

# Dynamic CO-CIN report to SAGE and NERVTAG (All cases)

Dynamic content updated: 2021-01-20 04:13:24.

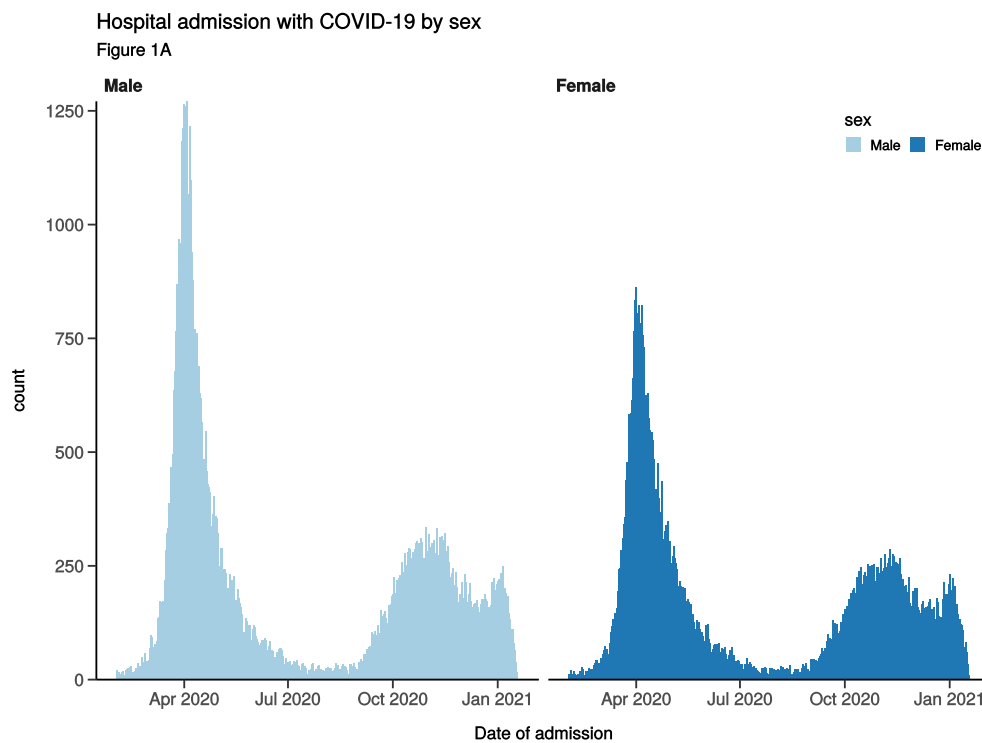
## Executive summary

### Includes all patients

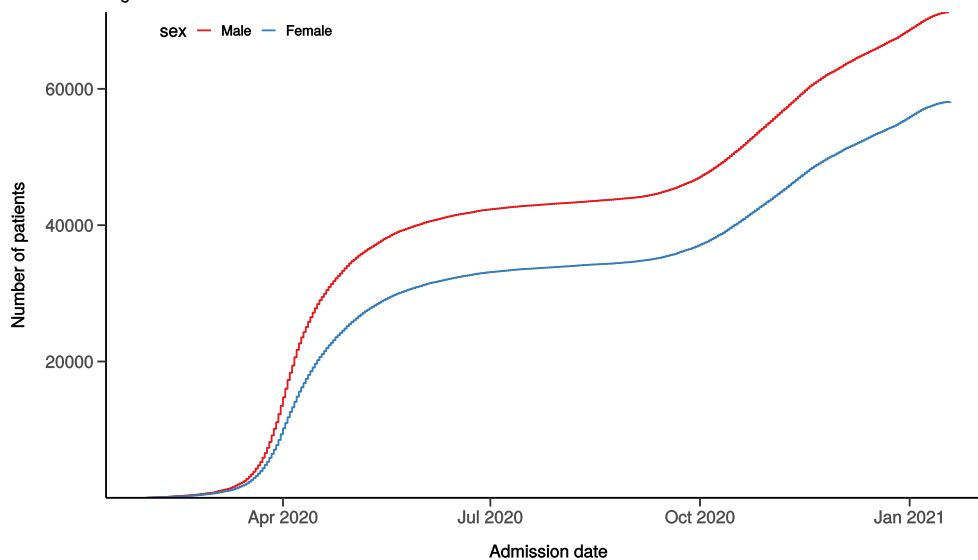
There are 156888 patients included in CO-CIN. Of these, 32832 patient(s) have died and 19831 required ICU. 74520 have been discharged home.

