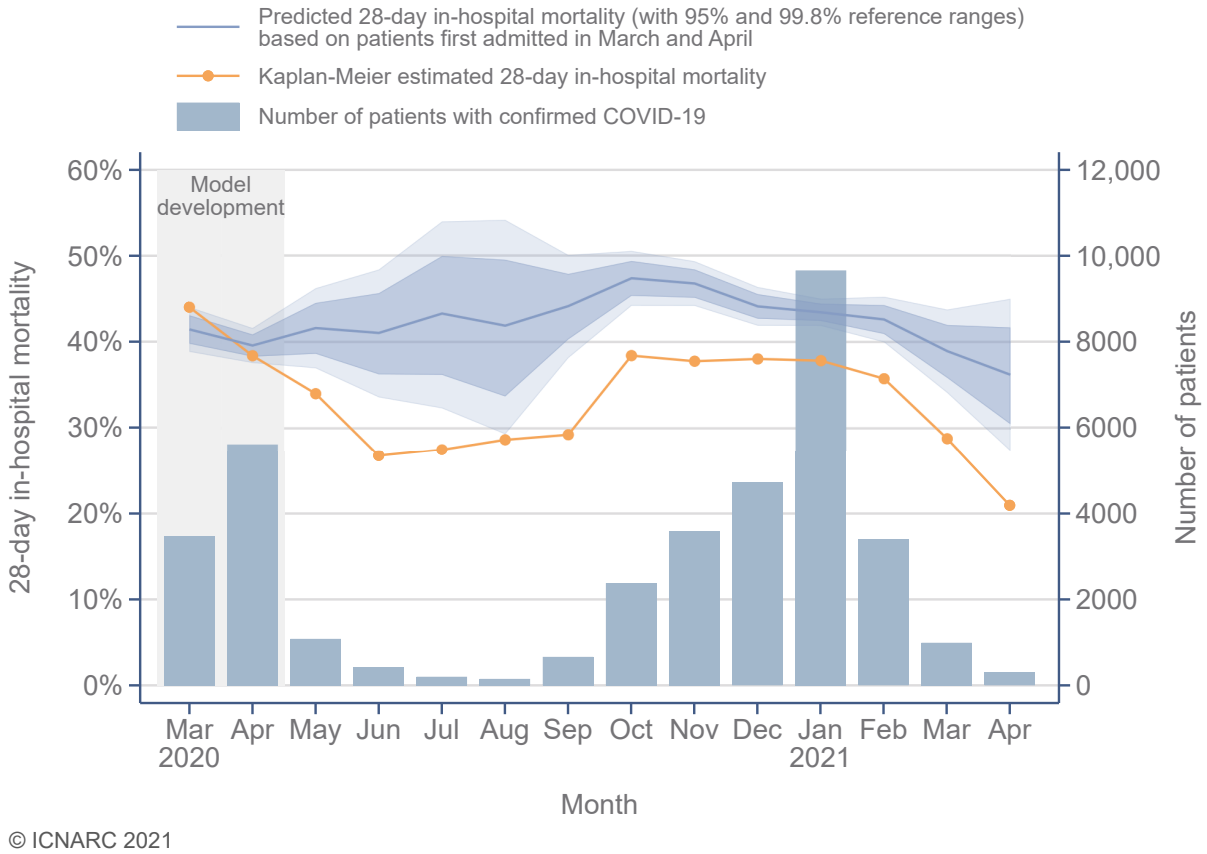


Figure 62. Risk-adjusted 28-day in-hospital mortality

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 63.

