icnarc intensive care national audit & research centre
25 years and counting...

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ICNARC report on COVID-19 in critical care:

England, Wales and Northern Ireland

8 January 2021

This report presents analyses of data on patients critically ill with confirmed COVID-19, reported to ICNARC up to 23:59 on 7 January 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 start of critical care:

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

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

Reporting process

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 13,850 admissions of 12,115 patients critically ill with confirmed COVID-19, either at or after the start of critical care, admitted from 1 September 2020 to date in England, Wales and Northern Ireland. Of these, data covering the first 24 hours of critical care have been submitted to ICNARC for 11,235 patients (Figure 1). Of the 12,115 total patients, 9059 have outcomes reported and 3056 patients were last reported as still receiving critical care. These patients are compared with a cohort of 10,935 patients with confirmed COVID-19 admitted up to 31 August 2020.

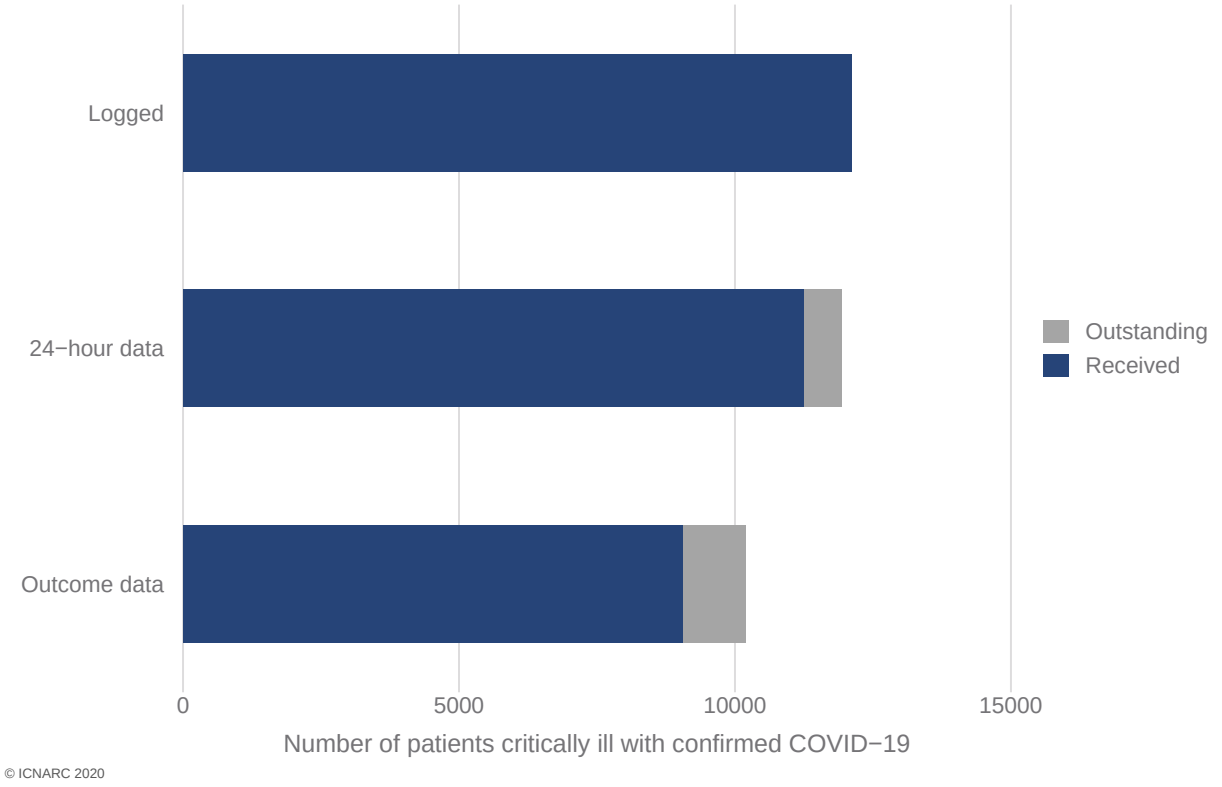


Figure 1. Numbers of patients with data included in this report and outstanding *

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

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

Of the 12,115 patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date, the largest numbers were admitted in the London, Midlands, North West, and North East And Yorkshire regions (Figure 2). Of the patients included in this week's report, 2938 patients were admitted to critical care within the past 14 days (25 Dec 2020 to 07 Jan 2021). The geographical spread of these patients is shown in Figure 3.

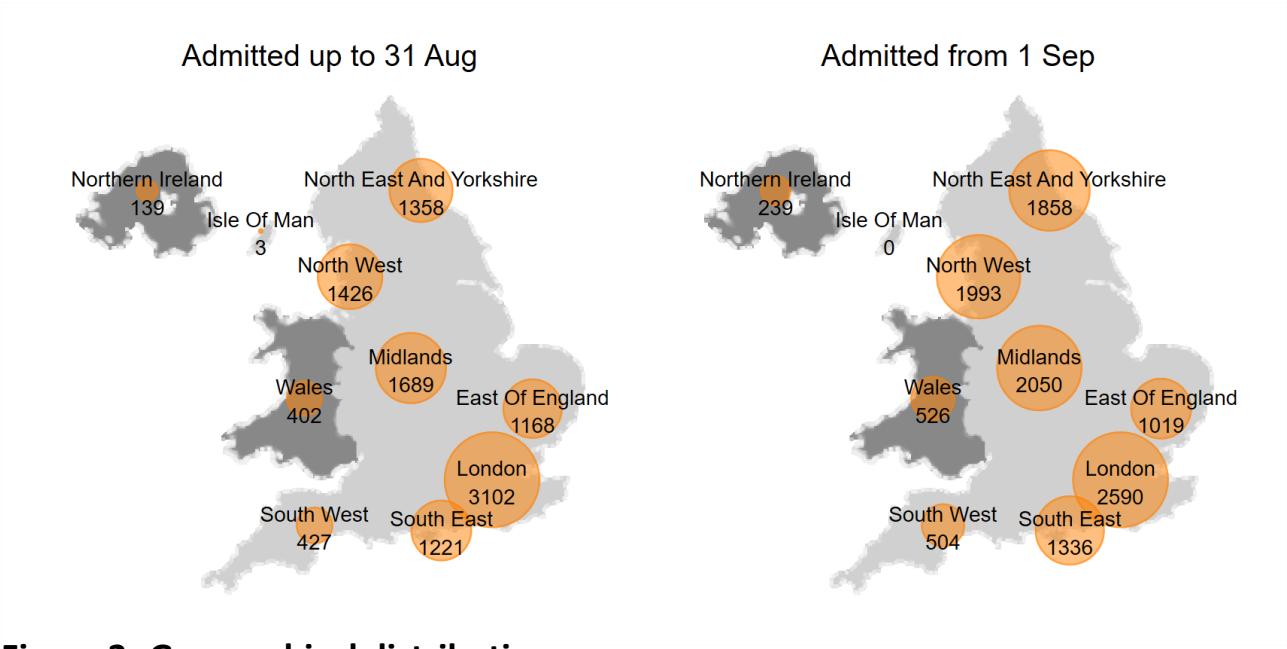


Figure 2. Geographical distribution

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

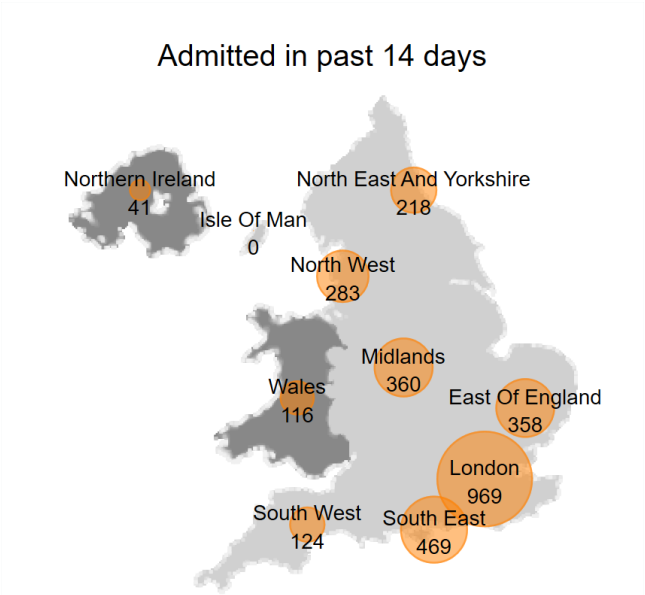


Figure 3. Geographical distribution – past 14 days

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

The numbers of new patients, cumulative numbers of patients and numbers of patients in critical care by date are shown in Figures 4-12. Please note that these figures are affected by a variable lag time for submission of data.

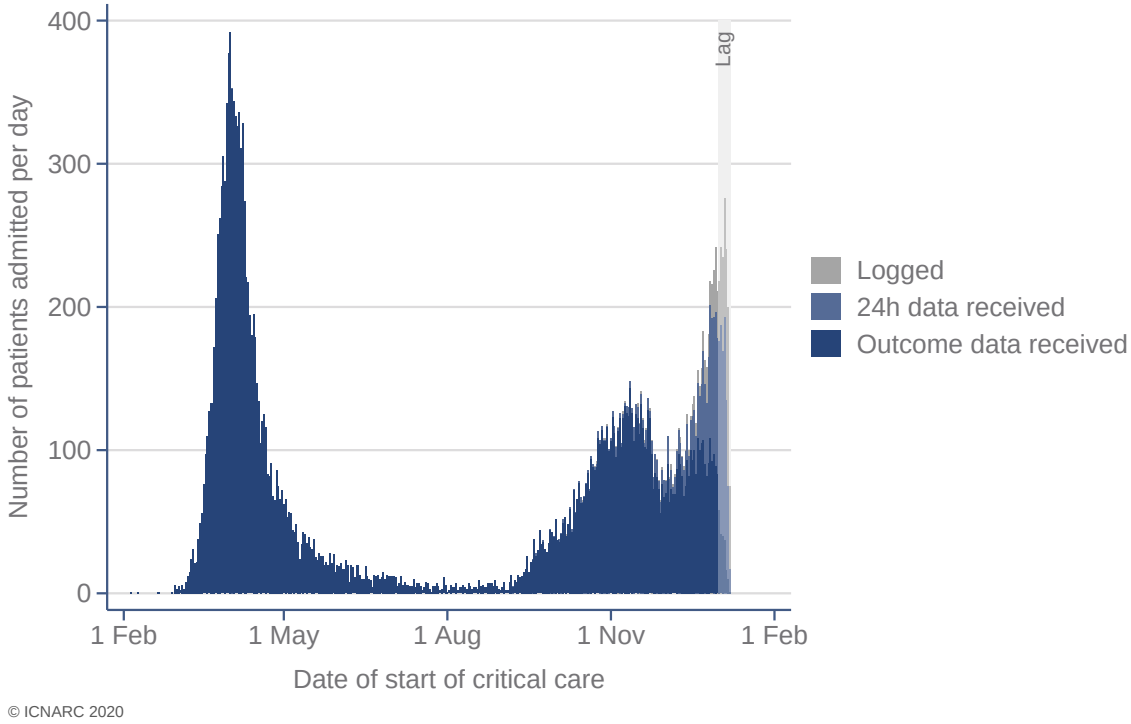


Figure 4. Number of new patients by start of critical care

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

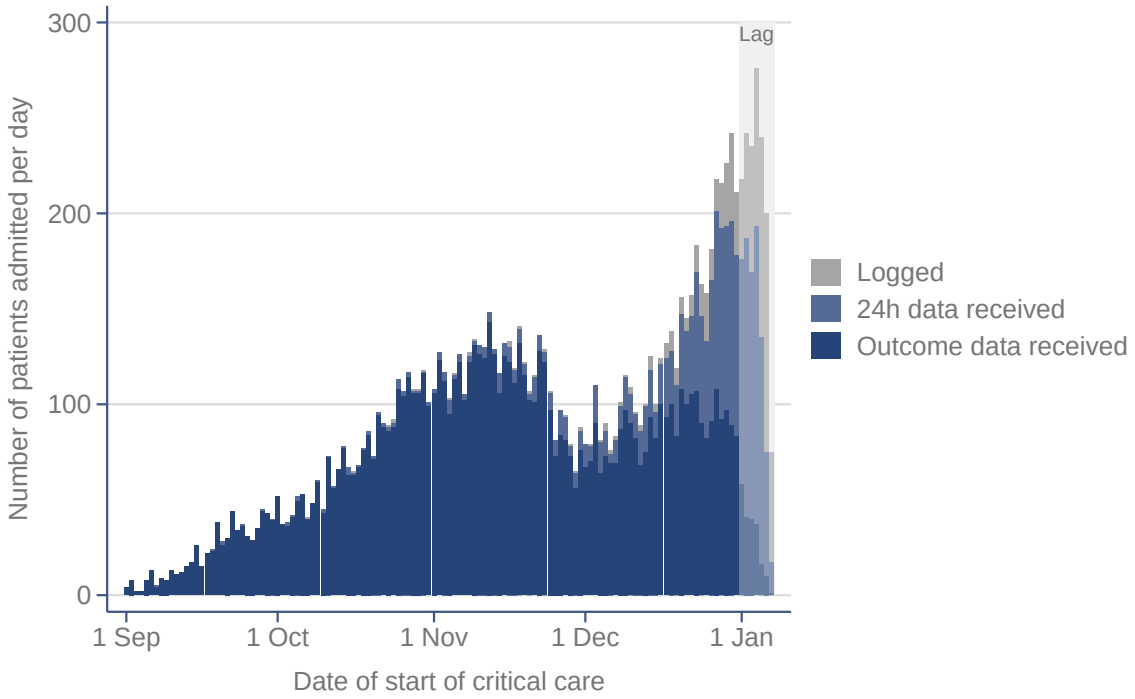


Figure 5. Number of new patients admitted from 1 September 2020 by date of start of critical care

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

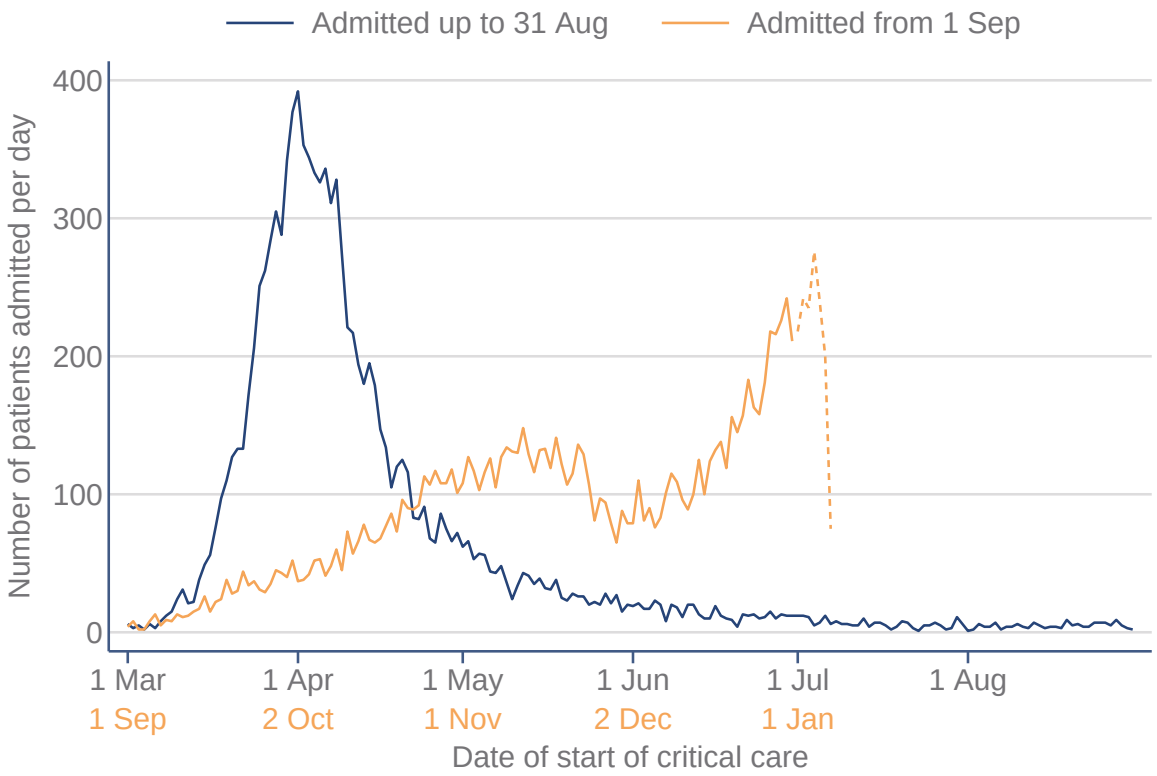


Figure 6. Number of new patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date *

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

* Dashed line indicates lag in data submission.

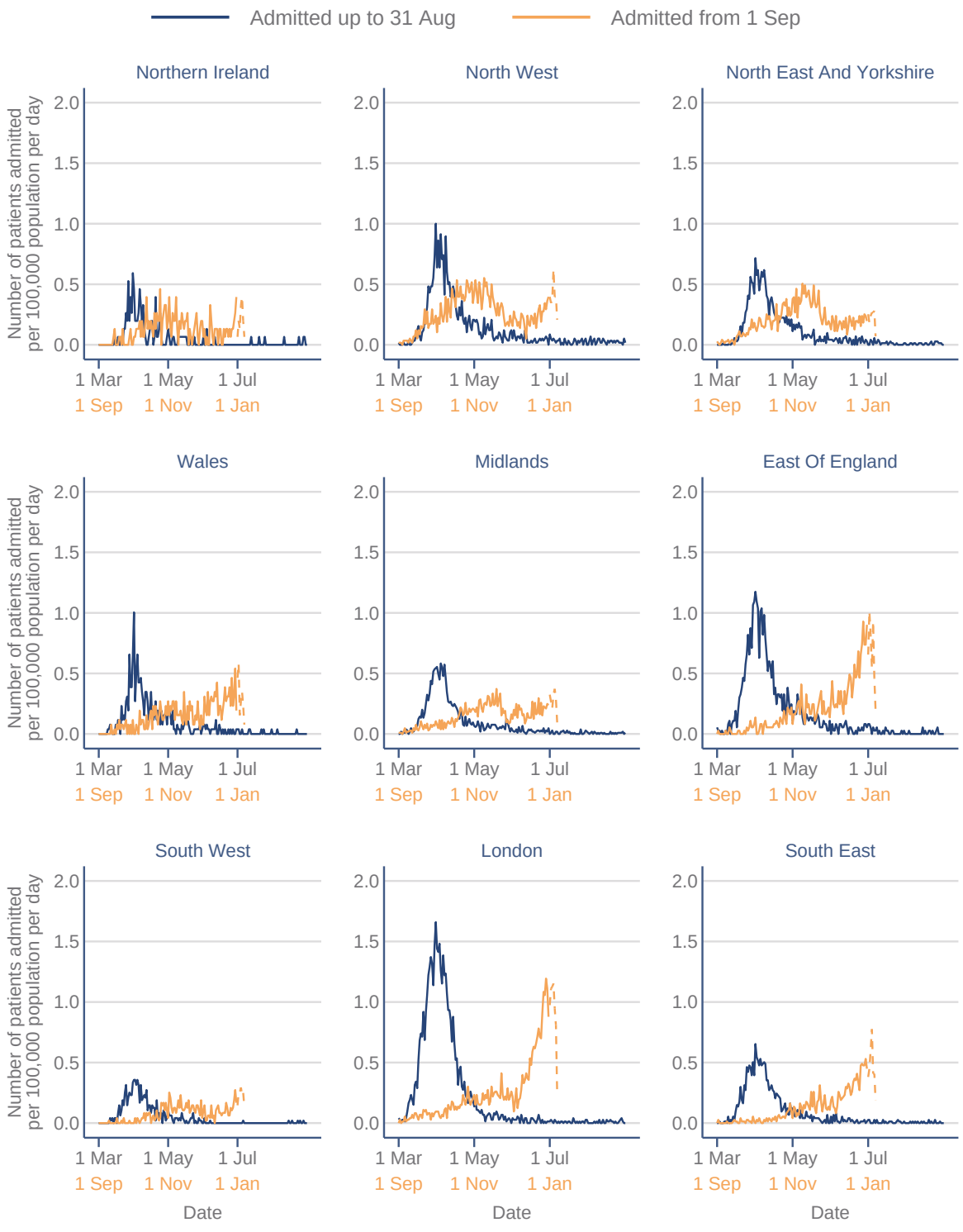


Figure 7. Number of new patients from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region *

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

* Dashed line indicates lag in data submission.