## Admission

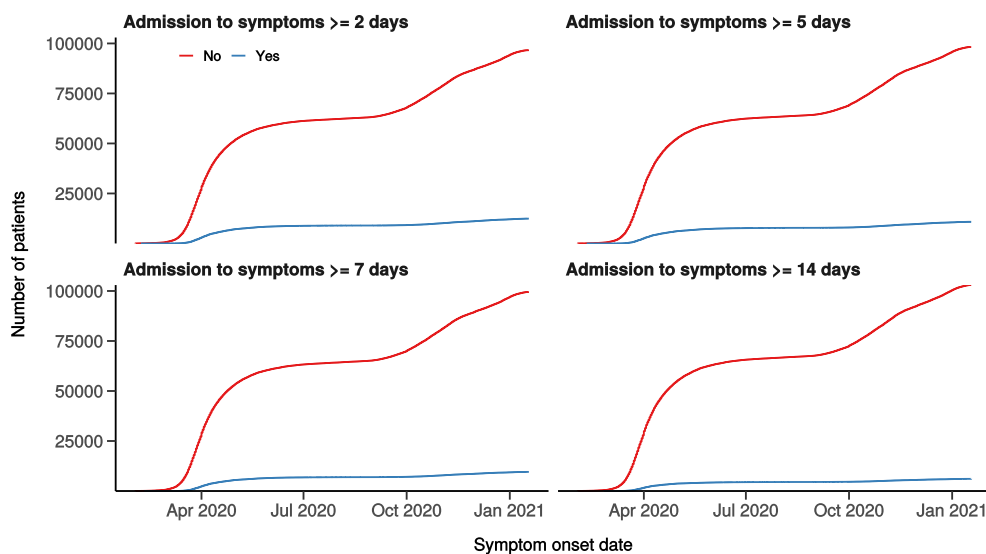
Figure 1



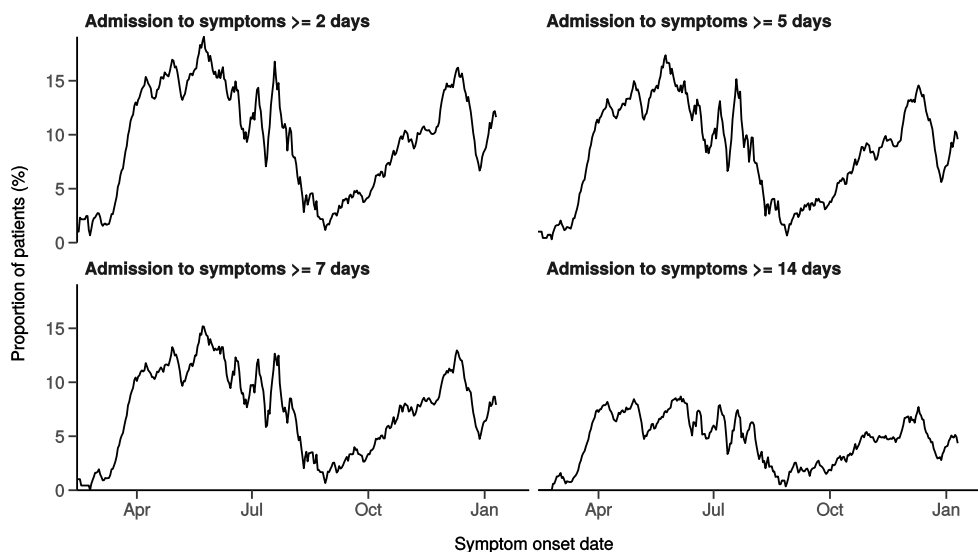
Hospital admission with COVID-19 by sex  
Figure 1B