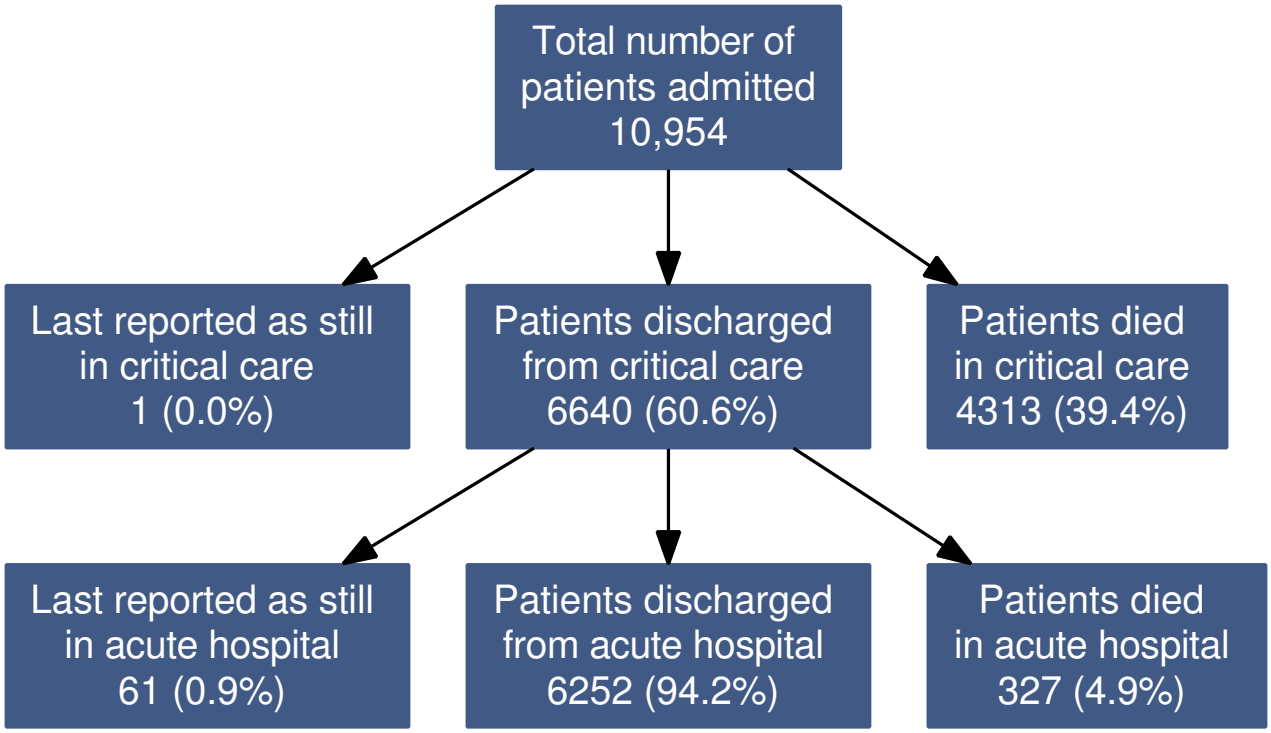


Figure 63. Critical care and acute hospital outcomes for patients admitted up to 31 August 2020

Of 10,182 patients critically ill with confirmed COVID-19 admitted up to 31 May 2020, 5733 have been discharged alive from acute hospital and, of these, 154 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; 46:2035-47. 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* 2021; 49:102-11. 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* 2021; 203:565-74. 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; 106:1503-11. doi:10.1136/heartjnl-2020-317393
- Pairo-Castineira E, Clohisey S, Klaric L, et al. Genetic mechanisms of critical illness in Covid-19. *Nature* 2021; 591:92-8. doi:10.1038/s41586-020-03065-y
- Forbes H, Morton CE, Bacon S, et al. Association between living with children and outcomes from covid-19: OpenSAFELY cohort study of 12 million adults in England. *BMJ* 2021; 372:n628. doi:10.1136/bmj.n628
- Aveyard P, Gao M, Lindson N, et al. Association between pre-existing respiratory disease and its treatments and severe COVID-19: a population cohort study. *Lancet Respir Med* 2021; doi:10.1016/S2213-2600(21)00095-3
- Mathur R, Rentsch CT, Morton C, et al. Ethnic differences in SARS-CoV-2 infection and COVID-19-related hospitalisation, intensive care unit admission, and death in 17 million adults in England: an observational cohort study using the OpenSAFELY platform. *Lancet* 2021; doi:10.1016/S0140-6736(21)00634-6
- Patone M, Thomas K, Hatch R, et al. Analysis of severe outcomes associated with the SARS-CoV-2 Variant of Concern 202012/01 in England using ICNARC Case Mix Programme and QResearch databases. *medRxiv* 2021; doi:10.1101/2021.03.11.21253364

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