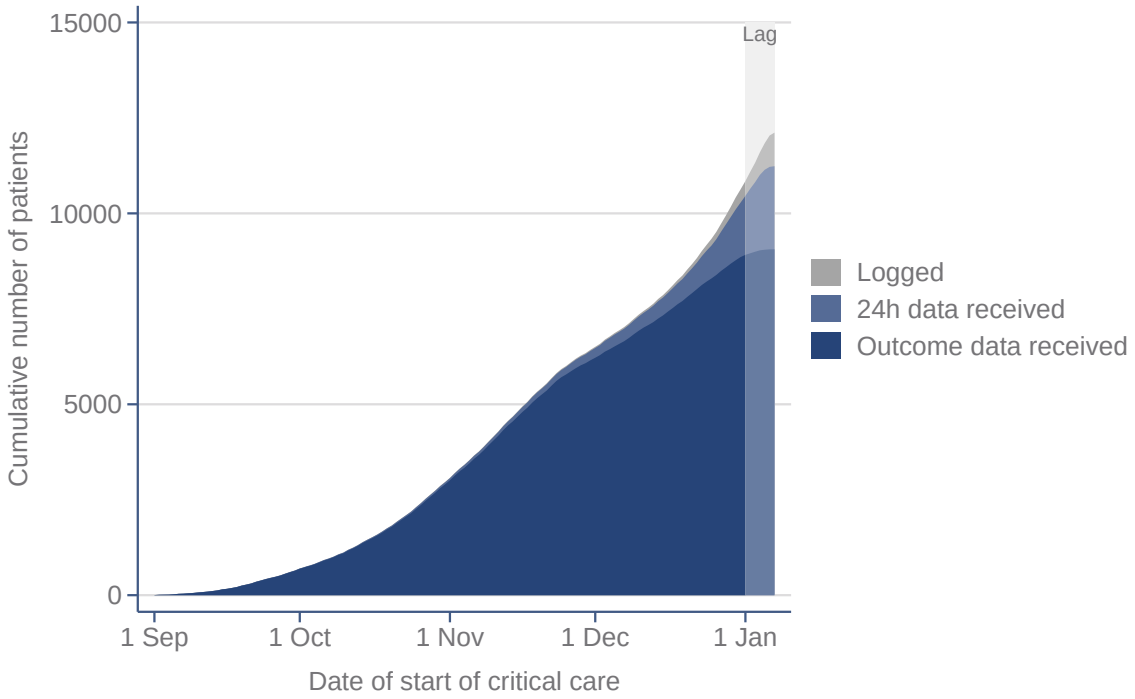


Figure 8. Cumulative number of patients

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

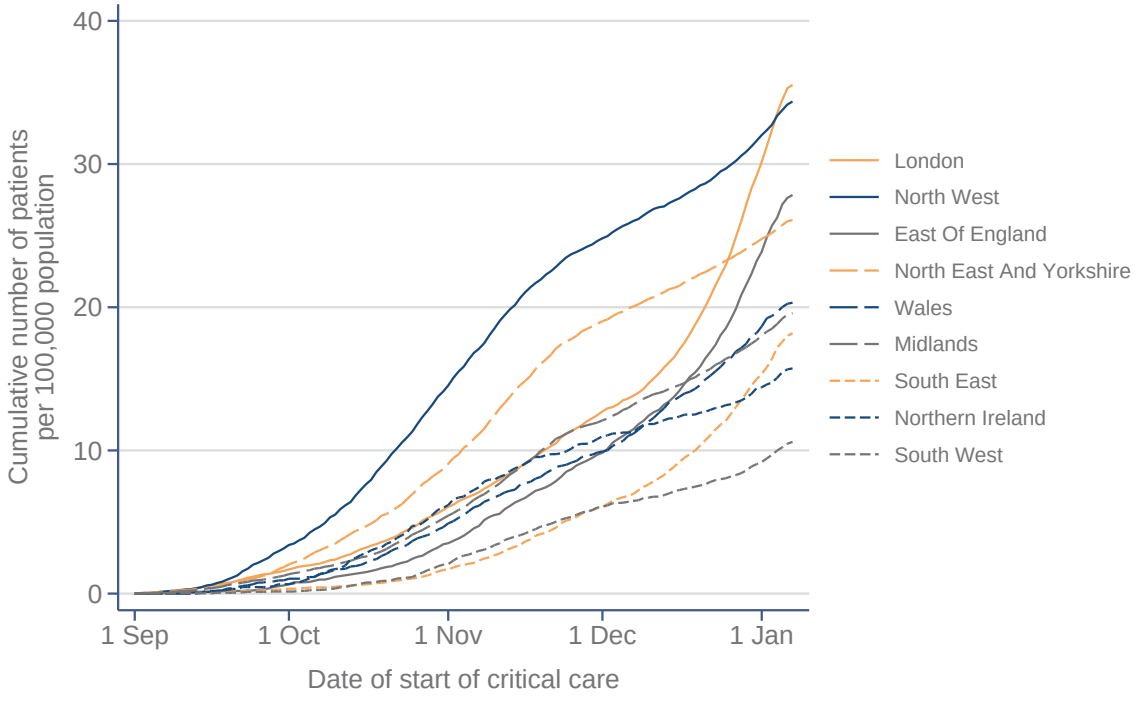


Figure 9. Cumulative number of patients per 100,000 adult population by region

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

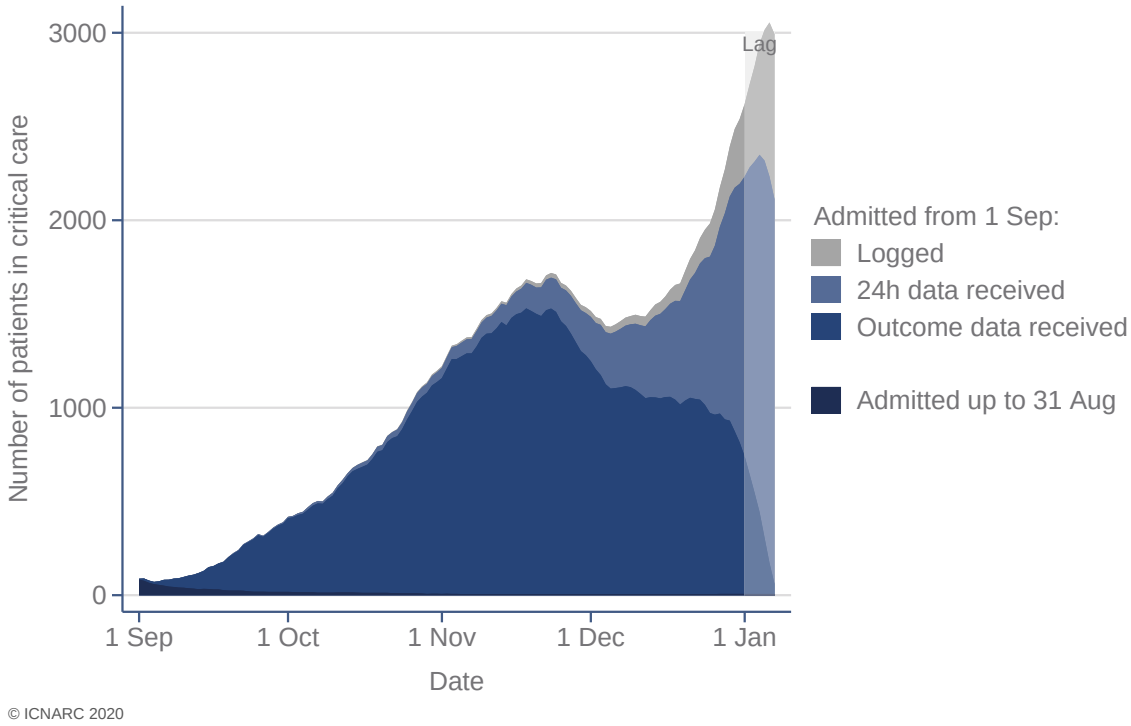


Figure 10. Number of patients in critical care *

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 7 January 2021.

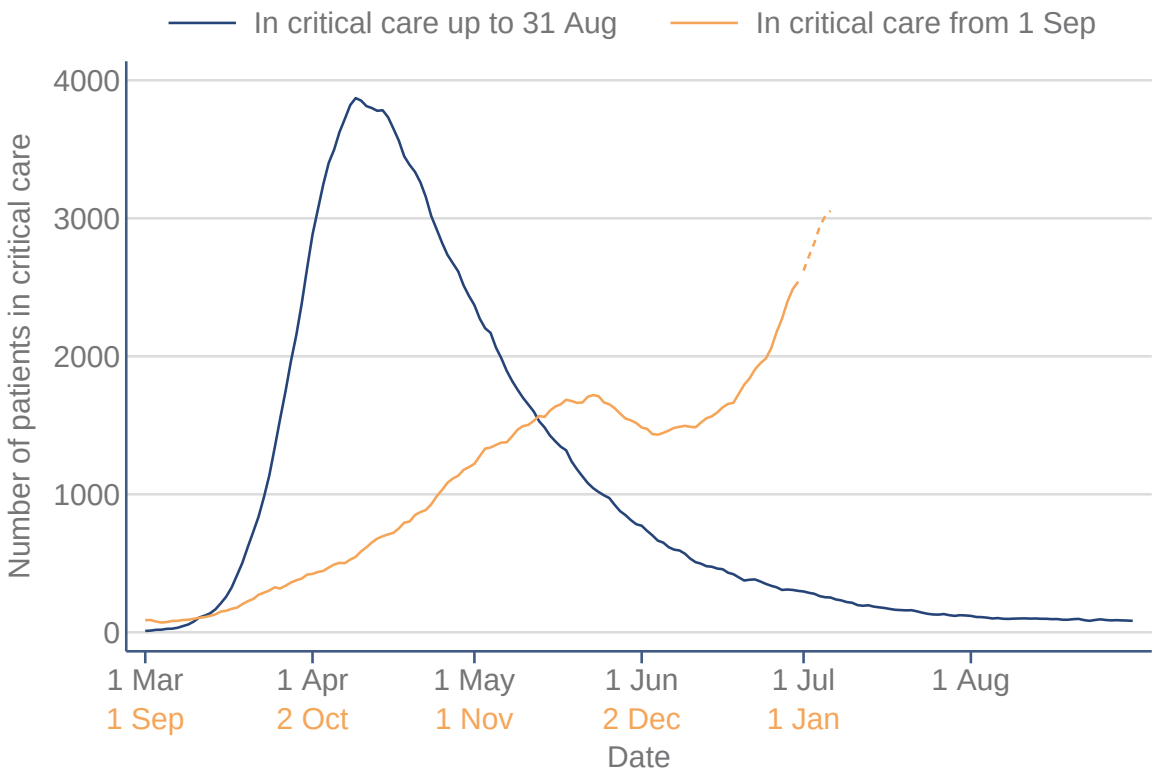


Figure 11. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date

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 7 January 2021. Dashed line indicates lag in data submission.

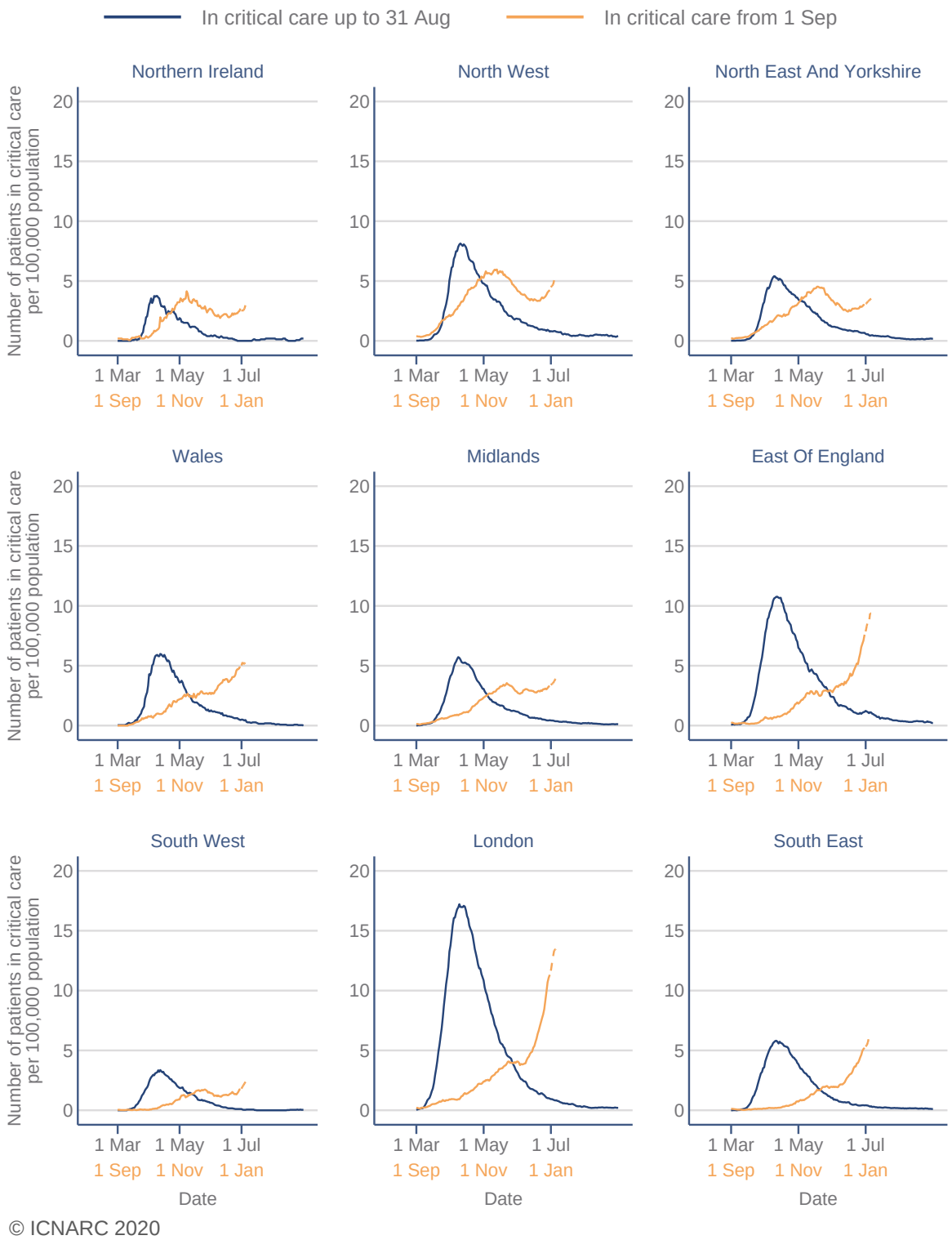


Figure 12. Number of patients in critical care * from 1 March 2020 to 31 August 2020 versus 1 September 2020 to date by region

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 7 January 2021. Dashed line indicates lag in data submission.

Figure 13 shows the average daily number of patients in critical care for each month over the past five years. For 2020, this is broken down into the numbers of: elective admissions (not COVID-19) – those admitted directly following elective or scheduled surgery or for a planned medical procedure; non-elective admissions (not COVID-19); confirmed COVID-19 admitted to an ICU; and confirmed COVID-19 managed in a surge area outside of ICU.

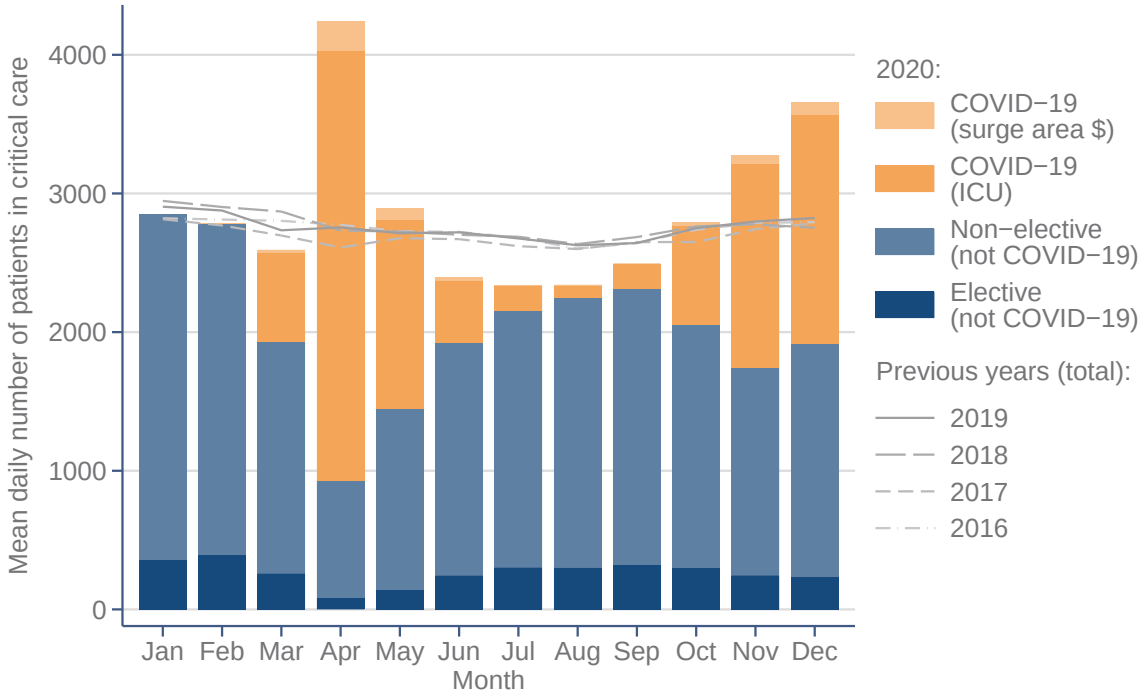


Figure 13. Average daily number of patients in critical care by month, 2016-2020 *

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

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

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 14 to 17.

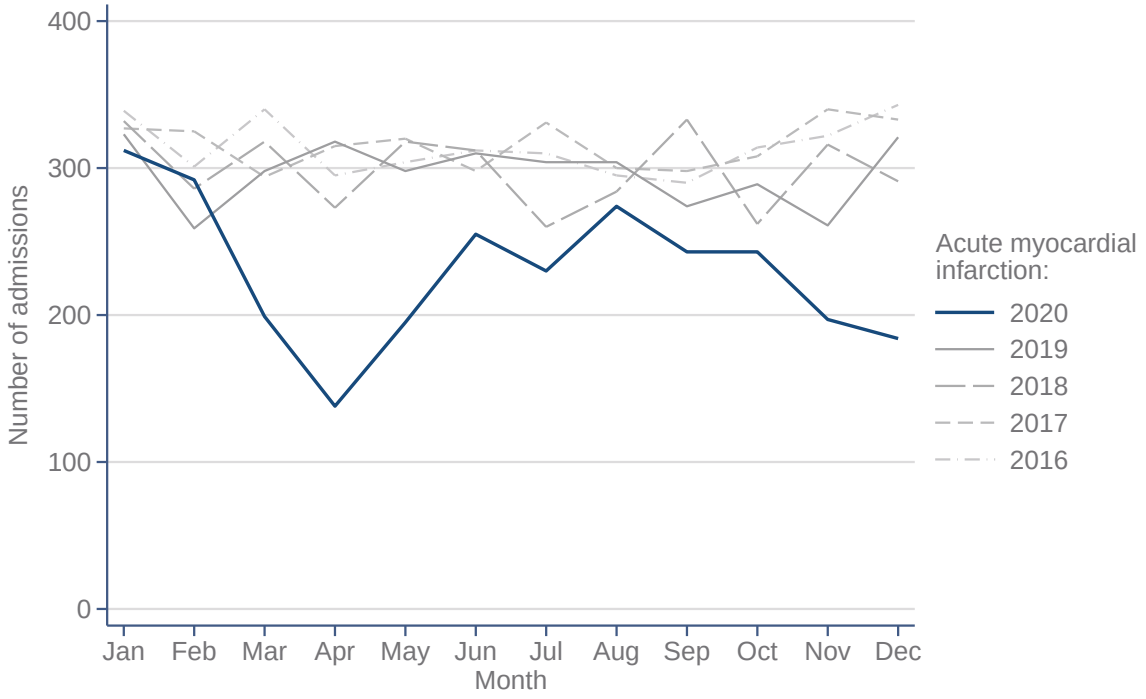


Figure 14. Number of admissions with acute myocardial infarction by month, 2016-2020 *

* 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.

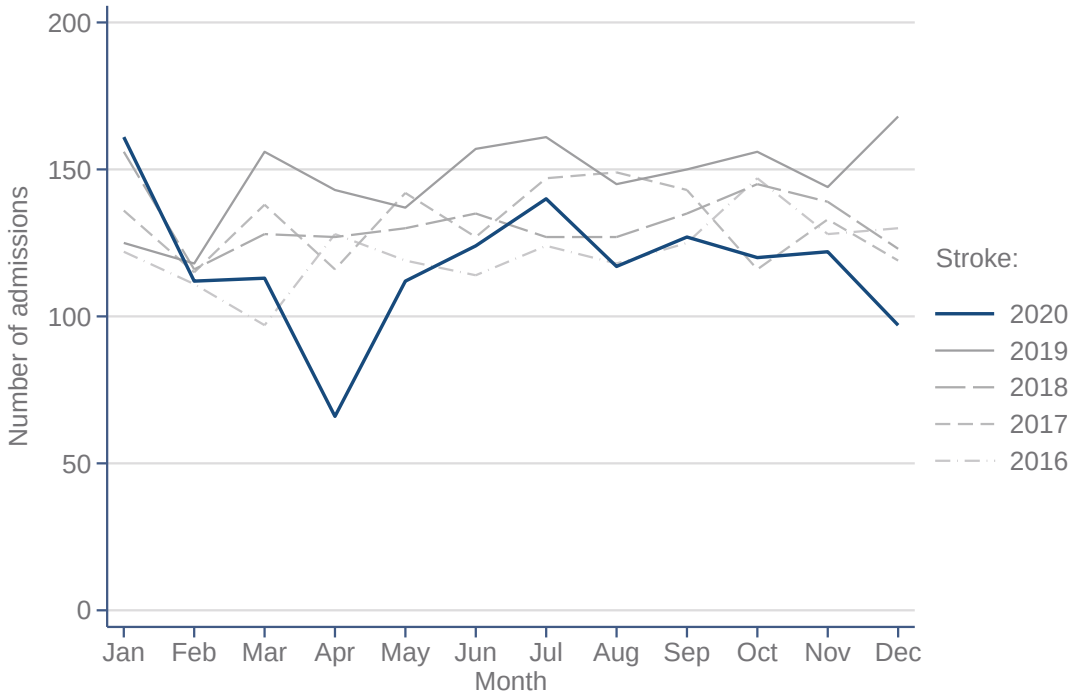


Figure 15. Number of admissions with stroke by month, 2016-2020 *

* 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.