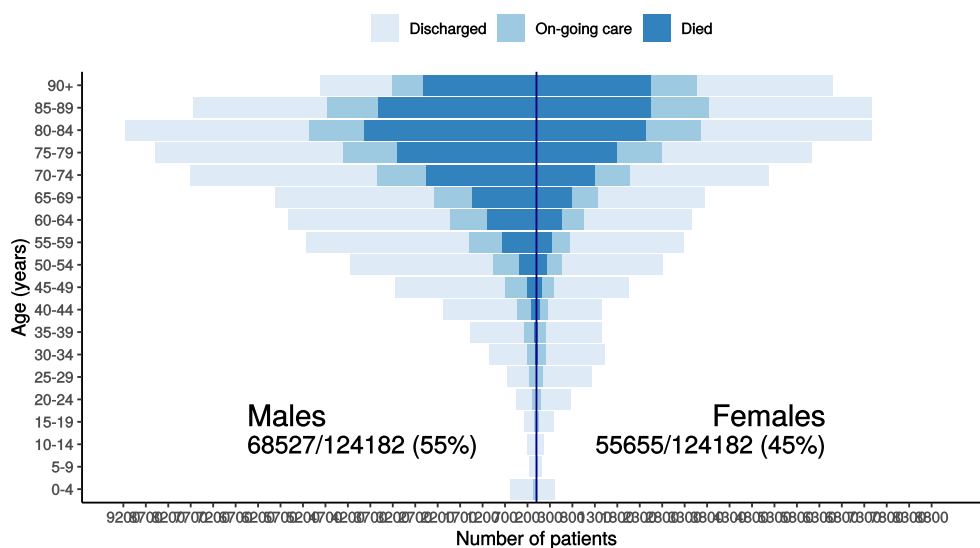
Number with symptom onset occurring after admission to hospital  
Figure 1C



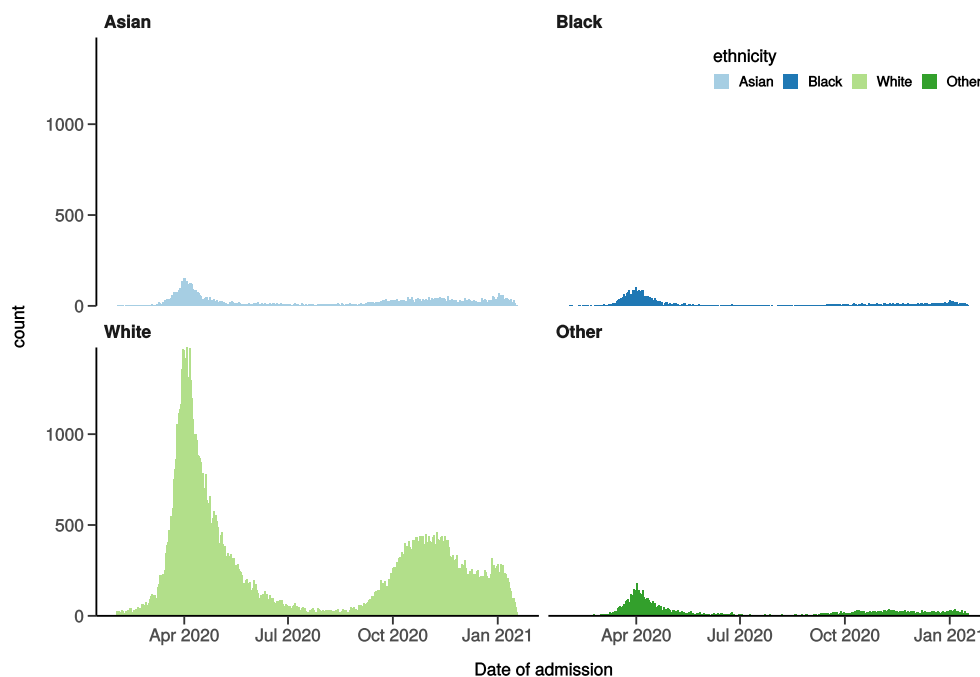
Proportion with symptom onset occurring after hospital admission  
Figure 1D - 7-day rolling percentage.  $n = 109042$