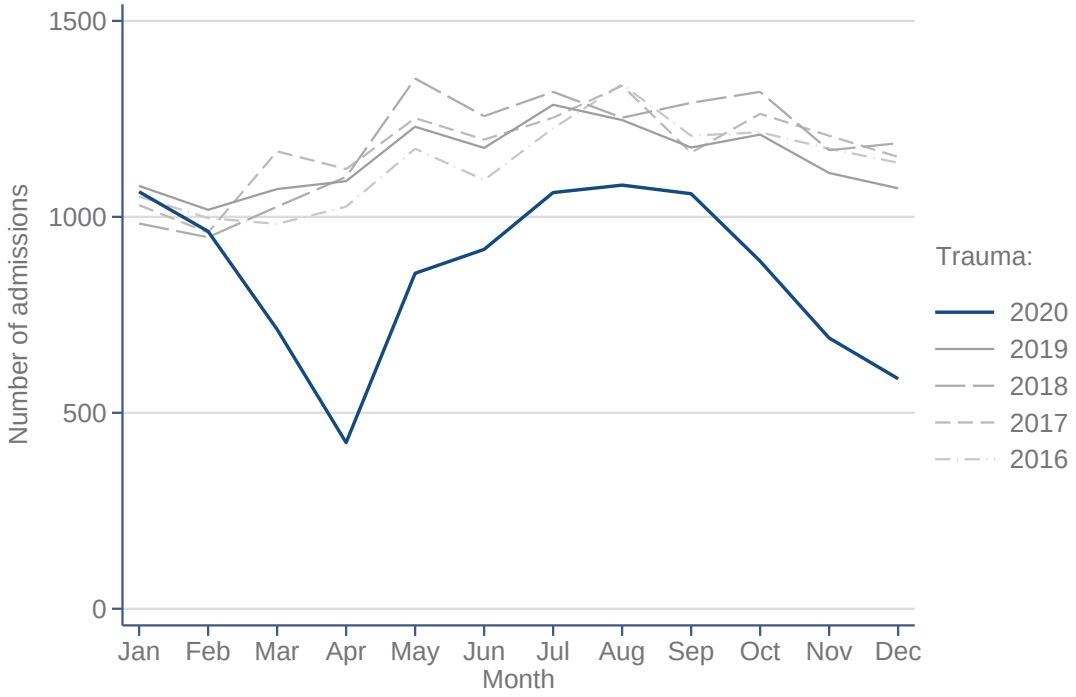


Figure 16. Number of admissions with trauma by month, 2016-2020 *

* 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.

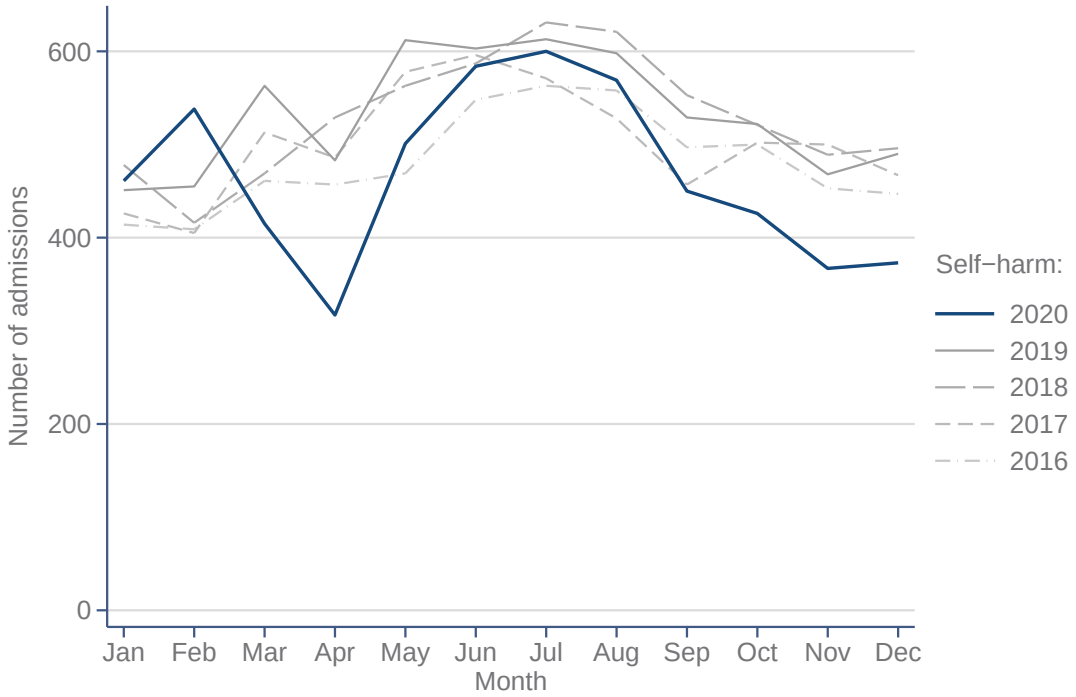


Figure 17. Number of admissions with self-harm (drugs or other substances) by month, 2016-2020 *

* 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 18 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 19 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).

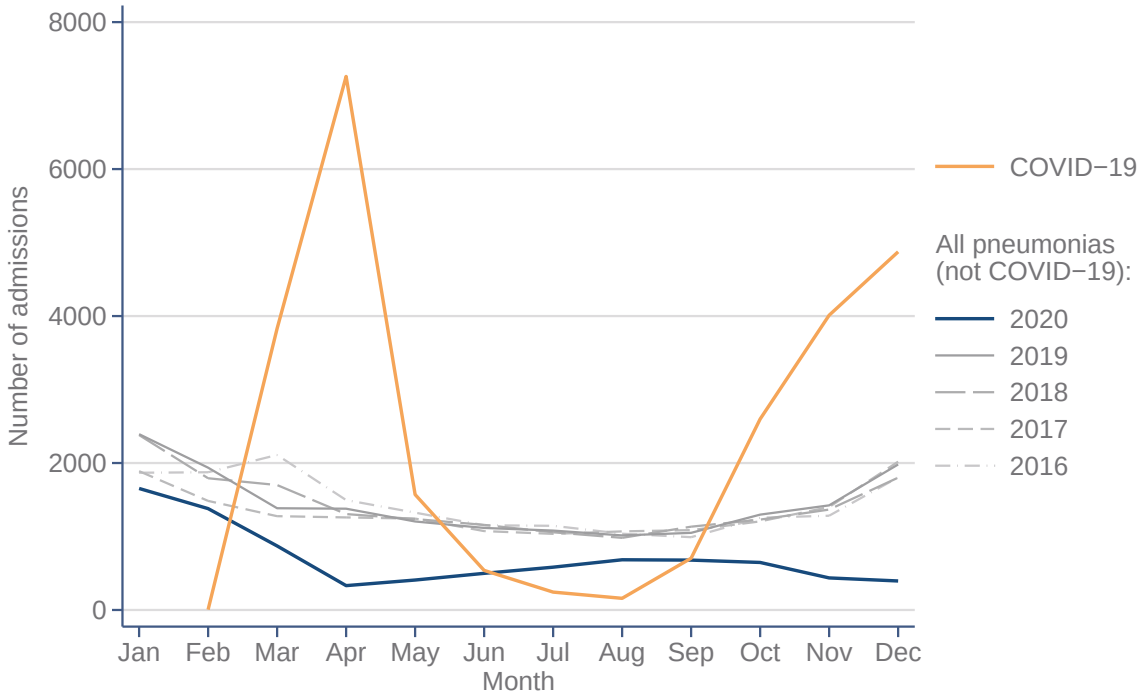


Figure 18. Number of admissions with pneumonia (not COVID-19) by month, 2016-2020 *, compared with confirmed COVID-19 during 2020

* 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.

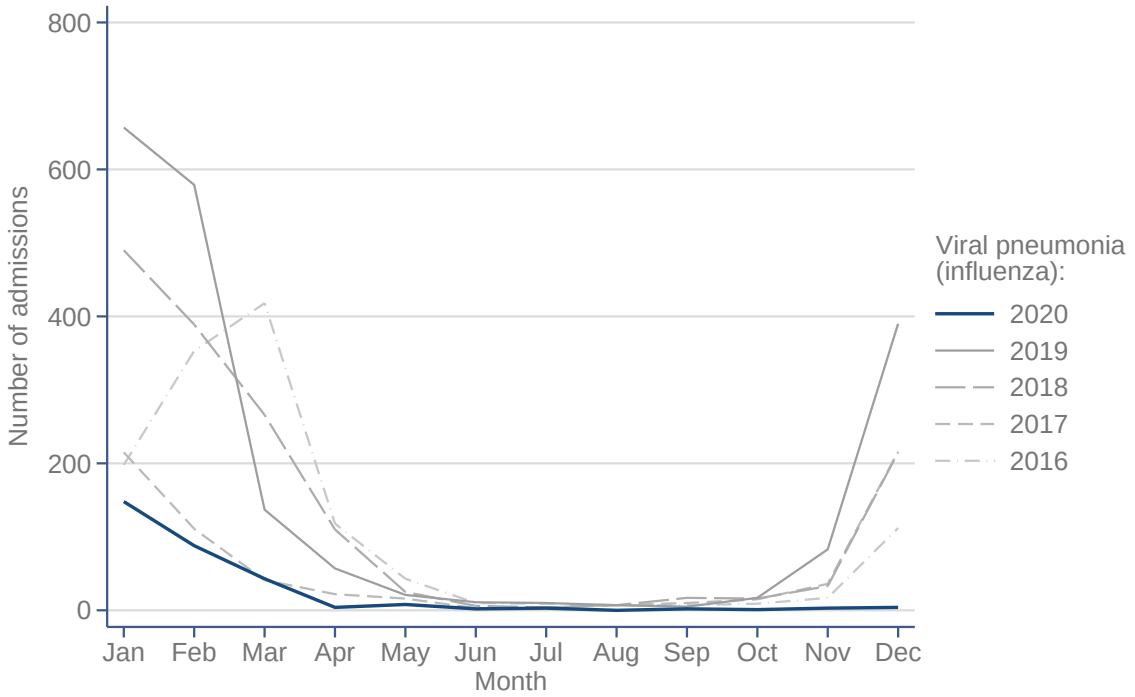


Figure 19. Number of admissions with viral pneumonia (influenza) by month, 2016-2020 *

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

Patient characteristics

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

Table 1. Patient characteristics: demographics

Demographics	Patients with confirmed COVID-19	
	Admitted from 1 Sep (N=12,115)	Admitted up to 31 Aug (N=10,935)
Age at admission (years) [N=12099]		
Mean (SD)	60.2 (13.6)	58.8 (12.7)
Median (IQR)	61 (52, 70)	60 (51, 68)
Sex, n (%) [N=12099]		
Female	4044 (33.4)	3275 (30.0)
Male	8055 (66.6)	7654 (70.0)
Ethnicity, n (%) [N=11108]		
White	8075 (72.7)	6947 (66.0)
Mixed	153 (1.4)	191 (1.8)
Asian	1815 (16.3)	1680 (16.0)
Black	550 (5.0)	1007 (9.6)
Other	515 (4.6)	700 (6.7)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=11821]		
1 (least deprived)	1451 (12.3)	1545 (14.3)
2	1778 (15.0)	1738 (16.1)
3	2122 (18.0)	2084 (19.3)
4	2864 (24.2)	2613 (24.2)
5 (most deprived)	3606 (30.5)	2804 (26.0)
Urban/rural classification *, n (%) [N=11654]		
Major conurbation	5260 (45.1)	5220 (48.8)
Minor conurbation	516 (4.4)	337 (3.1)
City and town	4613 (39.6)	3991 (37.3)
Rural	1262 (10.8)	1152 (10.8)

* Please see Definitions on page 73.

Table 2. Patient characteristics: medical history

	Patients with confirmed COVID-19	
Medical history	**Admitted from 1 Sep (N=12,115)**	**Admitted up to 31 Aug (N=10,935)**
Dependency prior to admission to acute hospital, n (%) [N=10897]		
Able to live without assistance in daily activities	9524 (87.4)	9682 (89.4)
Some assistance with daily activities	1334 (12.2)	1113 (10.3)
Total assistance with all daily activities	39 (0.4)	40 (0.4)
Very severe comorbidities *, n (%) [N=11201]		
Cardiovascular	86 (0.8)	68 (0.6)
Respiratory	136 (1.2)	122 (1.1)
Renal	212 (1.9)	187 (1.7)
Liver	68 (0.6)	51 (0.5)
Metastatic disease	84 (0.7)	59 (0.5)
Haematological malignancy	188 (1.7)	214 (2.0)
Immunocompromised	426 (3.8)	387 (3.6)
Body mass index *, n (%) [N=10559]		
<18.5	72 (0.7)	79 (0.8)
18.5-<25	2120 (20.1)	2643 (25.4)
25-<30	3383 (32.0)	3573 (34.4)
30-<40	3819 (36.2)	3268 (31.4)
≥40	1165 (11.0)	831 (8.0)
CPR within previous 24h, n (%) [N=11466]		
In the community	87 (0.8)	50 (0.5)
In hospital	106 (0.9)	76 (0.7)
Prior hospital length of stay [N=11896]		
Mean (SD)	3.2 (11.4)	2.5 (6.2)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=955]		
Currently pregnant	69 (7.2)	29 (3.7)
Recently pregnant (within 6 weeks)	43 (4.5)	41 (5.2)
Not known to be pregnant	843 (88.3)	720 (91.1)

* Please see Definitions on page 73.

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=11,235)**	**Admitted up to 31 Aug (N=10,935)**
Invasively ventilated within first 24h *, n (%) [N=10376]	2688 (25.9)	5866 (54.3)
APACHE II Score [N=10638]		
Mean (SD)	14.6 (5.4)	15.1 (5.3)
Median (IQR)	14 (11, 17)	15 (11, 18)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=9874]	13.3 (9.9, 18.9)	15.8 (11.3, 22.0)
PaO_2 /FiO_2 ratio †, n (%) [N=9874]		
$<$ 13.3 kPa ($<$ 100 mmHg)	4887 (49.5)	3809 (37.0)
13.3-26.6 kPa (100-200 mmHg)	3838 (38.9)	4934 (47.9)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	1149 (11.6)	1558 (15.1)
FiO_2 †, median (IQR) [N=9874]	0.60 (0.45, 0.75)	0.50 (0.40, 0.70)

* Please see Definitions on page 73. 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 is presented in Figure 20.

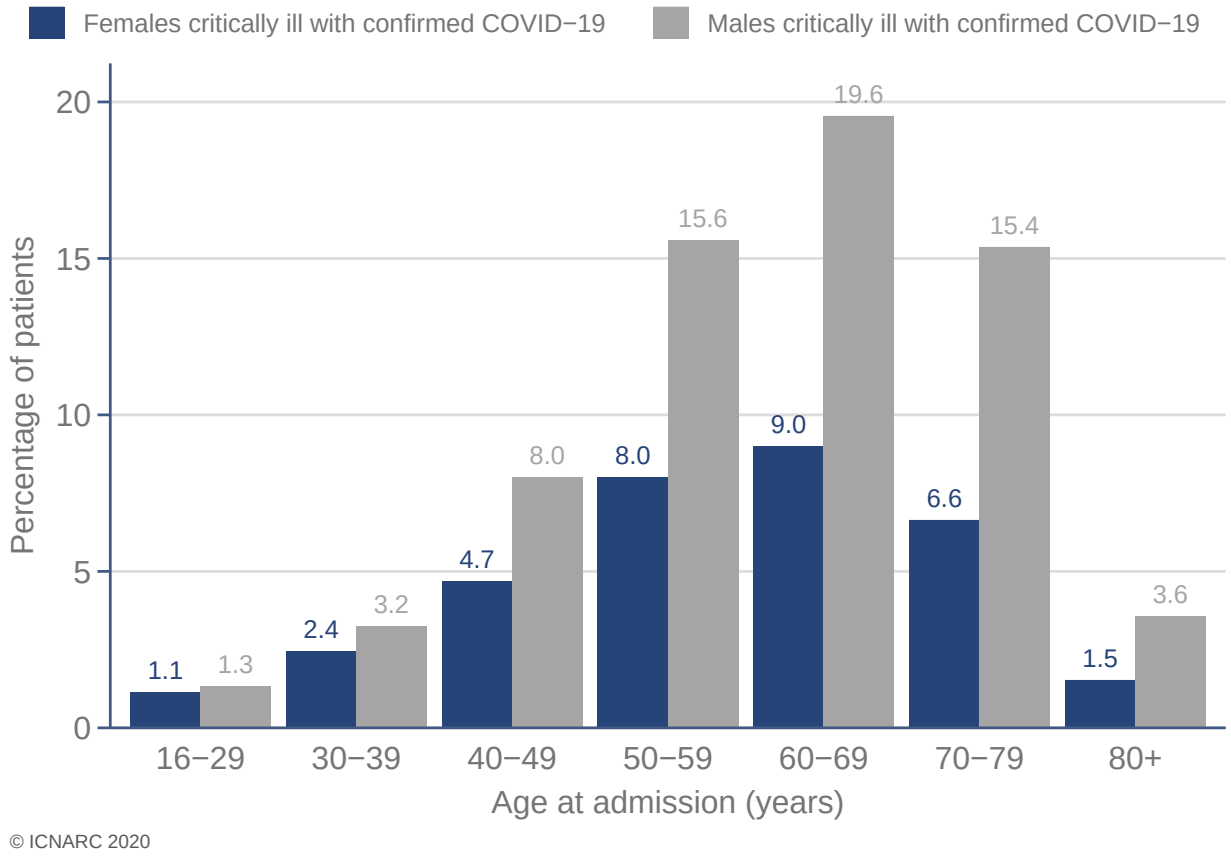


Figure 20. Age and sex distribution

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

The distribution of ethnicity, matched on 2011 census ward for location of patients critically ill with COVID-19, is presented in Figure 21.

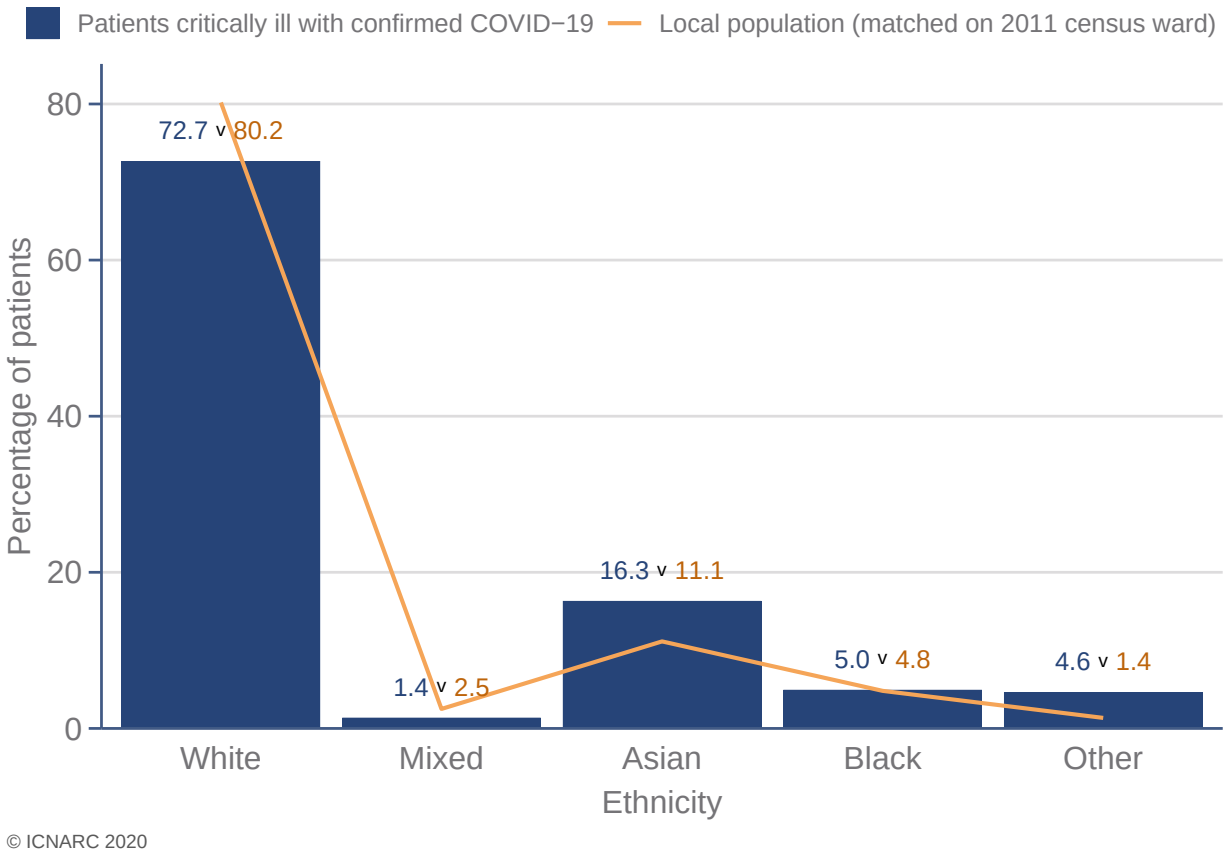


Figure 21. Ethnicity distribution compared with the local population

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

The distribution of Index of Multiple Deprivation (IMD) is presented in Figure 22.

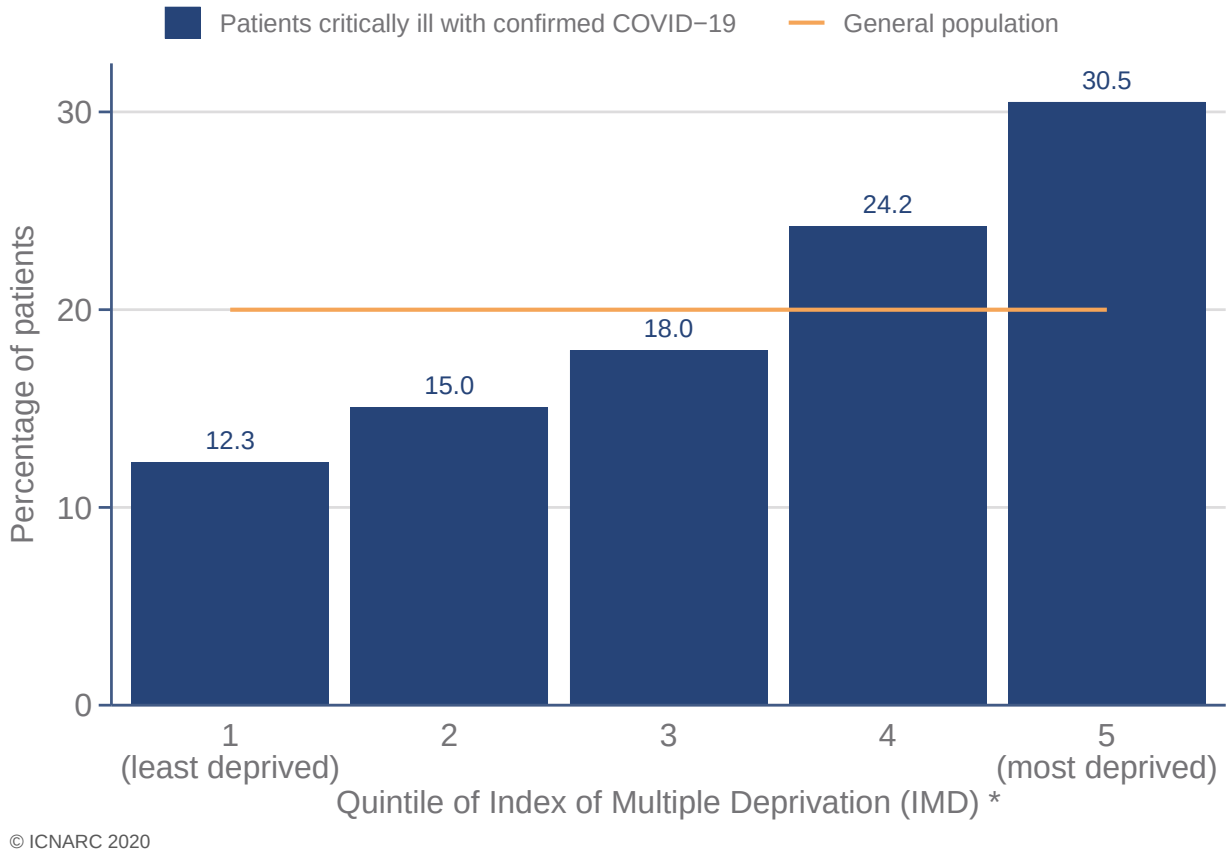


Figure 22. Index of Multiple Deprivation * distribution compared with the general population

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 73.

The distribution of patients by the urban/rural classification of their usual residence, compared with the age-matched general population (Office for National Statistics 2020), is presented in Figure 23.

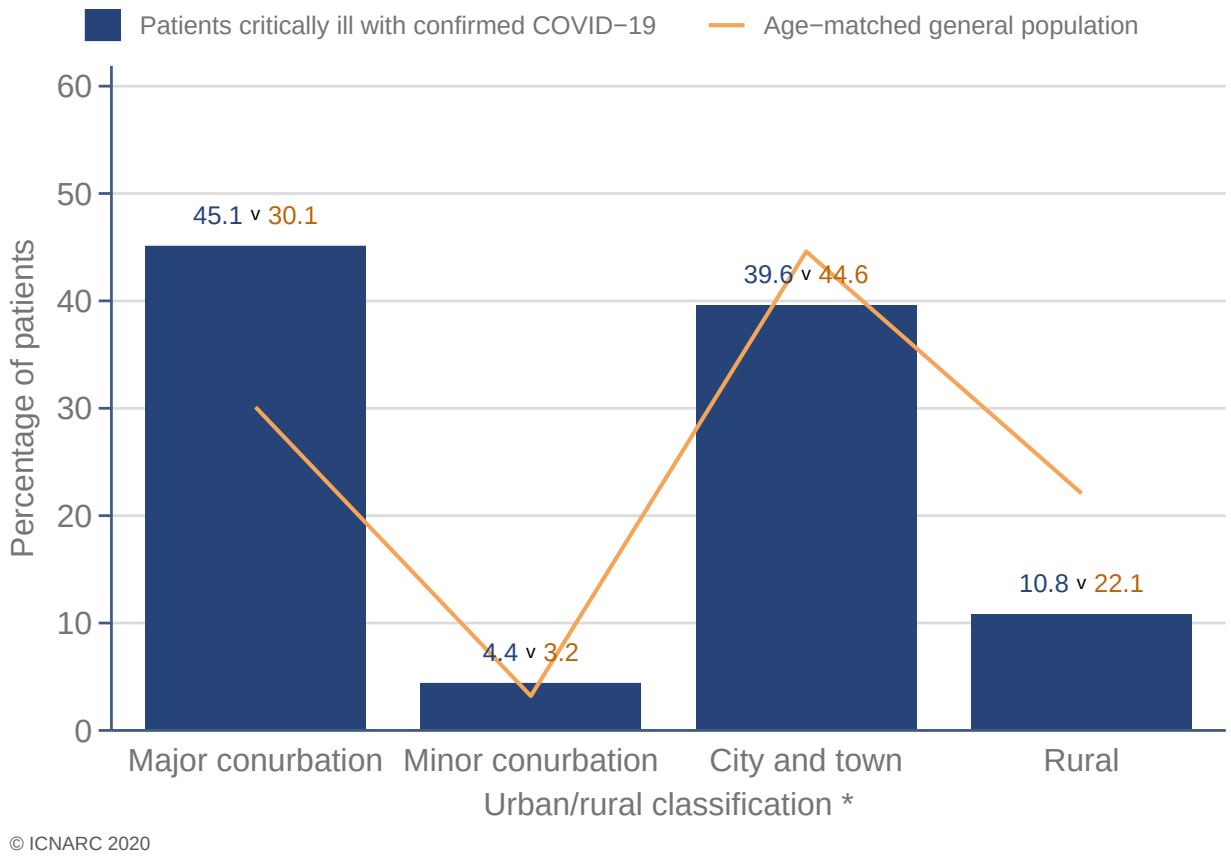


Figure 23. Urban/rural * distribution compared with the age-matched general population

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 73.

The distribution of body mass index (BMI), compared with an age- and sex-matched population (from the Health Survey for England 2018), is presented in Figure 24.

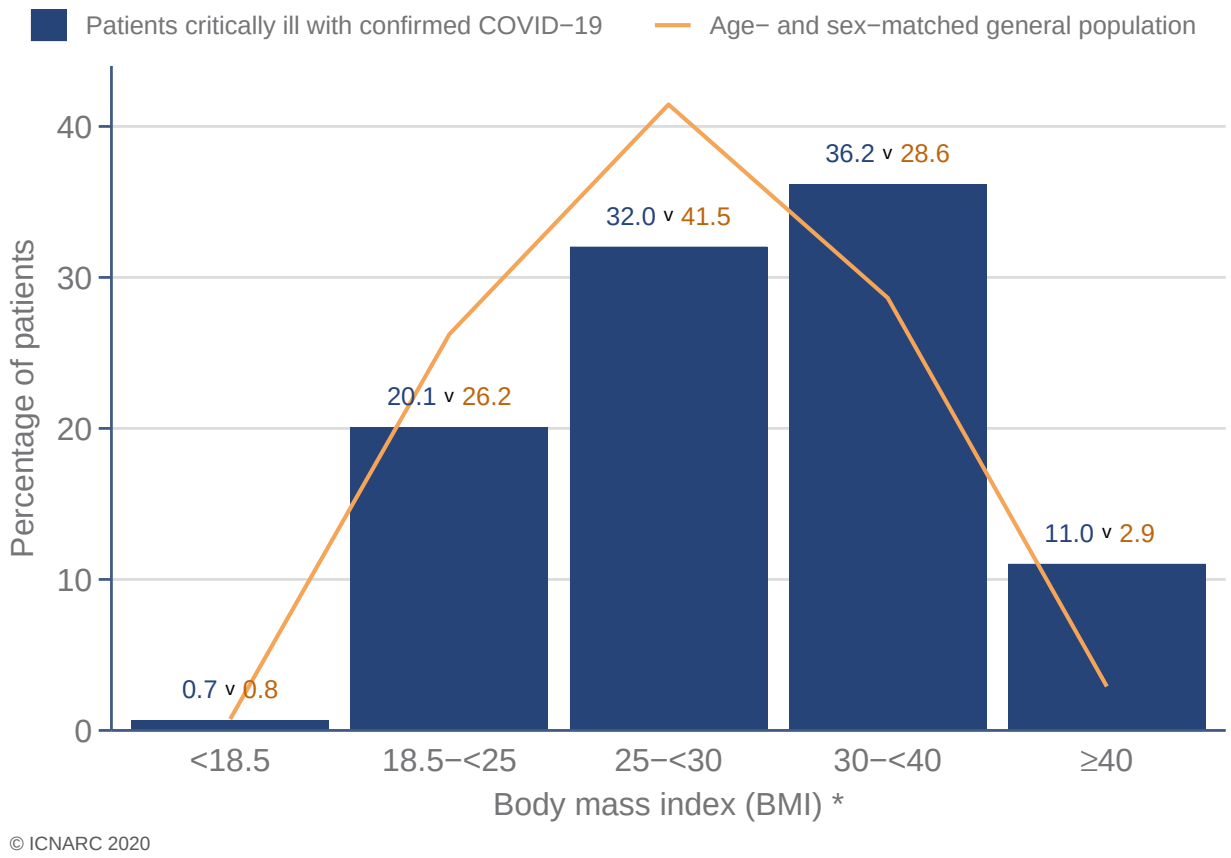


Figure 24. Body mass index * distribution compared with the age- and sex-matched general population

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 73.

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=2688)**	**Admitted up to 31 Aug (N=5866)**
Age at admission (years) [N=2687]		
Mean (SD)	60.1 (13.3)	58.5 (12.1)
Median (IQR)	62 (52, 70)	59 (51, 67)
Sex, n (%) [N=2685]		
Female	902 (33.6)	1607 (27.4)
Male	1783 (66.4)	4254 (72.6)
Ethnicity, n (%) [N=2532]		
White	1796 (70.9)	3466 (61.5)
Mixed	32 (1.3)	114 (2.0)
Asian	447 (17.7)	965 (17.1)
Black	135 (5.3)	651 (11.5)
Other	122 (4.8)	443 (7.9)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=2646]		
1 (least deprived)	309 (11.7)	786 (13.6)
2	371 (14.0)	925 (16.0)
3	484 (18.3)	1152 (19.9)
4	664 (25.1)	1487 (25.7)
5 (most deprived)	818 (30.9)	1446 (24.9)
Urban/rural classification *, n (%) [N=2540]		
Major conurbation	1290 (50.8)	3127 (54.6)
Minor conurbation	71 (2.8)	119 (2.1)
City and town	936 (36.9)	1909 (33.3)
Rural	242 (9.5)	567 (9.9)

* Please see Definitions on page 73.

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=2688)**	**Admitted up to 31 Aug (N=5866)**
Dependency prior to admission to acute hospital, n (%) [N=2605]		
Able to live without assistance in daily activities	2287 (87.8)	5363 (92.3)
Some assistance with daily activities	315 (12.1)	438 (7.5)
Total assistance with all daily activities	3 (0.1)	10 (0.2)
Very severe comorbidities *, n (%) [N=2622]		
Cardiovascular	22 (0.8)	19 (0.3)
Respiratory	23 (0.9)	32 (0.6)
Renal	41 (1.6)	79 (1.4)
Liver	25 (1.0)	23 (0.4)
Metastatic disease	9 (0.3)	20 (0.3)
Haematological malignancy	35 (1.3)	75 (1.3)
Immunocompromised	93 (3.5)	162 (2.8)
Body mass index *, n (%) [N=2561]		
<18.5	23 (0.9)	30 (0.5)
18.5-<25	532 (20.8)	1415 (24.8)
25-<30	824 (32.2)	1982 (34.8)
30-<40	886 (34.6)	1850 (32.5)
≥40	296 (11.6)	424 (7.4)
CPR within previous 24h, n (%) [N=2658]		
In the community	55 (2.1)	39 (0.7)
In hospital	77 (2.9)	58 (1.0)
Prior hospital length of stay [N=2677]		
Mean (SD)	3.4 (6.1)	2.1 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=225]		
Currently pregnant	12 (5.3)	9 (2.4)
Recently pregnant (within 6 weeks)	13 (5.8)	22 (5.9)
Not known to be pregnant	200 (88.9)	344 (91.7)

* Please see Definitions on page 73.

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=2688)**	**Admitted up to 31 Aug (N=5866)**
APACHE II Score [N=2687]		
Mean (SD)	16.7 (5.5)	15.6 (5.2)
Median (IQR)	16 (13, 20)	15 (12, 19)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=2681]	12.6 (8.6, 19.6)	15.5 (10.8, 21.6)
PaO_2 /FiO_2 ratio †, n (%) [N=2681]		
$<$ 13.3 kPa ($<$ 100 mmHg)	1430 (53.3)	2280 (39.0)
13.3-26.6 kPa (100-200 mmHg)	878 (32.7)	2782 (47.6)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	373 (13.9)	783 (13.4)
FiO_2 †, median (IQR) [N=2681]	0.65 (0.45, 0.90)	0.55 (0.40, 0.75)

* Please see Definitions on page 73. Indicators of acute severity are based on data from the first 24 hours of critical care.

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

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

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

	Patients with confirmed COVID-19 and advanced respiratory support *	
Demographics	**Admitted from 1 Sep (N=3938)**	**Admitted up to 31 Aug (N=7877)**
Age at admission (years) [N=3935]		
Mean (SD)	61.3 (12.7)	58.6 (11.9)
Median (IQR)	63 (54, 71)	60 (51, 67)
Sex, n (%) [N=3935]		
Female	1207 (30.7)	2204 (28.0)
Male	2728 (69.3)	5668 (72.0)
Ethnicity, n (%) [N=3742]		
White	2748 (73.4)	4751 (62.6)
Mixed	39 (1.0)	147 (1.9)
Asian	652 (17.4)	1298 (17.1)
Black	156 (4.2)	824 (10.9)
Other	147 (3.9)	564 (7.4)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=3894]		
1 (least deprived)	462 (11.9)	1063 (13.7)
2	550 (14.1)	1230 (15.8)
3	664 (17.1)	1553 (20.0)
4	927 (23.8)	1941 (24.9)
5 (most deprived)	1291 (33.2)	1995 (25.6)
Urban/rural classification *, n (%) [N=3783]		
Major conurbation	1742 (46.0)	4020 (52.2)
Minor conurbation	176 (4.7)	205 (2.7)
City and town	1440 (38.1)	2673 (34.7)
Rural	424 (11.2)	802 (10.4)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and advanced respiratory support *	
Medical history	**Admitted from 1 Sep (N=3938)**	**Admitted up to 31 Aug (N=7877)**
Dependency prior to admission to acute hospital, n (%) [N=3788]		
Able to live without assistance in daily activities	3340 (88.2)	7181 (92.0)
Some assistance with daily activities	442 (11.7)	612 (7.8)
Total assistance with all daily activities	6 (0.2)	11 (0.1)
Very severe comorbidities *, n (%) [N=3814]		
Cardiovascular	27 (0.7)	25 (0.3)
Respiratory	33 (0.9)	47 (0.6)
Renal	74 (1.9)	94 (1.2)
Liver	33 (0.9)	31 (0.4)
Metastatic disease	21 (0.6)	24 (0.3)
Haematological malignancy	78 (2.0)	128 (1.6)
Immunocompromised	169 (4.4)	234 (3.0)
Body mass index *, n (%) [N=3716]		
<18.5	23 (0.6)	41 (0.5)
18.5-<25	772 (20.8)	1888 (24.8)
25-<30	1209 (32.5)	2636 (34.7)
30-<40	1326 (35.7)	2466 (32.5)
≥40	386 (10.4)	567 (7.5)
CPR within previous 24h, n (%) [N=3886]		
In the community	62 (1.6)	45 (0.6)
In hospital	80 (2.1)	70 (0.9)
Prior hospital length of stay [N=3917]		
Mean (SD)	3.3 (7.2)	2.2 (5.3)
Median (IQR)	1 (0, 4)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=270]		
Currently pregnant	14 (5.2)	15 (2.9)
Recently pregnant (within 6 weeks)	17 (6.3)	27 (5.2)
Not known to be pregnant	239 (88.5)	481 (92.0)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and advanced respiratory support *	
Indicators of acute severity	**Admitted from 1 Sep (N=3938)**	**Admitted up to 31 Aug (N=7877)**
APACHE II Score [N=3815]		
Mean (SD)	16.1 (5.4)	15.4 (5.1)
Median (IQR)	15 (12, 19)	15 (12, 18)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=3702]	12.2 (9.0, 17.3)	15.0 (10.8, 21.0)
PaO_2 /FiO_2 ratio †, n (%) [N=3702]		
$<$ 13.3 kPa ($<$ 100 mmHg)	2124 (57.4)	3101 (40.3)
13.3-26.6 kPa (100-200 mmHg)	1191 (32.2)	3624 (47.1)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	387 (10.5)	964 (12.5)
FiO_2 †, median (IQR) [N=3702]	0.65 (0.50, 0.81)	0.55 (0.40, 0.70)

* Please see Definitions on page 73. 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 and known outcomes)

	Patients with confirmed COVID-19 and basic respiratory support only *	
Demographics	**Admitted from 1 Sep (N=4643)**	**Admitted up to 31 Aug (N=2791)**
Age at admission (years) [N=4641]		
Mean (SD)	59.9 (14.6)	59.4 (14.3)
Median (IQR)	61 (50, 71)	60 (50, 70)
Sex, n (%) [N=4642]		
Female	1596 (34.4)	959 (34.4)
Male	3046 (65.6)	1831 (65.6)
Ethnicity, n (%) [N=4395]		
White	3332 (75.8)	2017 (74.9)
Mixed	60 (1.4)	42 (1.6)
Asian	641 (14.6)	351 (13.0)
Black	189 (4.3)	164 (6.1)
Other	173 (3.9)	119 (4.4)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=4573]		
1 (least deprived)	569 (12.4)	440 (16.0)
2	704 (15.4)	465 (16.9)
3	799 (17.5)	489 (17.8)
4	1061 (23.2)	602 (21.9)
5 (most deprived)	1440 (31.5)	748 (27.3)
Urban/rural classification *, n (%) [N=4565]		
Major conurbation	1897 (41.6)	1048 (38.2)
Minor conurbation	249 (5.5)	128 (4.7)
City and town	1907 (41.8)	1242 (45.2)
Rural	511 (11.2)	324 (11.8)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and basic respiratory support only *	
Medical history	**Admitted from 1 Sep (N=4643)**	**Admitted up to 31 Aug (N=2791)**
Dependency prior to admission to acute hospital, n (%) [N=4489]		
Able to live without assistance in daily activities	3818 (85.1)	2296 (83.0)
Some assistance with daily activities	647 (14.4)	446 (16.1)
Total assistance with all daily activities	24 (0.5)	24 (0.9)
Very severe comorbidities *, n (%) [N=4546]		
Cardiovascular	46 (1.0)	39 (1.4)
Respiratory	72 (1.6)	72 (2.6)
Renal	89 (2.0)	76 (2.7)
Liver	15 (0.3)	17 (0.6)
Metastatic disease	46 (1.0)	26 (0.9)
Haematological malignancy	75 (1.6)	78 (2.8)
Immunocompromised	173 (3.8)	137 (5.0)
Body mass index *, n (%) [N=4328]		
<18.5	36 (0.8)	28 (1.1)
18.5-<25	824 (19.0)	666 (26.3)
25-<30	1392 (32.2)	857 (33.8)
30-<40	1573 (36.3)	737 (29.1)
≥40	503 (11.6)	249 (9.8)
CPR within previous 24h, n (%) [N=4584]		
In the community	9 (0.2)	5 (0.2)
In hospital	4 (0.1)	3 (0.1)
Prior hospital length of stay [N=4611]		
Mean (SD)	2.9 (9.8)	3.0 (7.3)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=408]		
Currently pregnant	30 (7.4)	11 (4.6)
Recently pregnant (within 6 weeks)	18 (4.4)	11 (4.6)
Not known to be pregnant	360 (88.2)	217 (90.8)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and basic respiratory support only *	
Indicators of acute severity	**Admitted from 1 Sep (N=4643)**	**Admitted up to 31 Aug (N=2791)**
APACHE II Score [N=4469]		
Mean (SD)	13.6 (5.1)	14.2 (5.5)
Median (IQR)	13 (10, 16)	14 (10, 17)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=4056]	14.5 (11.1, 19.7)	17.5 (12.5, 24.0)
PaO_2 /FiO_2 ratio †, n (%) [N=4056]		
$<$ 13.3 kPa ($<$ 100 mmHg)	1679 (41.4)	702 (29.1)
13.3-26.6 kPa (100-200 mmHg)	1960 (48.3)	1273 (52.8)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	417 (10.3)	437 (18.1)
FiO_2 †, median (IQR) [N=4056]	0.55 (0.40, 0.70)	0.50 (0.35, 0.60)

* Please see Definitions on page 73. 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 and known outcomes)

	Patients with confirmed COVID-19 and renal support *	
Demographics	**Admitted from 1 Sep (N=1261)**	**Admitted up to 31 Aug (N=2926)**
Age at admission (years) [N=1261]		
Mean (SD)	62.4 (12.0)	59.1 (11.0)
Median (IQR)	64 (56, 71)	60 (52, 67)
Sex, n (%) [N=1261]		
Female	319 (25.3)	672 (23.0)
Male	942 (74.7)	2252 (77.0)
Ethnicity, n (%) [N=1199]		
White	833 (69.5)	1661 (59.0)
Mixed	12 (1.0)	49 (1.7)
Asian	235 (19.6)	483 (17.1)
Black	71 (5.9)	419 (14.9)
Other	48 (4.0)	205 (7.3)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=1248]		
1 (least deprived)	151 (12.1)	368 (12.7)
2	178 (14.3)	443 (15.3)
3	222 (17.8)	609 (21.0)
4	325 (26.0)	731 (25.2)
5 (most deprived)	372 (29.8)	745 (25.7)
Urban/rural classification *, n (%) [N=1214]		
Major conurbation	599 (49.3)	1574 (55.0)
Minor conurbation	40 (3.3)	61 (2.1)
City and town	442 (36.4)	954 (33.3)
Rural	133 (11.0)	274 (9.6)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and renal support *	
Medical history	**Admitted from 1 Sep (N=1261)**	**Admitted up to 31 Aug (N=2926)**
Dependency prior to admission to acute hospital, n (%) [N=1231]		
Able to live without assistance in daily activities	1033 (83.9)	2670 (91.8)
Some assistance with daily activities	196 (15.9)	233 (8.0)
Total assistance with all daily activities	2 (0.2)	6 (0.2)
Very severe comorbidities *, n (%) [N=1238]		
Cardiovascular	13 (1.1)	14 (0.5)
Respiratory	12 (1.0)	16 (0.6)
Renal	149 (12.0)	150 (5.2)
Liver	13 (1.1)	6 (0.2)
Metastatic disease	13 (1.1)	13 (0.4)
Haematological malignancy	28 (2.3)	51 (1.8)
Immunocompromised	69 (5.6)	93 (3.2)
Body mass index *, n (%) [N=1193]		
<18.5	6 (0.5)	16 (0.6)
18.5-<25	265 (22.2)	653 (23.0)
25-<30	403 (33.8)	969 (34.1)
30-<40	408 (34.2)	983 (34.6)
≥40	111 (9.3)	222 (7.8)
CPR within previous 24h, n (%) [N=1253]		
In the community	11 (0.9)	10 (0.3)
In hospital	23 (1.8)	18 (0.6)
Prior hospital length of stay [N=1258]		
Mean (SD)	3.8 (7.2)	2.3 (5.4)
Median (IQR)	1 (0, 5)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=63]		
Currently pregnant	1 (1.6)	3 (1.9)
Recently pregnant (within 6 weeks)	3 (4.8)	4 (2.5)
Not known to be pregnant	59 (93.7)	152 (95.6)

* Please see Definitions on page 73.