Patients with outcome stratified by age, and sex  
Figure 1E



Hospital admission with COVID-19 by ethnicity  
Figure 1F

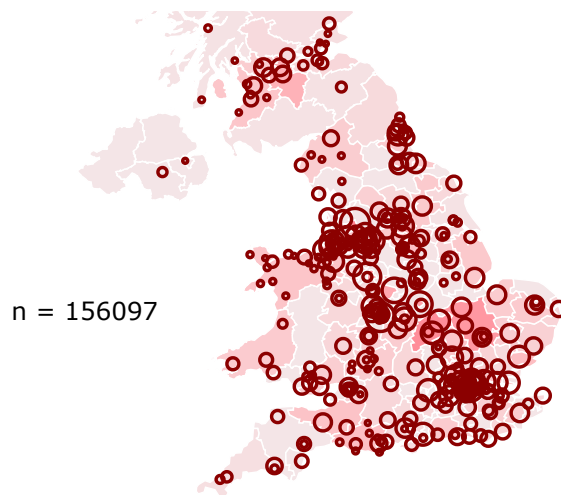


## Location by CCG / Healthboard

Figure 2

Click and drag on map to zoom into area. Reset via toolbar at top of map.





## Symptoms and comorbidity

Figure 3A

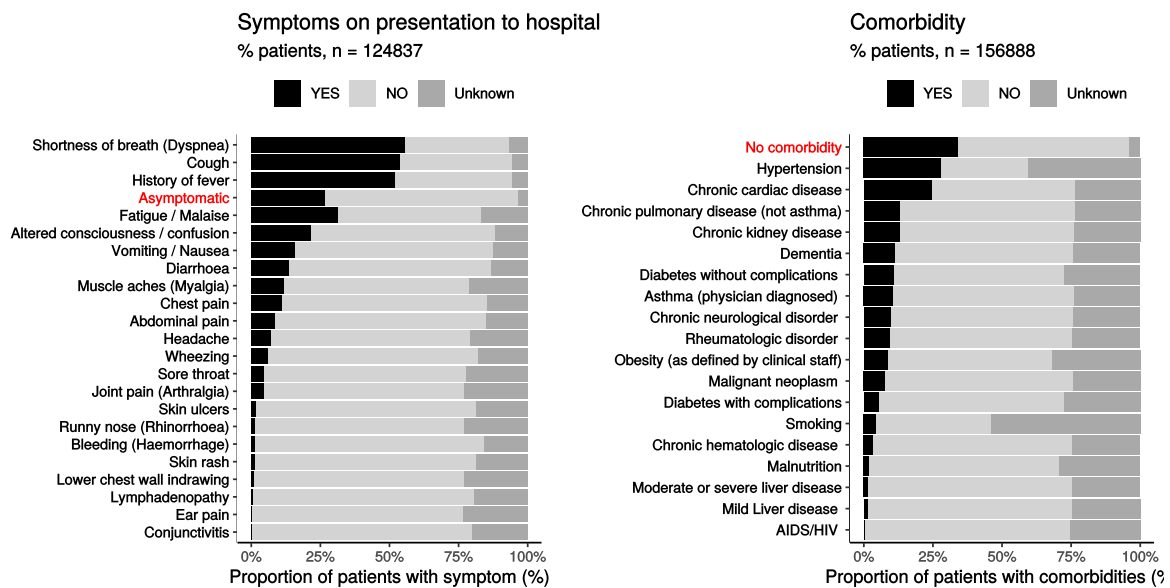


Figure 3B - Symptoms by Age

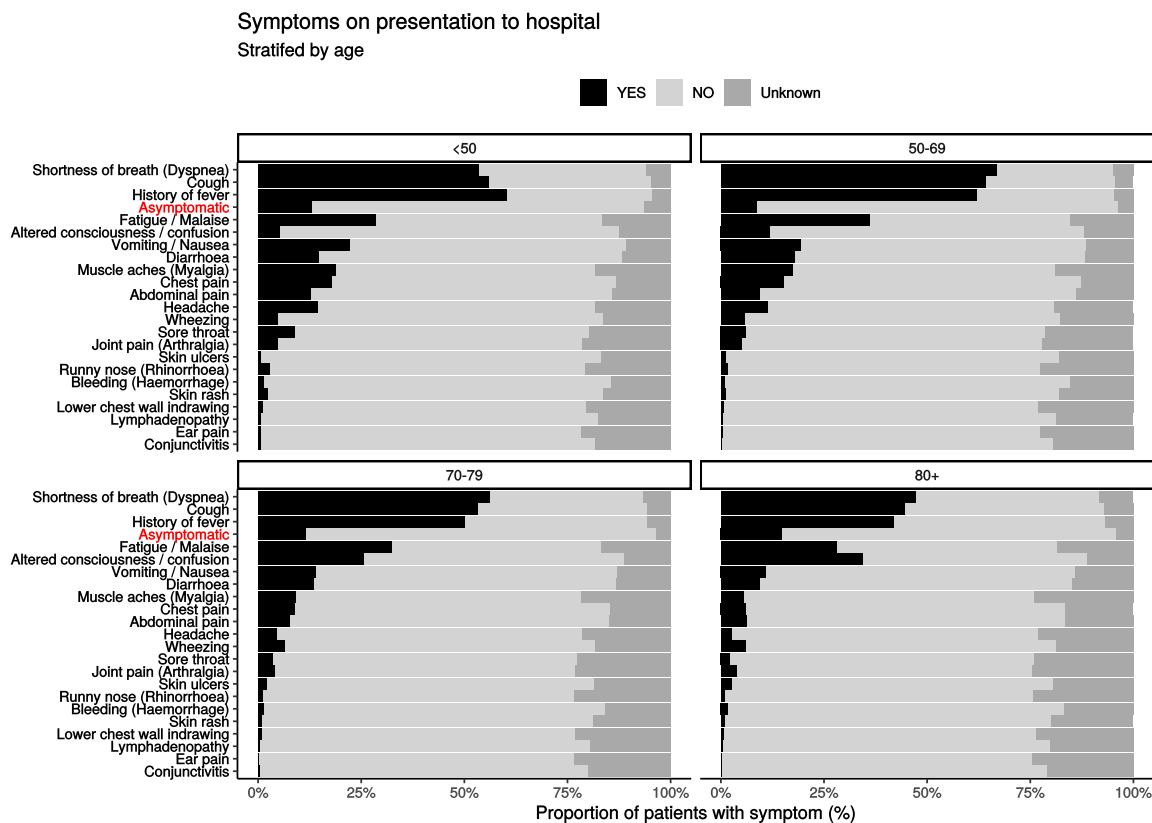
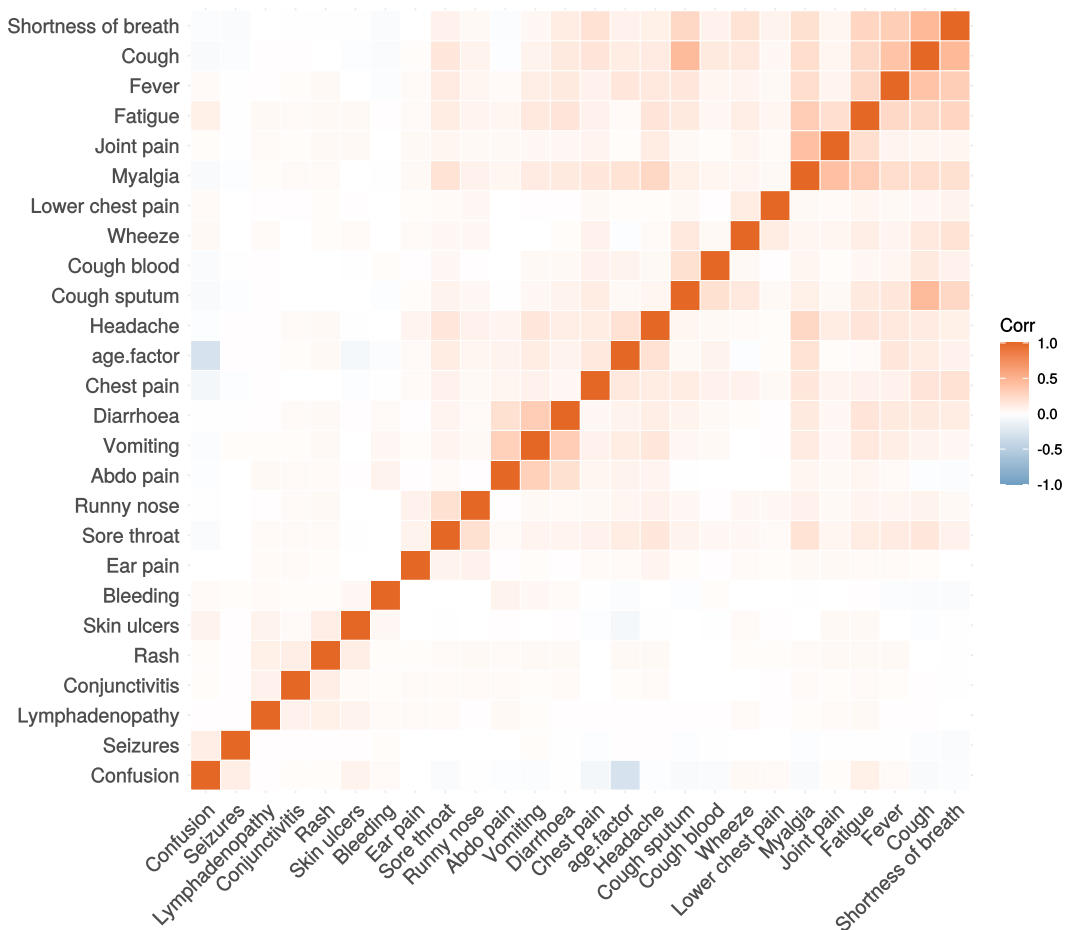