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

	Patients with confirmed COVID-19 and renal support *	
Indicators of acute severity	**Admitted from 1 Sep (N=1261)**	**Admitted up to 31 Aug (N=2926)**
Invasively ventilated within first 24h *, n (%) [N=1225]	523 (42.7)	2121 (73.1)
APACHE II Score [N=1233]		
Mean (SD)	18.4 (6.1)	17.0 (5.6)
Median (IQR)	18 (14, 22)	16 (13, 20)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=1168]	12.5 (9.1, 18.3)	14.3 (10.5, 20.0)
PaO_2 /FiO_2 ratio †, n (%) [N=1168]		
$<$ 13.3 kPa ($<$ 100 mmHg)	640 (54.8)	1252 (44.0)
13.3-26.6 kPa (100-200 mmHg)	389 (33.3)	1288 (45.2)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	139 (11.9)	308 (10.8)
FiO_2 †, median (IQR) [N=1168]	0.60 (0.45, 0.80)	0.60 (0.44, 0.75)

* Please see Definitions on page 73. 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 1056 inter-hospital critical care transfers of 968 patients, of which 787 transfers of 760 patients were classified as being for comparable critical care. The percentage of transfers by month is shown in Figure 25, and the transfers for comparable critical care by region are shown in Figure 26.

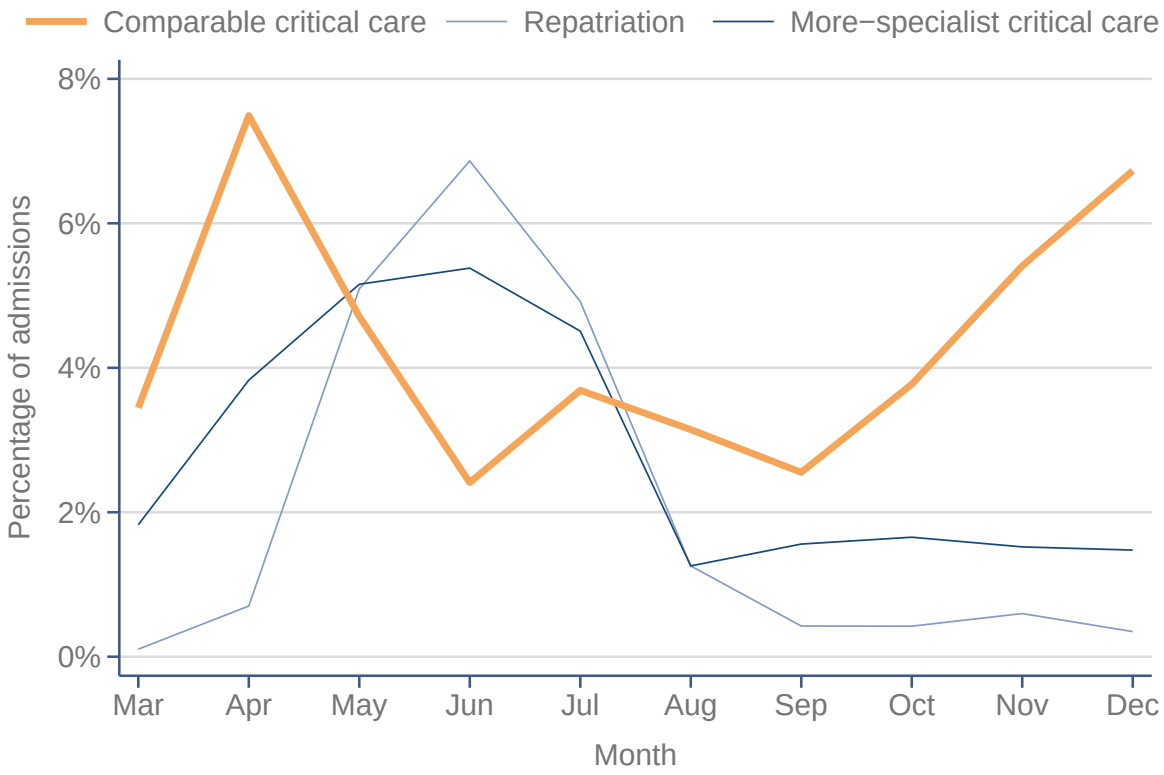


Figure 25. Inter-hospital critical care transfers

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

* Please see Definitions on page 73.

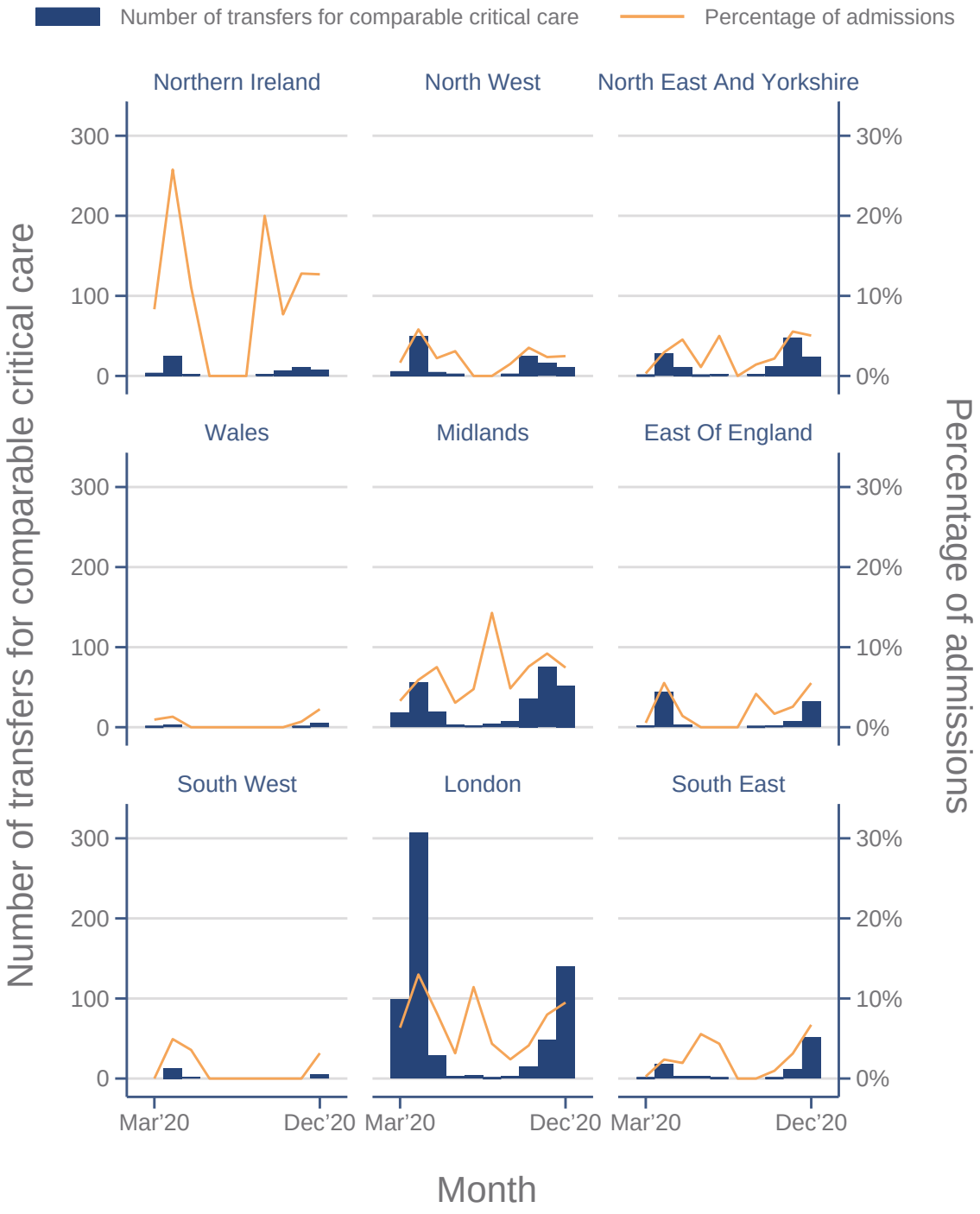


Figure 26. Inter-hospital critical care transfers for comparable critical care by region

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

* Please see Definitions on page 73.

The distribution of the number of days from critical care admission to transfer for comparable critical care is shown in Figure 27.

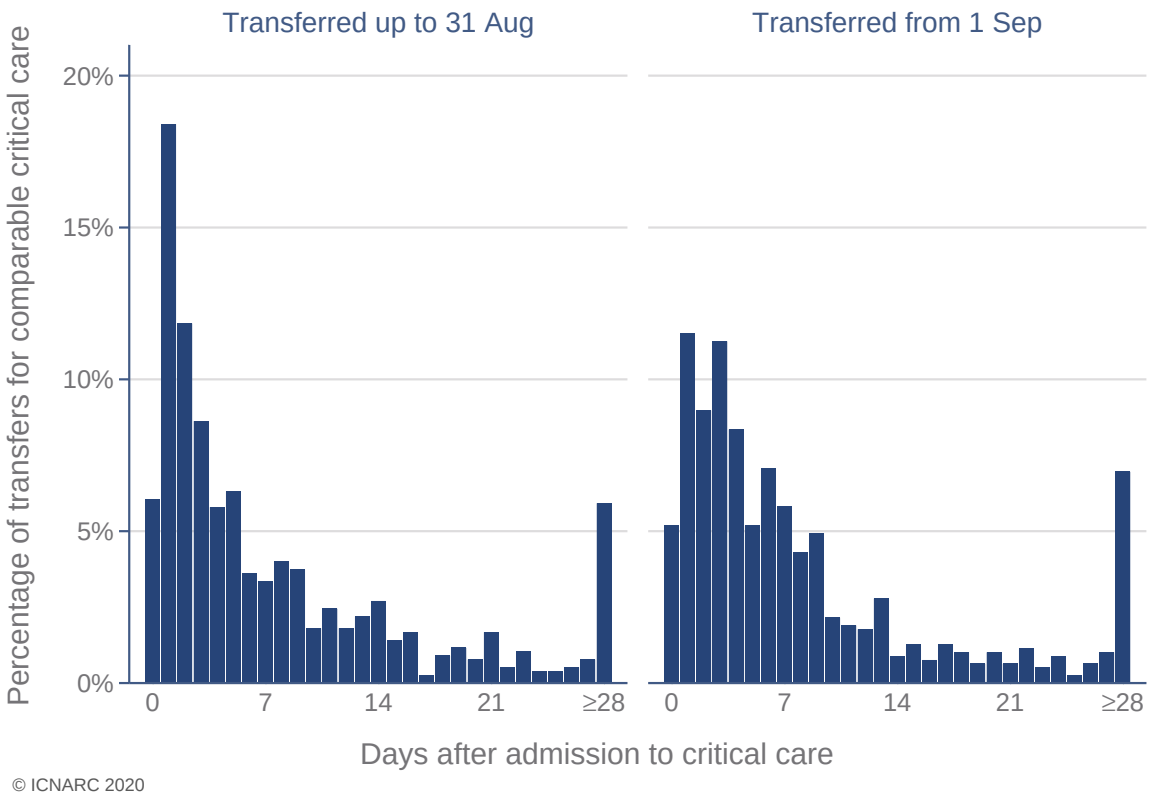


Figure 27. Timing of inter-hospital critical care transfers for comparable critical care

Percentage of transfers for comparable critical care * by number of days from critical care admission to transfer.

* Please see Definitions on page 73.

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=760)**	**Admitted up to 31 Aug (N=742)**
Age at admission (years) [N=760]		
Mean (SD)	60.2 (12.0)	57.8 (11.2)
Median (IQR)	62 (53, 69)	59 (52, 66)
Sex, n (%) [N=755]		
Female	235 (31.1)	173 (23.4)
Male	520 (68.9)	567 (76.6)
Ethnicity, n (%) [N=731]		
White	465 (63.6)	359 (49.4)
Mixed	9 (1.2)	18 (2.5)
Asian	147 (20.1)	194 (26.7)
Black	53 (7.3)	83 (11.4)
Other	57 (7.8)	73 (10.0)
Index of Multiple Deprivation (IMD) quintile *, n (%) [N=752]		
1 (least deprived)	76 (10.1)	93 (12.6)
2	102 (13.6)	91 (12.3)
3	123 (16.4)	149 (20.2)
4	193 (25.7)	216 (29.3)
5 (most deprived)	258 (34.3)	188 (25.5)
Urban/rural classification *, n (%) [N=723]		
Major conurbation	446 (61.7)	525 (73.8)
Minor conurbation	24 (3.3)	27 (3.8)
City and town	211 (29.2)	126 (17.7)
Rural	42 (5.8)	33 (4.6)

* Please see Definitions on page 73.

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=760)**	**Admitted up to 31 Aug (N=742)**
Dependency prior to admission to acute hospital, n (%) [N=698]		
Able to live without assistance in daily activities	632 (90.5)	696 (95.3)
Some assistance with daily activities	65 (9.3)	32 (4.4)
Total assistance with all daily activities	1 (0.1)	2 (0.3)
Very severe comorbidities *, n (%) [N=727]		
Cardiovascular	2 (0.3)	0 (0.0)
Respiratory	1 (0.1)	4 (0.5)
Renal	8 (1.1)	4 (0.5)
Liver	2 (0.3)	0 (0.0)
Metastatic disease	0 (0.0)	1 (0.1)
Haematological malignancy	3 (0.4)	5 (0.7)
Immunocompromised	17 (2.3)	14 (1.9)
Body mass index *, n (%) [N=668]		
<18.5	6 (0.9)	5 (0.7)
18.5-<25	111 (16.6)	169 (23.3)
25-<30	229 (34.3)	286 (39.4)
30-<40	253 (37.9)	232 (32.0)
≥40	69 (10.3)	34 (4.7)
CPR within previous 24h, n (%) [N=744]		
In the community	1 (0.1)	0 (0.0)
In hospital	3 (0.4)	6 (0.8)
Prior hospital length of stay [N=751]		
Mean (SD)	2.5 (4.1)	1.9 (3.7)
Median (IQR)	1 (0, 3)	1 (0, 3)
Currently or recently pregnant, n (% of females aged 16-49) [N=47]		
Currently pregnant	3 (6.4)	1 (3.3)
Recently pregnant (within 6 weeks)	1 (2.1)	1 (3.3)
Not known to be pregnant	43 (91.5)	28 (93.3)

* Please see Definitions on page 73.

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=760)**	**Admitted up to 31 Aug (N=742)**
Invasively ventilated within first 24h *, n (%) [N=685]	364 (53.1)	594 (81.8)
APACHE II Score [N=699]		
Mean (SD)	14.7 (4.7)	14.4 (4.9)
Median (IQR)	14 (12, 17)	14 (11, 17)
PaO_2 /FiO_2 ratio † (kPa), median (IQR) [N=663]	12.2 (9.1, 16.0)	15.1 (10.9, 19.8)
PaO_2 /FiO_2 ratio †, n (%) [N=663]		
$<$ 13.3 kPa ($<$ 100 mmHg)	392 (59.1)	279 (38.6)
13.3-26.6 kPa (100-200 mmHg)	231 (34.8)	373 (51.7)
$\geq$ 26.7 kPa ($\geq$ 200 mmHg)	40 (6.0)	70 (9.7)
FiO_2 †, median (IQR) [N=663]	0.65 (0.50, 0.80)	0.60 (0.45, 0.75)

* Please see Definitions on page 73. 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 9059 (of 12,115) patients. Of these, 3415 have died and 5644 have been discharged from critical care (Figures 28 and 29). The remaining 3056 were last reported to still be receiving critical care.

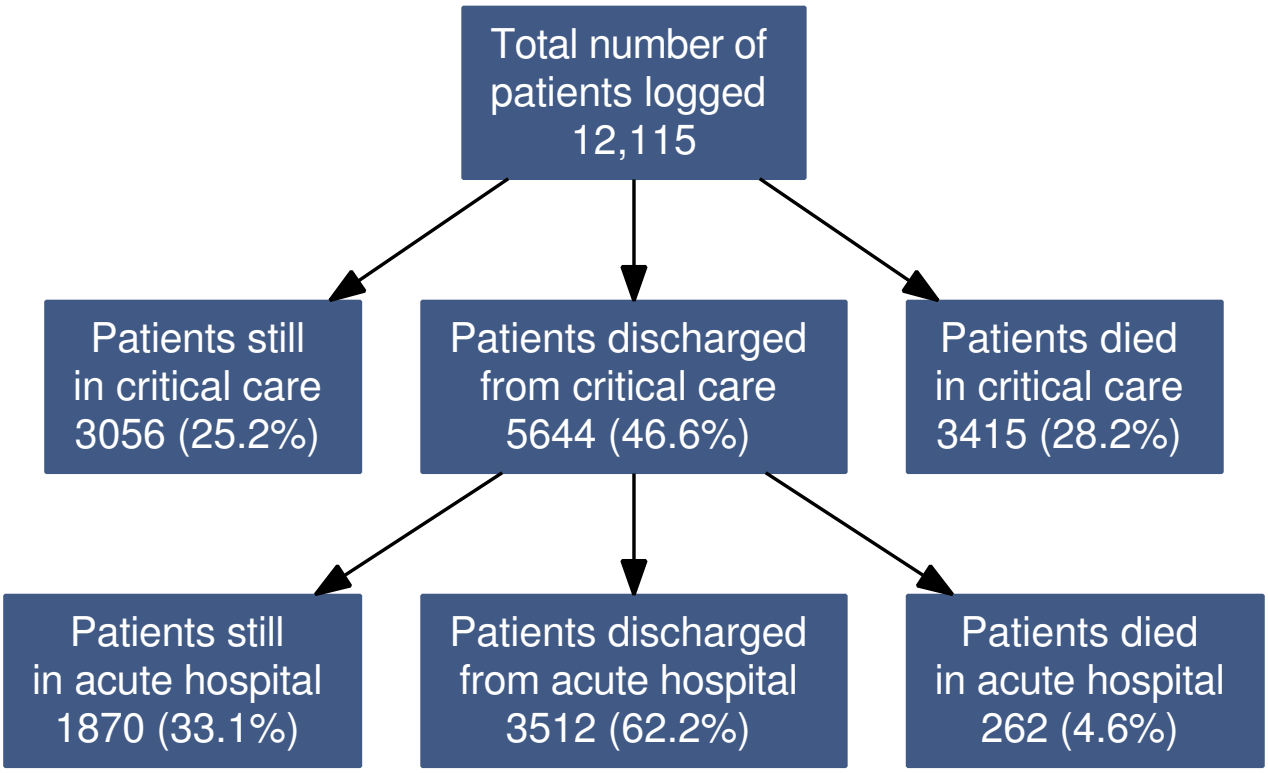


Figure 28. Critical care and acute hospital outcomes

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

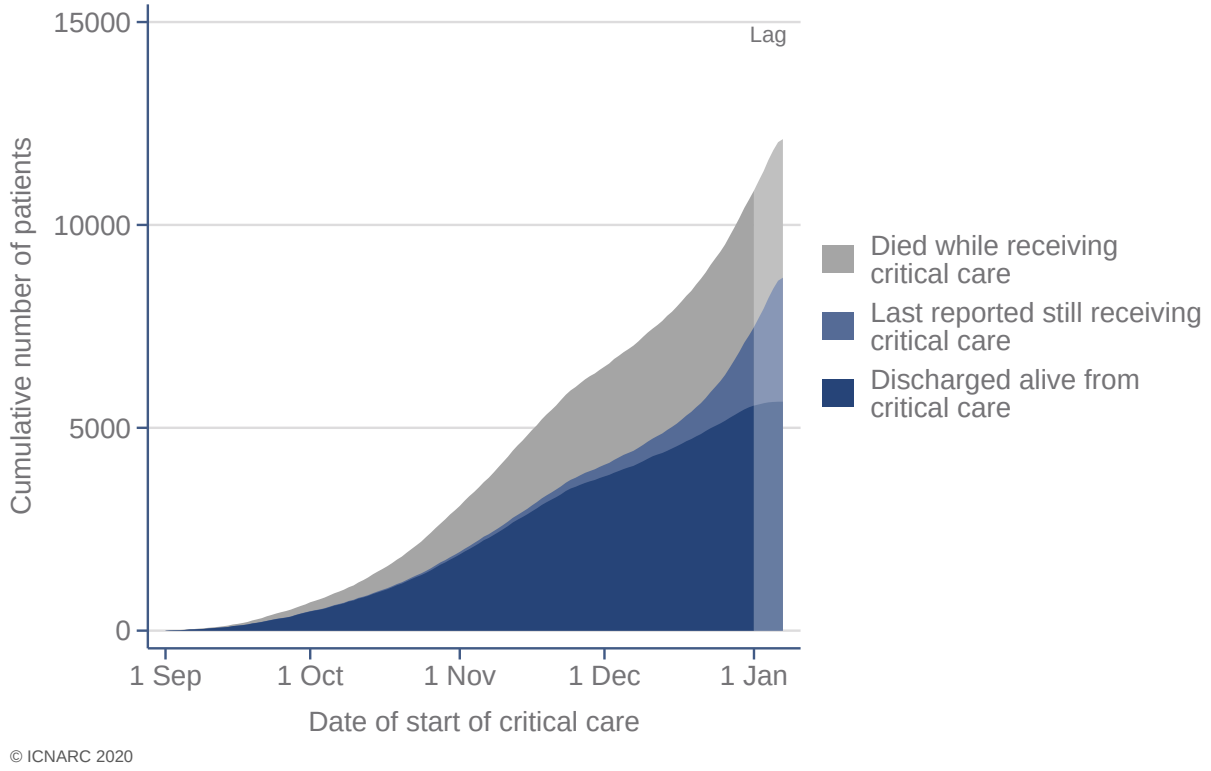


Figure 29. Cumulative outcomes *

Cumulative outcomes for patients admitted from 1 September 2020 to date by date of start of critical care.

* Please note that patients whose outcome data have not been received are assumed to remain in critical care as of 7 January 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=12,115)**	**Admitted up to 31 Aug (N=10,935)**
Outcome at end of critical care, n (%)		
Discharged	5644 (46.6)	6623 (60.6)
Died	3415 (28.2)	4311 (39.4)
Still receiving critical care	3056 (25.2)	1 (0.0)
Duration of critical care	**(N=9045)**	**(N=10,928)**
Duration of critical care (days) †, median (IQR)		
Survivors	6 (3, 10)	12 (5, 28)
Non-survivors	10 (5, 16)	9 (5, 16)
Organ support (Critical Care Minimum Dataset) *	**(N=8970)**	**(N=10,932)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	3938 (43.9)	7877 (72.1)
Basic respiratory support only	4643 (51.8)	2791 (25.5)
No respiratory support	389 (4.3)	264 (2.4)
Advanced cardiovascular support	1664 (18.6)	3366 (30.8)
Basic cardiovascular support only	6762 (75.4)	7103 (65.0)
No cardiovascular support	544 (6.1)	463 (4.2)
Renal support	1261 (14.1)	2926 (26.8)
Liver support	50 (0.6)	114 (1.0)
Neurological support	544 (6.1)	994 (9.1)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	10 (5, 17)	14 (7, 24)
Total (advanced + basic) respiratory support	7 (4, 14)	11 (5, 22)
Advanced cardiovascular support	2 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	7 (4, 14)	11 (5, 22)
Renal support	5 (2, 10)	8 (3, 15)

Please note that the results for patients admitted from 1 September 2020 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

* Please see Definitions on page 73.

† 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 and receiving invasive ventilation during the first 24 hours in critical care admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 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=2688)**	**Admitted up to 31 Aug (N=5866)**
Outcome at end of critical care, n (%)		
Discharged	860 (32.0)	3132 (53.4)
Died	1111 (41.3)	2734 (46.6)
Still receiving critical care	717 (26.7)	0 (0.0)
Duration of critical care	**(N=1969)**	**(N=5863)**
Duration of critical care (days) †, median (IQR)		
Survivors	12 (6, 23)	22 (12, 35)
Non-survivors	10 (4, 16)	10 (5, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=1948)**	**(N=5865)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	804 (41.3)	2393 (40.8)
Basic cardiovascular support only	1140 (58.5)	3459 (59.0)
No cardiovascular support	4 (0.2)	13 (0.2)
Renal support	523 (26.8)	2121 (36.2)
Liver support	26 (1.3)	80 (1.4)
Neurological support	287 (14.7)	718 (12.2)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	9 (4, 17)	14 (7, 24)
Total (advanced + basic) respiratory support	11 (6, 18)	15 (8, 26)
Advanced cardiovascular support	2 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	11 (6, 18)	15 (8, 26)
Renal support	5 (2, 11)	8 (4, 16)

Please note that the results for patients admitted from 1 September 2020 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

* Please see Definitions on page 73.

† 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 that received advanced respiratory support at any time during their critical care stay admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 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 and known outcomes)

	Patients with confirmed COVID-19 and advanced respiratory support *	
Critical care outcome	**Admitted from 1 Sep (N=6012 ‡)**	**Admitted up to 31 Aug (N=7877)**
Outcome at end of critical care, n (%)		
Discharged	1464 (24.4)	4122 (52.3)
Died	2474 (41.2)	3755 (47.7)
Still receiving critical care ‡	2074 (34.5)	0 (0.0)
Duration of critical care	**(N=3928)**	**(N=7872)**
Duration of critical care (days) †, median (IQR)		
Survivors	13 (7, 27)	23 (12, 37)
Non-survivors	12 (7, 19)	10 (6, 17)
Organ support (Critical Care Minimum Dataset) *	**(N=3938)**	**(N=7877)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	1567 (39.8)	3296 (41.8)
Basic cardiovascular support only	2363 (60.0)	4564 (57.9)
No cardiovascular support	8 (0.2)	17 (0.2)
Renal support	1079 (27.4)	2777 (35.3)
Liver support	45 (1.1)	110 (1.4)
Neurological support	501 (12.7)	968 (12.3)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	10 (5, 17)	14 (7, 24)
Total (advanced + basic) respiratory support	13 (7, 21)	16 (8, 27)
Advanced cardiovascular support	3 (1, 5)	3 (2, 6)
Total (advanced + basic) cardiovascular support	13 (8, 20)	16 (9, 27)
Renal support	5 (2, 11)	8 (4, 16)

Please note that the results for patients admitted from 1 September 2020 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

* Please see Definitions on page 73.

† 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 that received basic respiratory support only during their critical care stay admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 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 and known outcomes)

	Patients with confirmed COVID-19 and basic respiratory support only *	
Critical care outcome	**Admitted from 1 Sep (N=5714 ‡)**	**Admitted up to 31 Aug (N=2791)**
Outcome at end of critical care, n (%)		
Discharged	3774 (66.0)	2251 (80.7)
Died	869 (15.2)	540 (19.3)
Still receiving critical care ‡	1071 (18.7)	0 (0.0)
Duration of critical care	**(N=4641)**	**(N=2790)**
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=4643)**	**(N=2791)**
Receipt of organ support, at any point, n (%)		
Advanced cardiovascular support	80 (1.7)	53 (1.9)
Basic cardiovascular support only	4190 (90.2)	2326 (83.3)
No cardiovascular support	373 (8.0)	412 (14.8)
Renal support	145 (3.1)	114 (4.1)
Liver support	3 (0.1)	3 (0.1)
Neurological support	36 (0.8)	22 (0.8)
Duration of organ support (calendar days), median (IQR)		
Total (advanced + basic) respiratory support	5 (3, 8)	4 (3, 7)
Advanced cardiovascular support	2 (1, 3)	2 (1, 3)
Total (advanced + basic) cardiovascular support	5 (3, 8)	5 (3, 7)
Renal support	4 (2, 6)	3 (2, 5)

Please note that the results for patients admitted from 1 September 2020 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

* Please see Definitions on page 73.

† 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 that received renal support at any time during their critical care stay admitted from 1 September 2020 to date for whom outcomes have been received are summarised in Table 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 and known outcomes)

	Patients with confirmed COVID-19 and renal support *	
Critical care outcome	**Admitted from 1 Sep (N=1570 ‡)**	**Admitted up to 31 Aug (N=2926)**
Outcome at end of critical care, n (%)		
Discharged	304 (19.4)	1278 (43.7)
Died	957 (61.0)	1648 (56.3)
Still receiving critical care ‡	309 (19.7)	0 (0.0)
Duration of critical care	**(N=1260)**	**(N=2926)**
Duration of critical care (days) †, median (IQR)		
Survivors	15 (5, 35.5)	32 (19, 46)
Non-survivors	13 (7, 20)	13 (7, 20)
Organ support (Critical Care Minimum Dataset) *	**(N=1261)**	**(N=2926)**
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	1079 (85.6)	2777 (94.9)
Basic respiratory support only	145 (11.5)	114 (3.9)
No respiratory support	37 (2.9)	35 (1.2)
Advanced cardiovascular support	671 (53.2)	1587 (54.2)
Basic cardiovascular support only	573 (45.4)	1330 (45.5)
No cardiovascular support	17 (1.3)	9 (0.3)
Liver support	29 (2.3)	78 (2.7)
Neurological support	150 (11.9)	409 (14.0)
Duration of organ support (calendar days), median (IQR)		
Advanced respiratory support	12 (7, 21)	18 (11, 30)
Total (advanced + basic) respiratory support	14.5 (8, 23)	19 (11, 33)
Advanced cardiovascular support	3 (2, 6)	4 (2, 7)
Total (advanced + basic) cardiovascular support	14 (7, 23)	19 (11, 32)
Renal support	5 (2, 10)	8 (3, 15)

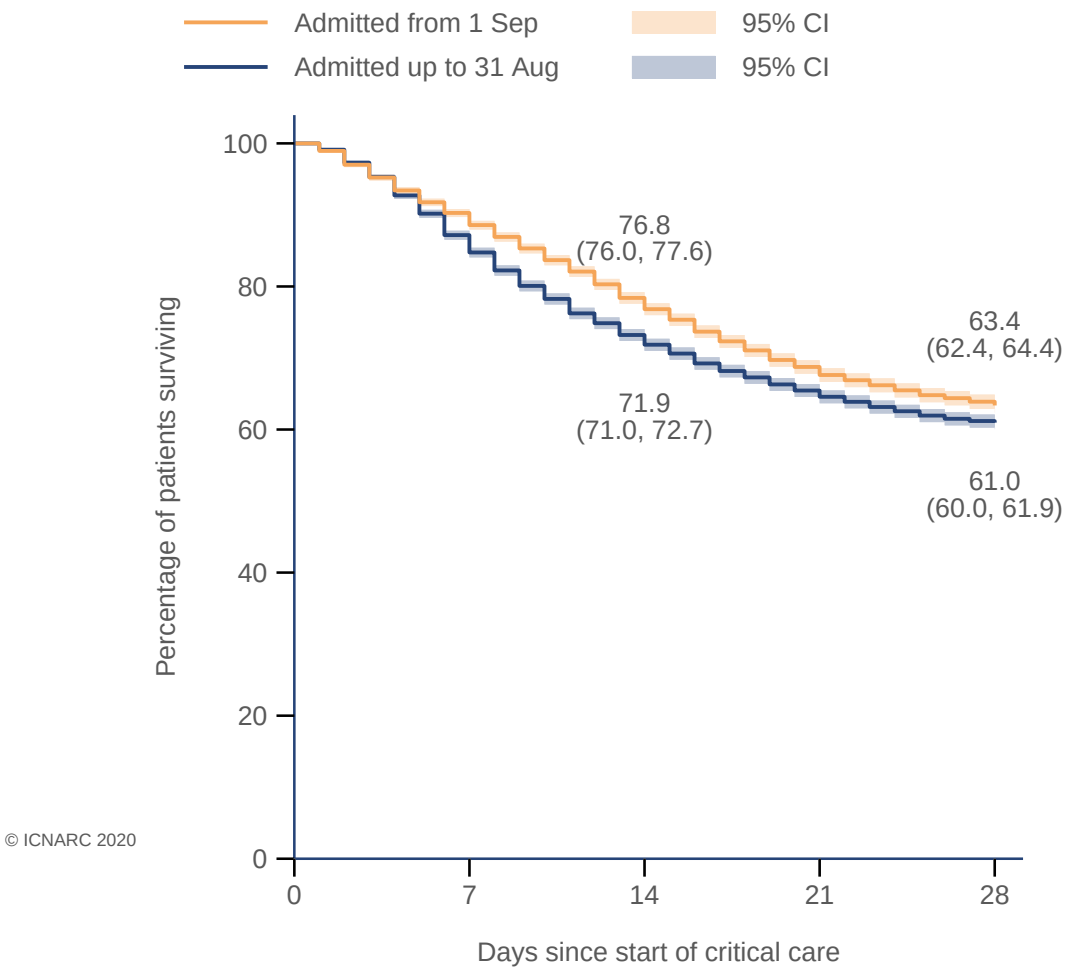
Please note that the results for patients admitted from 1 September 2020 are biased towards patients with shorter lengths of stay in critical care prior to discharge or death, i.e. those who died or recovered quickly.

* Please see Definitions on page 73.

† 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.

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



Admitted from 1 Sep					
At risk	11235	8923	6707	5261	4494
Died (in hospital)	0	1237	2349	3116	3436
Censored	0	1075	2179	2858	3305
Admitted up to 31 Aug					
At risk	10935	9267	7856	7059	6662
Died (in hospital)	0	1667	3077	3873	4268
Censored	0	1	2	3	5

Figure 30. In-hospital survival to 28 days following admission to critical care

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

28-day in-hospital outcome - by patient characteristics

28-day in-hospital mortality for patients critically ill with confirmed COVID-19 admitted from 1 September 2020 to date by patient characteristics (demographics, medical history and indicators of acute severity) is presented in Figures 31-34 and compared with those admitted up to 31 August 2020.

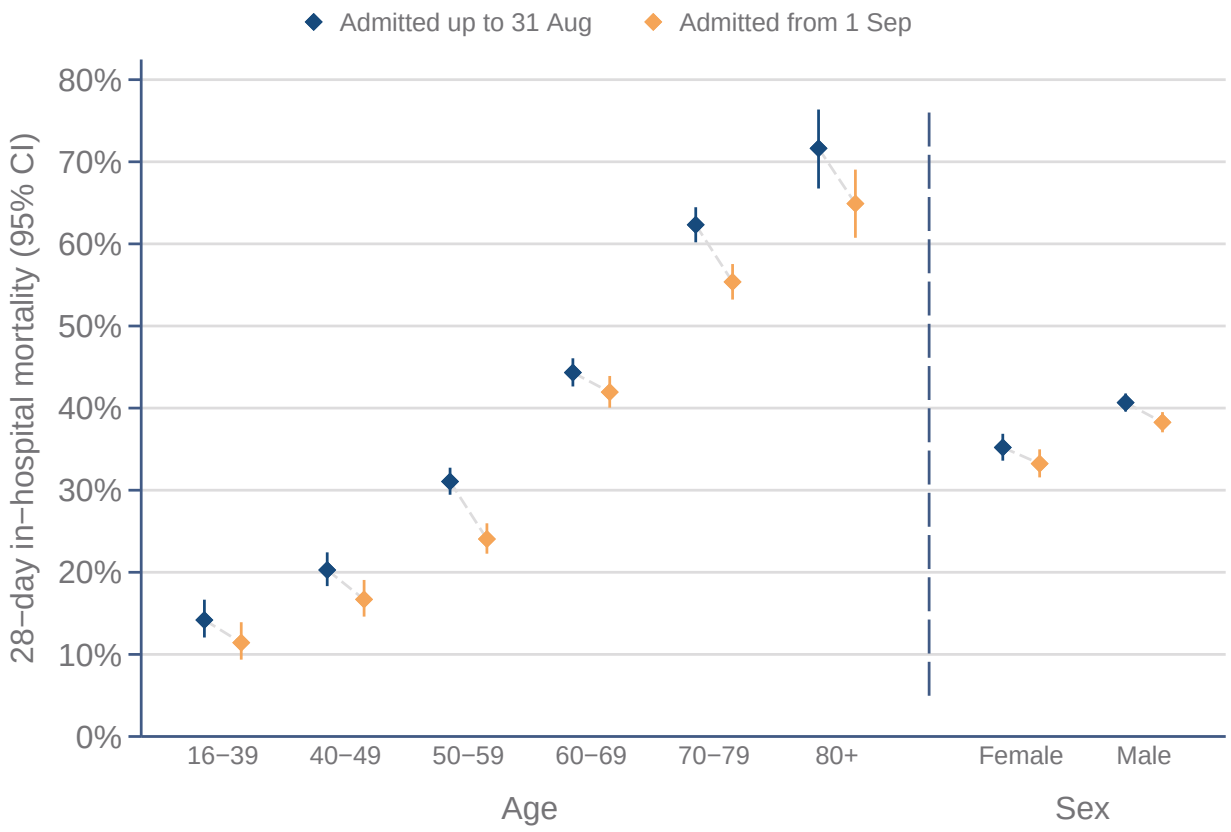


Figure 31. 28-day in-hospital mortality by patient characteristics (demographics)

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

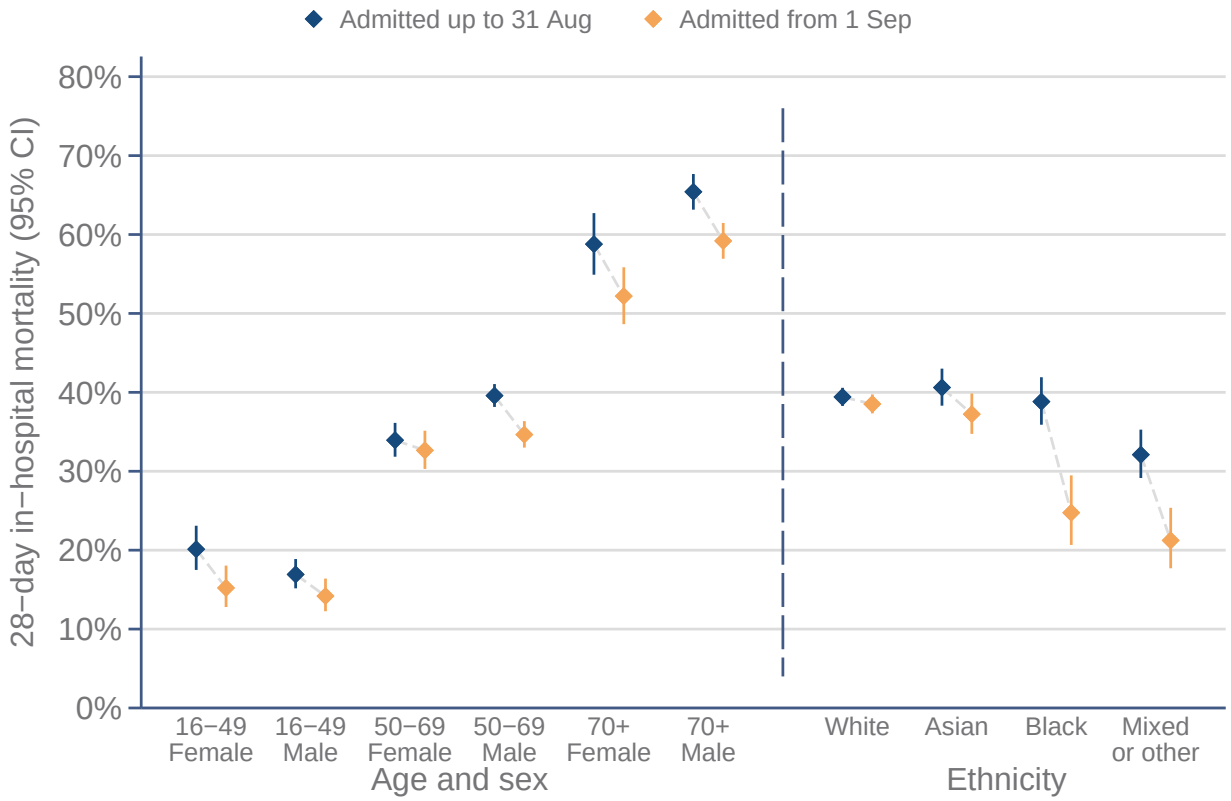


Figure 32. 28-day in-hospital mortality by patient characteristics (demographics continued)