Figure 3C

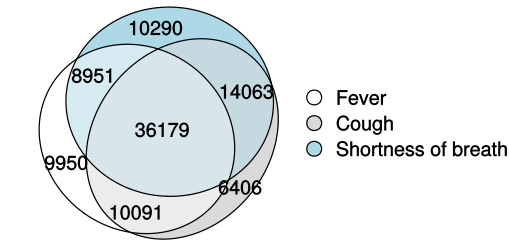
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



Symptoms (diagnostic criteria)

Figure 4A

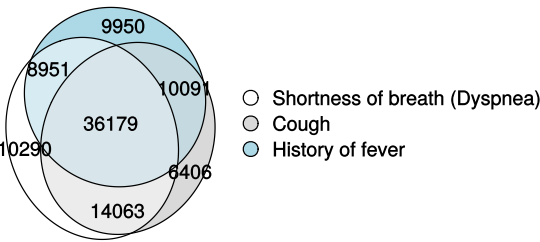
n = 124837



Symptoms (most common)

Figure 4B

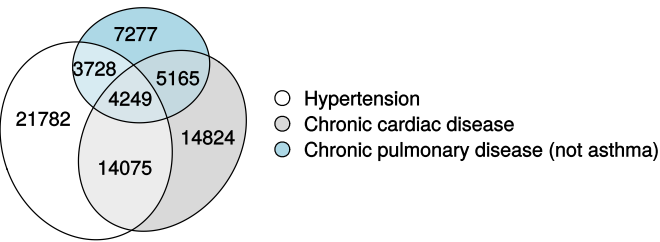
n = 124837



Comorbidity (most common)