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

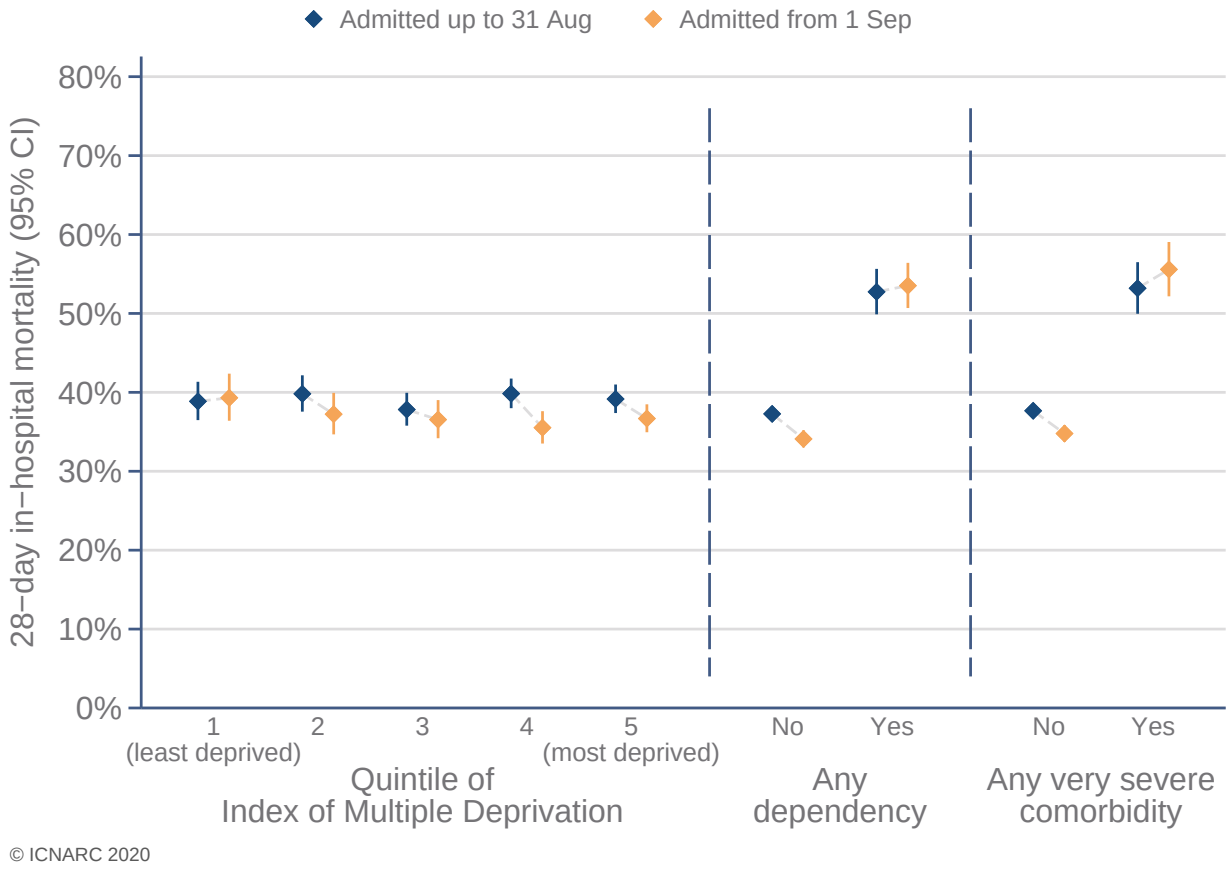


Figure 33. 28-day in-hospital mortality by patient characteristics (demographics and medical history)

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

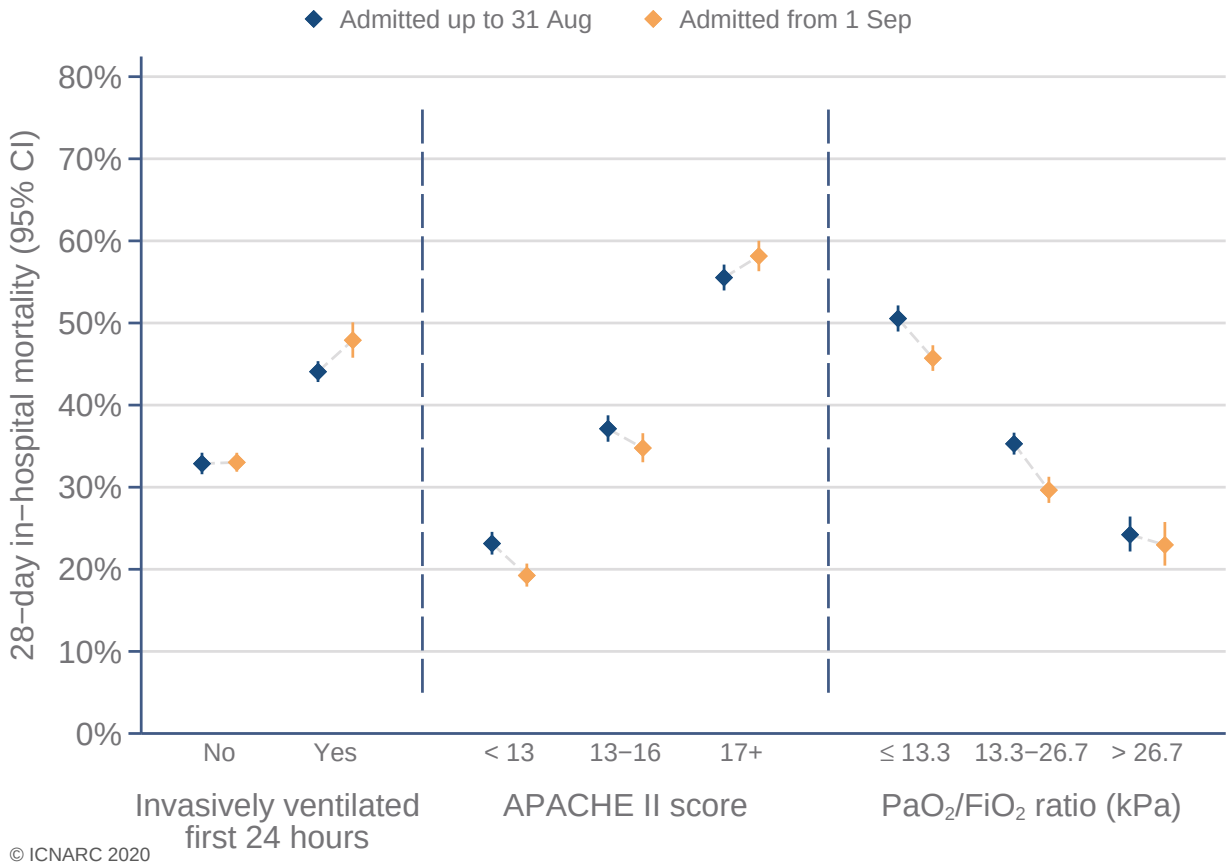


Figure 34. 28-day in-hospital mortality by patient characteristics (indicators of acute severity *)

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

* Please see Definitions on page 73. 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 35-37 and compared with those admitted up to 31 August 2020.

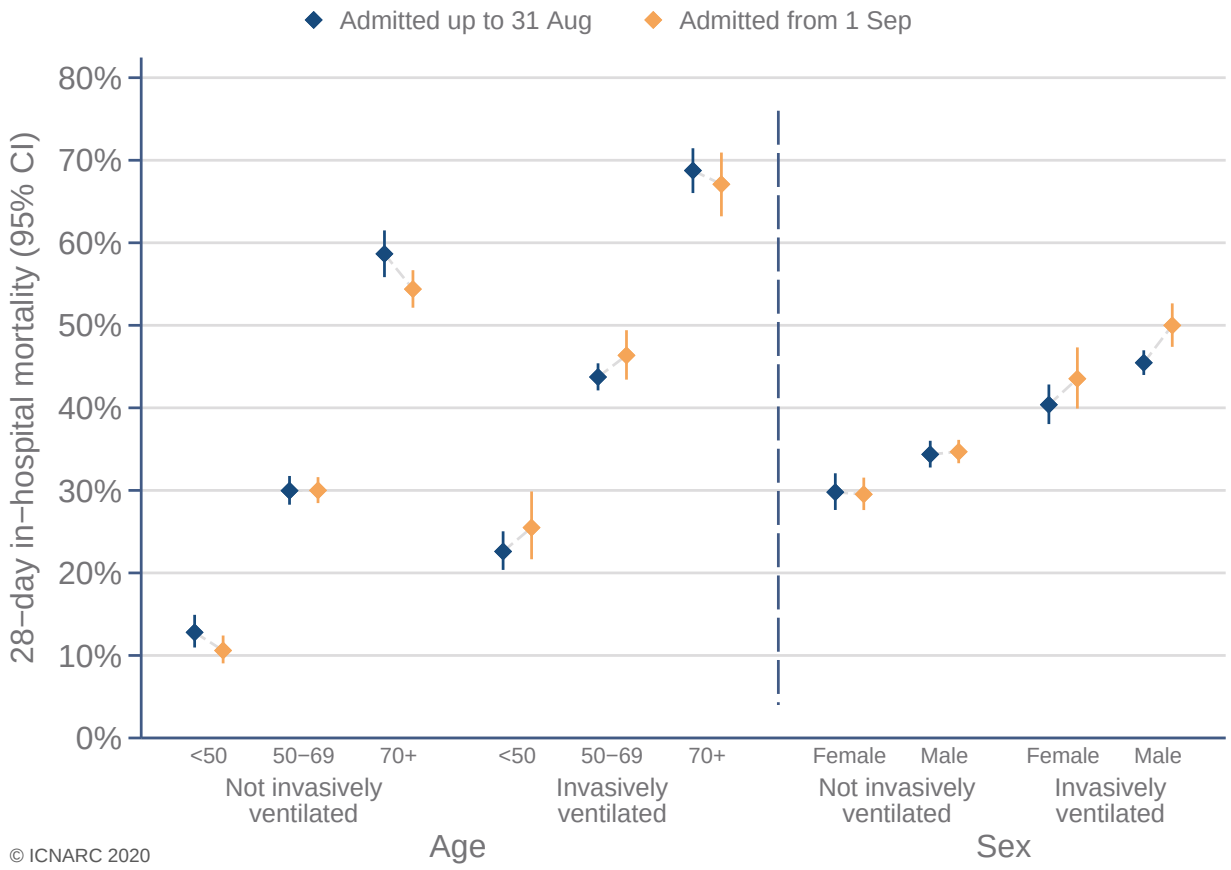


Figure 35. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics)

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

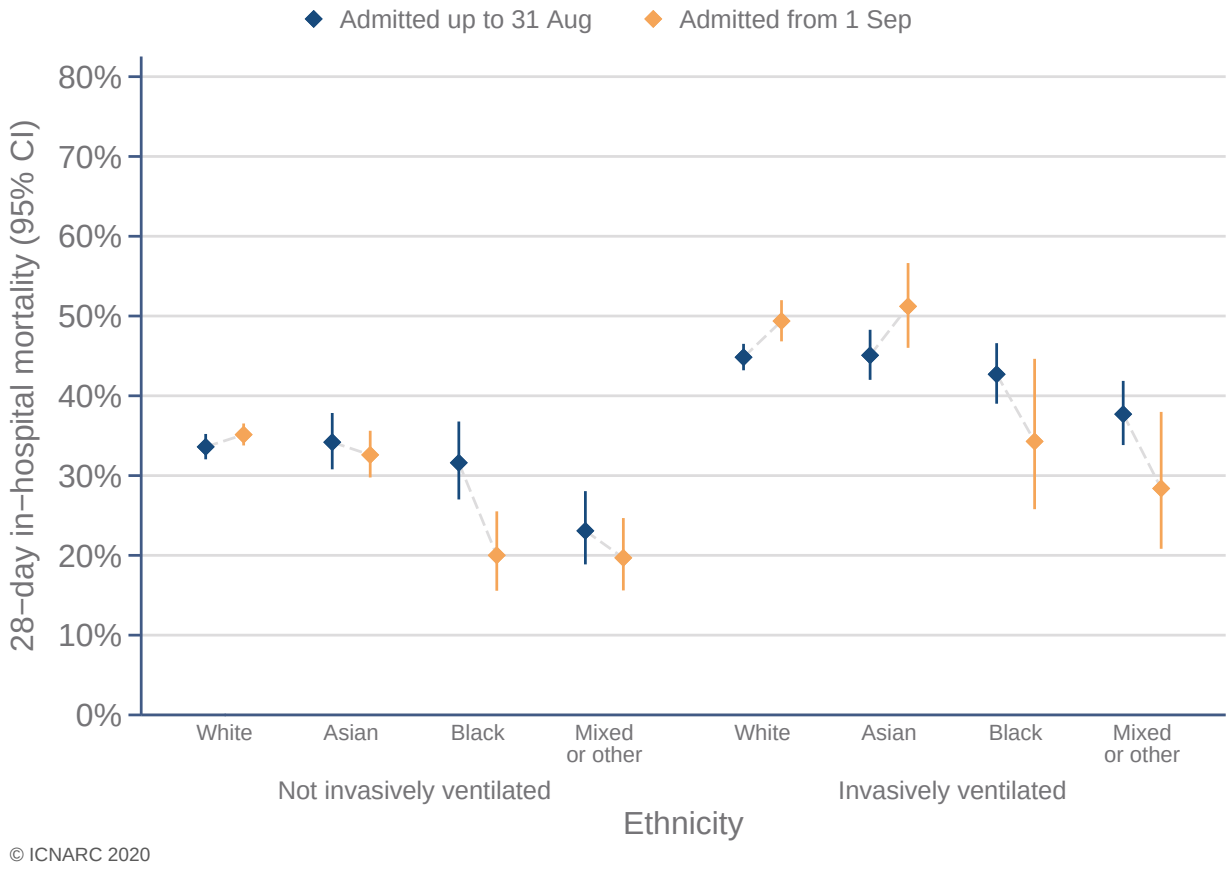


Figure 36. 28-day in-hospital mortality by patient characteristics and invasive ventilation (demographics continued)

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

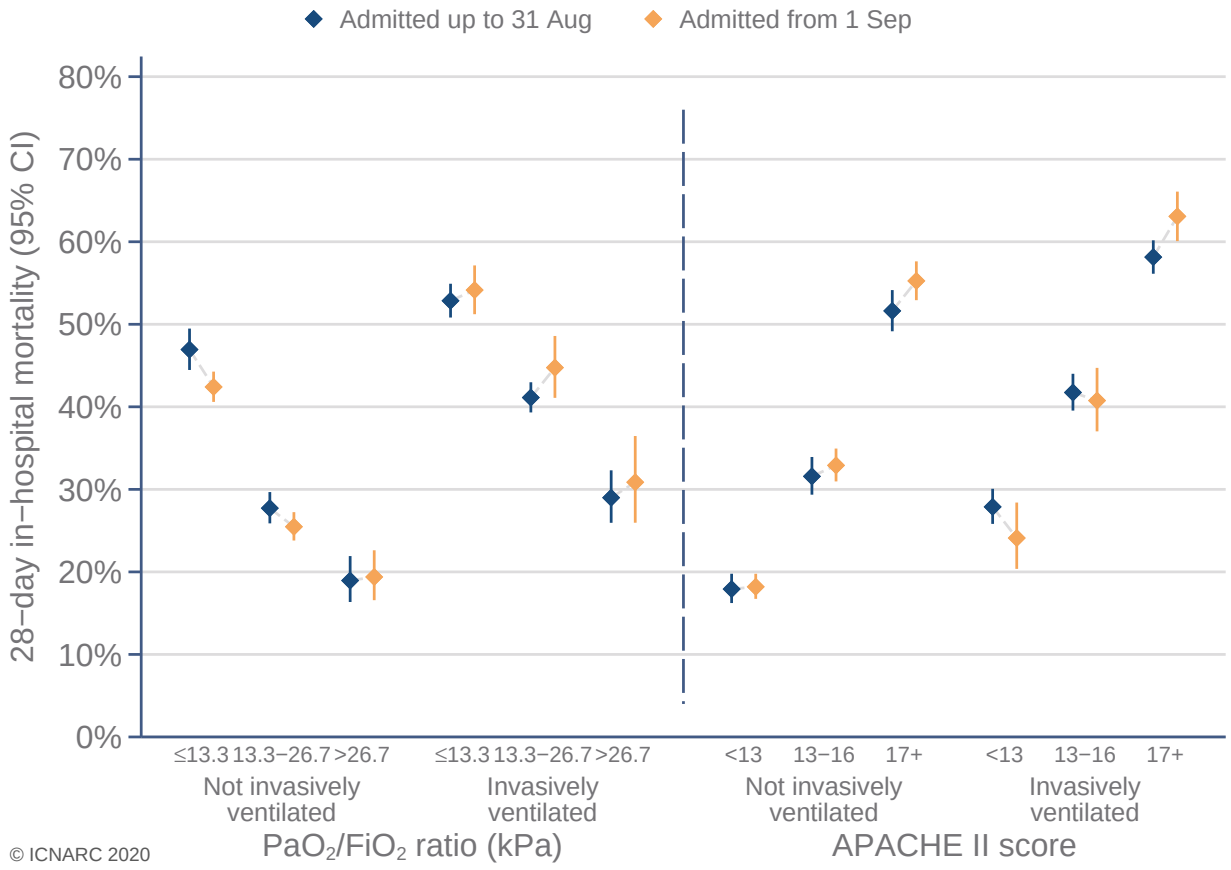


Figure 37. 28-day in-hospital mortality by patient characteristics and invasive ventilation (acute severity)

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

* Please see Definitions on page 73. 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 38 and compared with those admitted up to 31 August 2020.

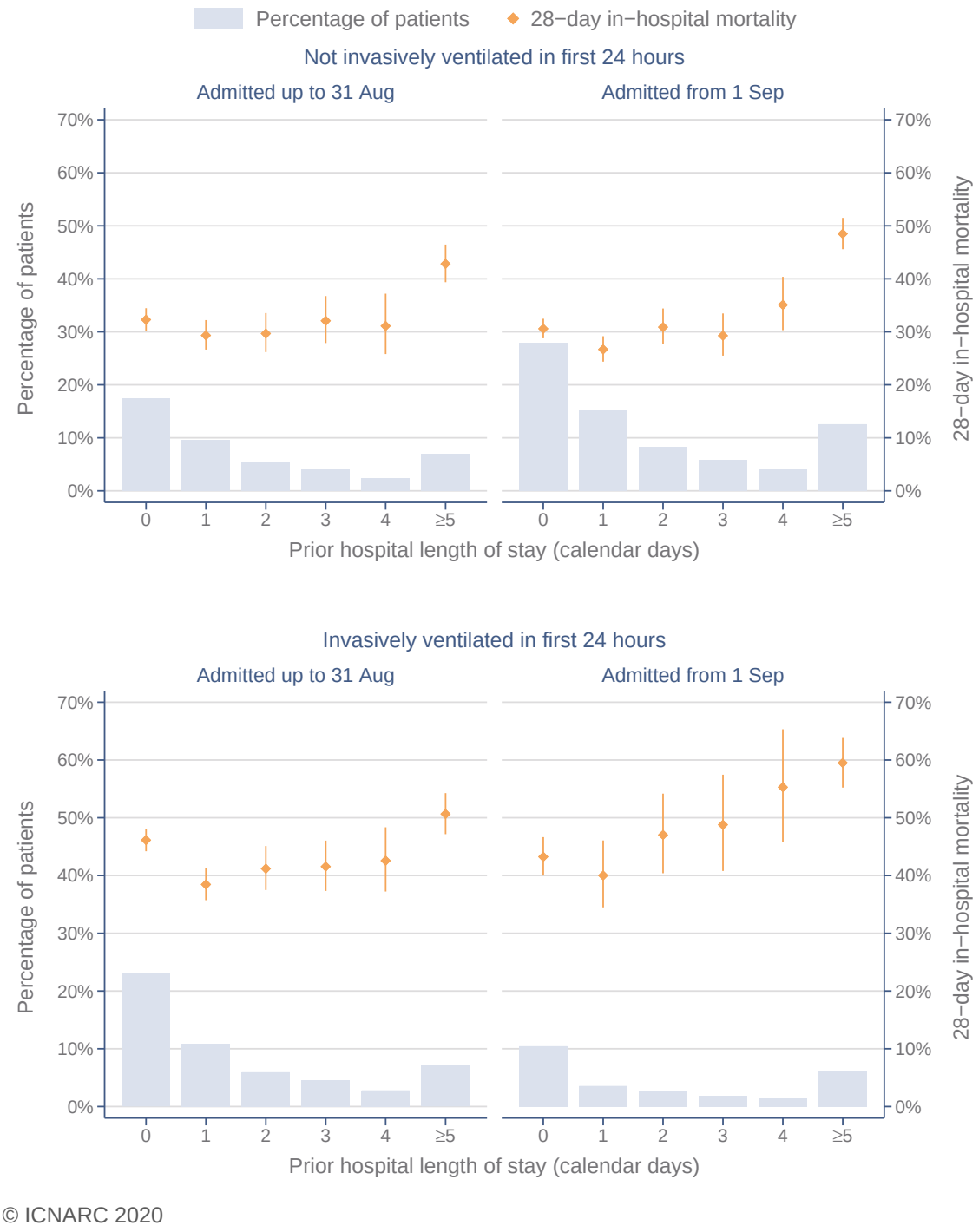


Figure 38. Percentage of patients and 28-day in-hospital mortality by invasive ventilation and prior hospital length of stay

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

Figure 39 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 40-42 show monthly variation in patient characteristics relating to ventilation and timing of critical care compared with the change in mortality.