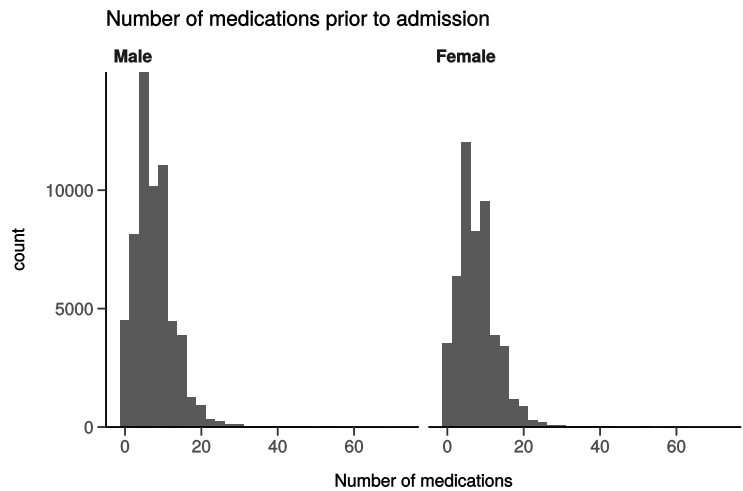
Figure 4C

n = 156888



Medication prior to illness

Figure 5

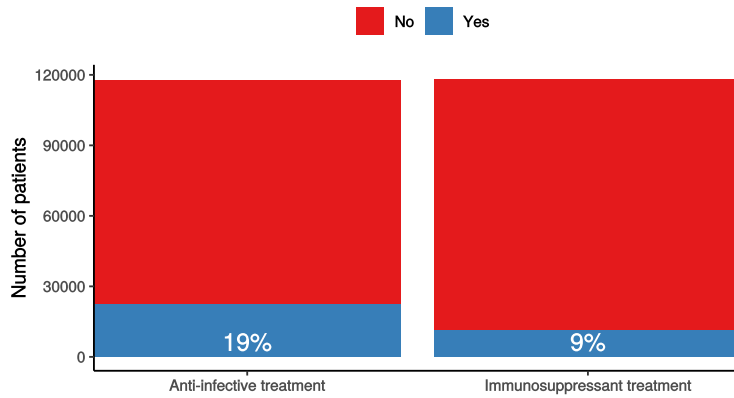


Preadmission treatment

Figure 6

## Pre-admission treatment

Anti-infectives for illness episode (left) immunosuppressants including oral (no



## Patient flow

Figure 7A - All patients

N = 128211

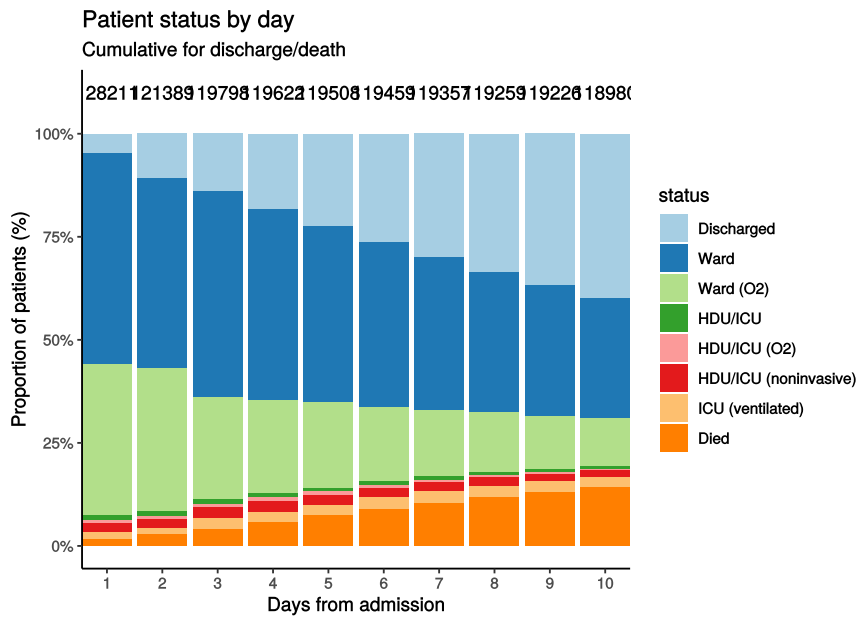
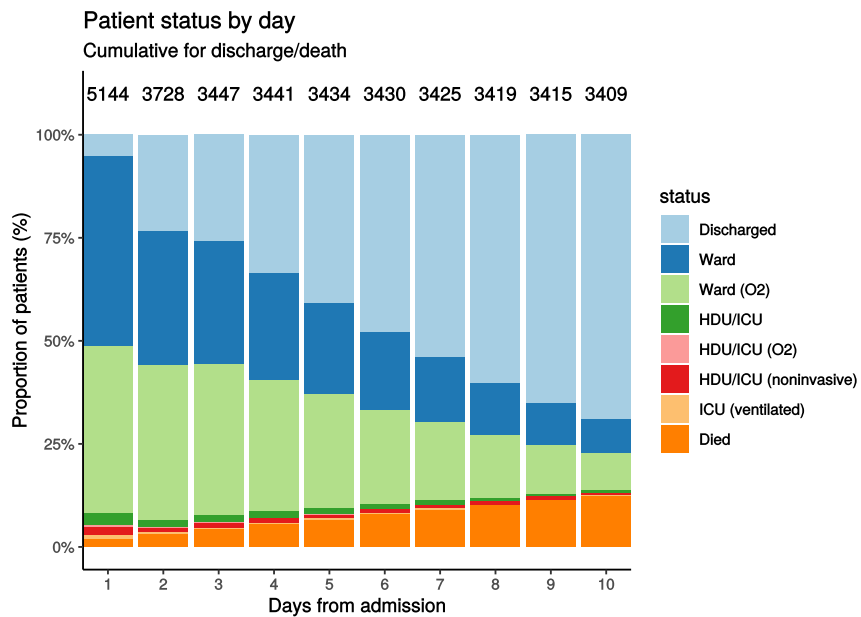