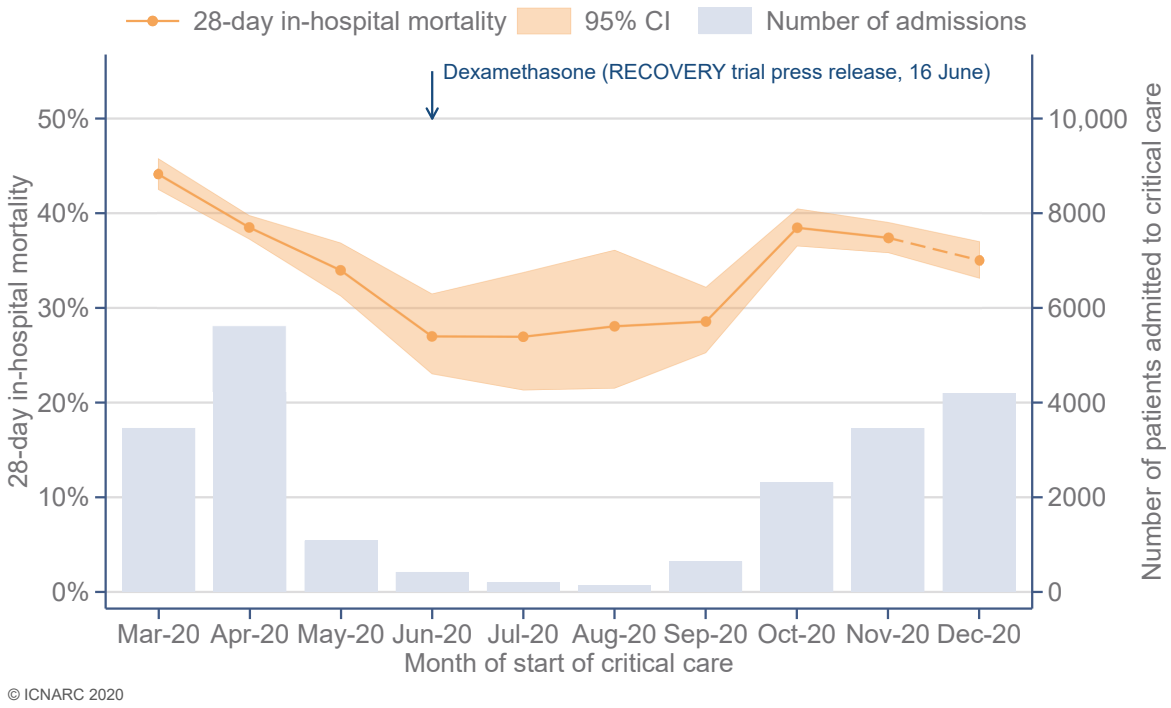


Figure 39. Number of admissions and 28-day in-hospital mortality by month

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

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

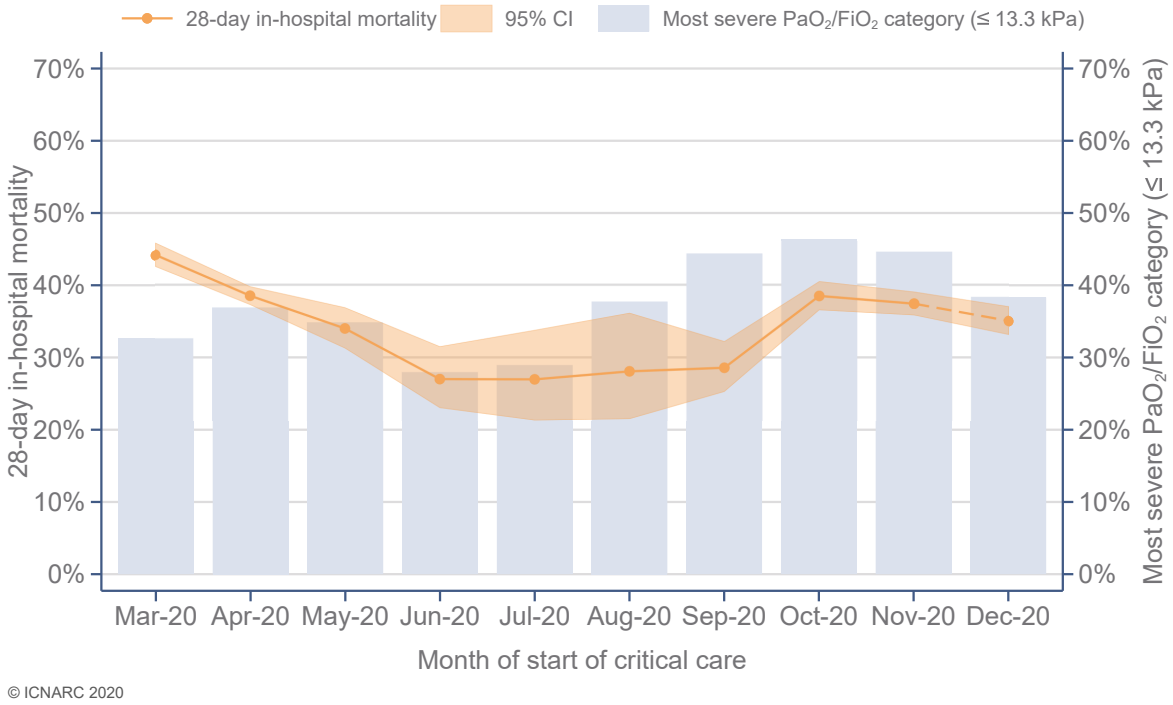


Figure 40. PaO_2/FiO_2 and 28-day in-hospital mortality by month

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 start of critical care.

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

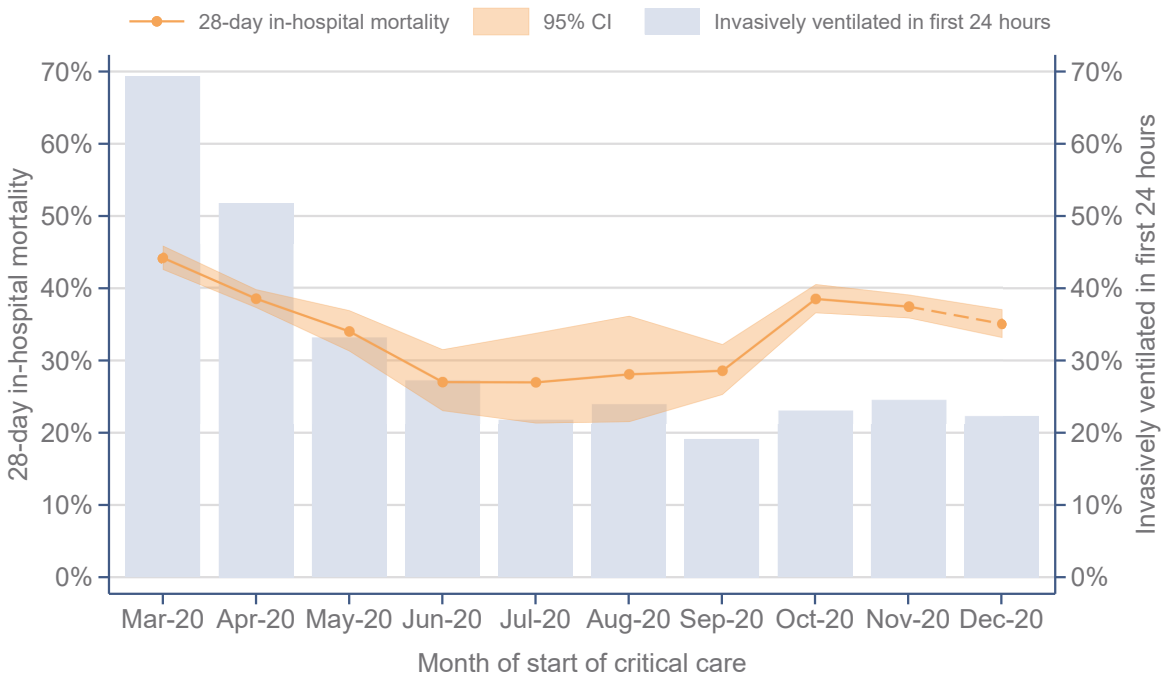


Figure 41. Invasive ventilation first 24 hours and 28-day in-hospital mortality by month

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

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

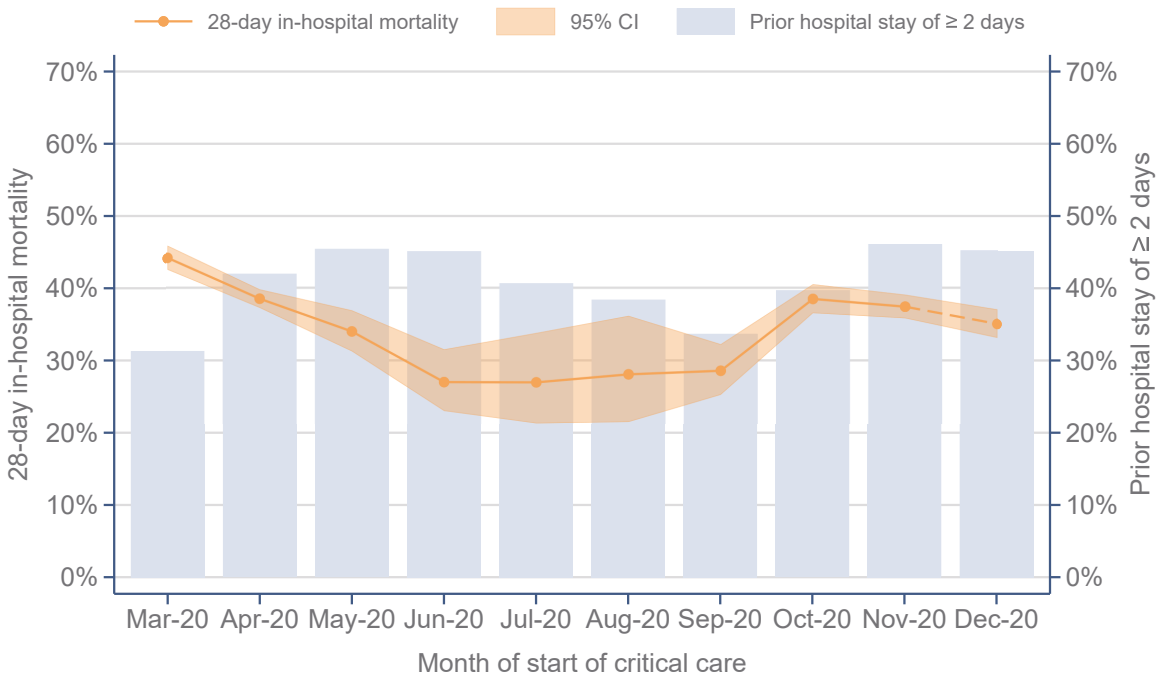


Figure 42. Prior hospital length of stay and 28-day in-hospital mortality by month

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

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

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 43.

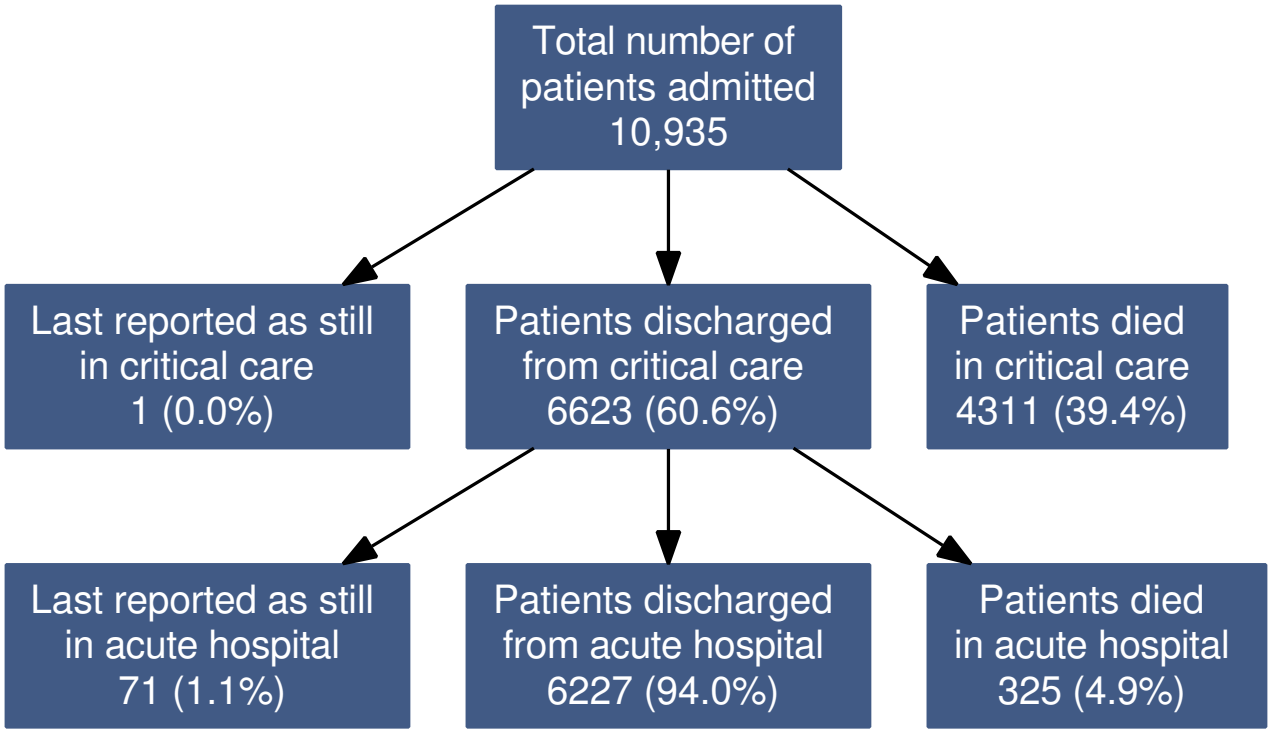
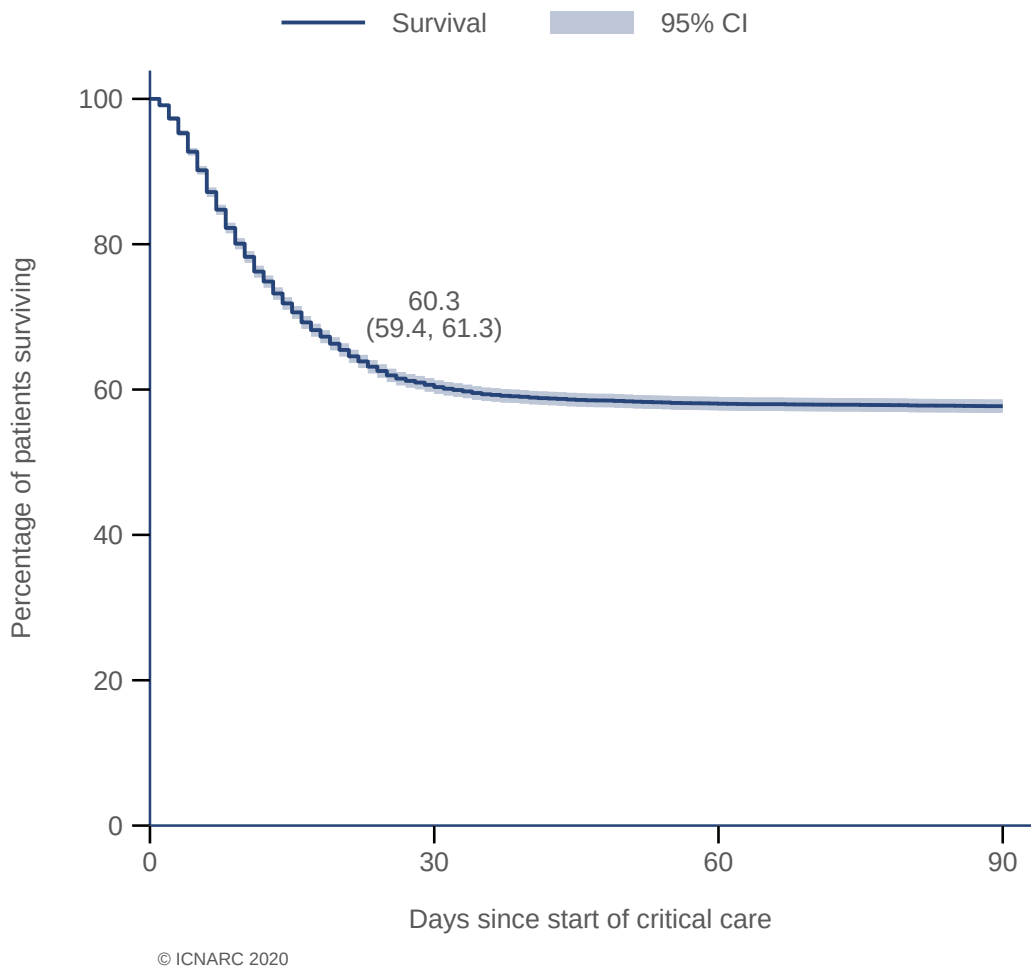


Figure 43. Critical care and acute hospital outcomes for patients admitted up to 31 August 2020

Of 10,170 patients admitted up to 31 May 2020, 5723 have been discharged alive from acute hospital and, of these, 115 have subsequently been readmitted to critical care.

A Kaplan-Meier plot of in-hospital survival to 90 days following admission to critical care for patients critically ill with confirmed COVID-19 admitted up to 31 August 2020 is shown in Figure 44.



At risk	10935	6594	6321	6280
Died (in hospital)	0	4336	4586	4622
Censored	0	5	28	33

Figure 44. In-hospital survival to 90 days following admission to critical care for patients admitted up to 31 August 2020

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

Ethnicity is recorded using the ethnic category codes from the 2001 census and grouped as:

- White: White – British; White – Irish; White – any other
- Mixed: Mixed – white and black Caribbean; Mixed – white and black African; Mixed – white and Asian; Mixed – any other
- Asian: Asian or Asian British – Indian; Asian or Asian British – Pakistani; Asian or Asian British – Bangladeshi; Asian or Asian British – any other
- Black: Black or black British – Caribbean; Black or black British – African; Black or black British – any other
- Other: Other ethnic group – Chinese; Any other ethnic group
- Not stated or not recorded

Index of Multiple Deprivation (IMD) is based on the patient's usual residential postcode (assigned at the level of Lower Layer Super Output Area) according to:

- English Index of Multiple Deprivation 2019 for postcodes in England
- Welsh Index of Multiple Deprivation 2019 for postcodes in Wales
- Northern Ireland Multiple Deprivation Measure 2017 for postcodes in Northern Ireland

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

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

Body mass index is calculated as the weight in kilograms divided by the height in metres squared. Weight and height values may have been measured or estimated.

Dependency prior to admission to acute hospital is assessed as the best description for the dependency of the patient in the two weeks prior to admission to acute hospital and prior to the onset of the acute illness, i.e. "usual" dependency. It is assessed according to the amount of personal assistance they receive with daily activities (bathing, dressing, going to the toilet, moving in/out of bed/chair, continence and eating).

Very severe comorbidities must have been evident within the six months prior to critical care and documented at or prior to critical care:

- Cardiovascular: symptoms at rest
- Respiratory: shortness of breath with light activity or home ventilation
- Renal: renal replacement therapy for end-stage renal disease
- Liver: biopsy-proven cirrhosis, portal hypertension or hepatic encephalopathy
- Metastatic disease: distant metastases
- Haematological malignancy: acute or chronic leukaemia, multiple myeloma or lymphoma
- Immunocompromise: chemotherapy, radiotherapy or daily high dose steroid treatment in previous six months, HIV/AIDS or congenital immune deficiency

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

Organ support is recorded as the number of calendar days (00:00-23:59) on which the support was received at any time, defined as:

- Advanced respiratory: invasive ventilation, BPAP via trans-laryngeal tube or tracheostomy, CPAP via trans-laryngeal tube, extracorporeal respiratory support
- Basic respiratory: >50% oxygen by face mask, close observation due to potential for acute deterioration, physiotherapy/suction to clear secretions at least two-hourly, recently extubated after a period of mechanical ventilation, mask/hood CPAP/BPAP, non-invasive ventilation, CPAP via a tracheostomy, intubated to protect airway
- Advanced cardiovascular: multiple IV/rhythm controlling drugs (at least one vasoactive), continuous observation of cardiac output, intra-aortic balloon pump, temporary cardiac pacemaker
- Basic cardiovascular: central venous catheter, arterial line, single IV vasoactive/ rhythm controlling drug
- Renal: acute renal replacement therapy, renal replacement therapy for chronic renal failure where other organ support is received
- Liver: management of coagulopathy and/or portal hypertension for acute on chronic hepatocellular failure or primary acute hepatocellular failure
- Neurological: central nervous system depression sufficient to prejudice airway, invasive neurological monitoring, continuous IV medication to control seizures, therapeutic hypothermia

Publications

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

- Richards-Belle A, Orzechowska I, Doidge J, Thomas K, Harrison DA, Koelewyn A, Christian MD, Shankar-Hari M, Rowan KM, Gould DW. Critical care outcomes, for the first 200 patients with confirmed COVID-19, in England, Wales and Northern Ireland: a report from the ICNARC Case Mix Programme. *J Intensive Care Soc* 2020; doi:10.1177/1751143720961672
- Richards-Belle A, Orzechowska I, Gould DW, Thomas K, Doidge JC, Mouncey PR, Christian MD, Shankar-Hari M, Harrison DA, Rowan KM. COVID-19 in critical care: epidemiology of the first epidemic wave across England, Wales and Northern Ireland. *Intensive Care Med* 2020; doi:10.1007/s00134-020-06267-0
- Ferrando-Vivas P, Doidge J, Thomas K, Gould DW, Mouncey P, Shankar-Hari M, Young JD, Rowan KM, Harrison DA. Prognostic Factors for 30-day Mortality in Critically Ill Patients with Coronavirus Disease 2019: An Observational Cohort Study. *Crit Care Med* 2020; doi:10.1097/CCM.0000000000004740
- Doidge JC, Gould DW, Ferrando-Vivas P, Mouncey PR, Thomas K, Shankar-Hari M, Harrison DA, Rowan KM. Trends in intensive care for patients with COVID-19 in England, Wales and Northern Ireland. *Am J Respir Crit Care Med* 2020; doi:10.1164/rccm.202008-321OC

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

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

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