Figure 7B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

N = 5144



## Oxygen requirement

Figure 8A - All patients

N = 121287

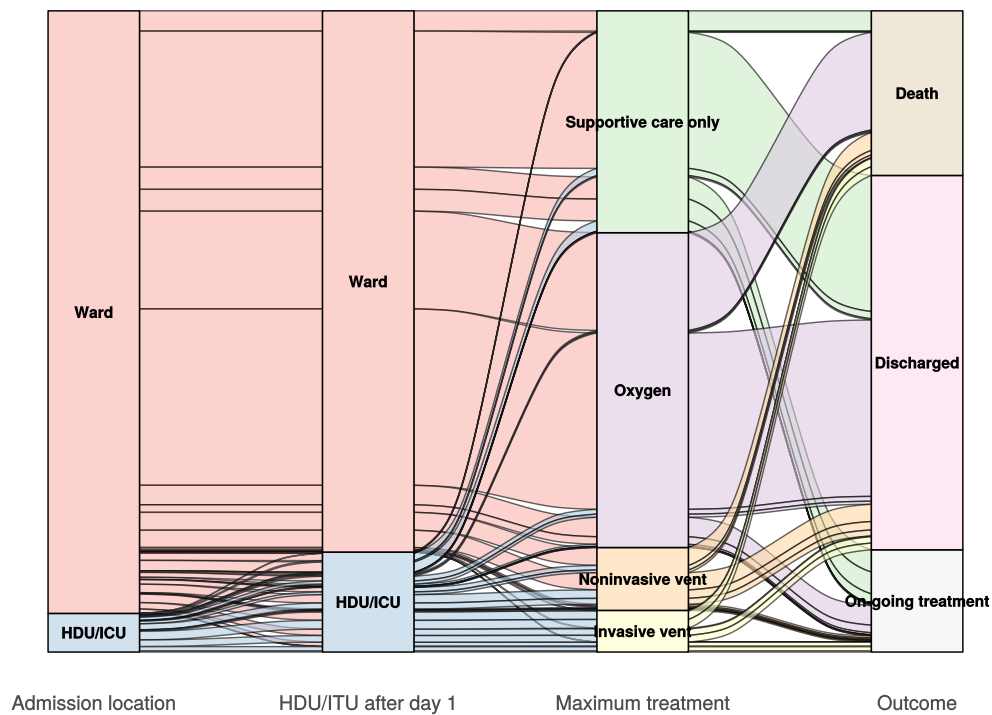


Figure 8B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

N = 4835

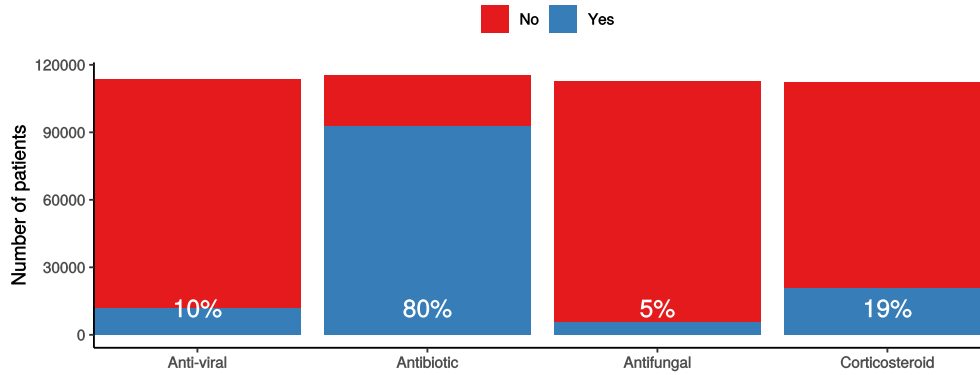
## In-hospital medical treatment

Figure 9



## In-hospital treatment

Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have completed journey.

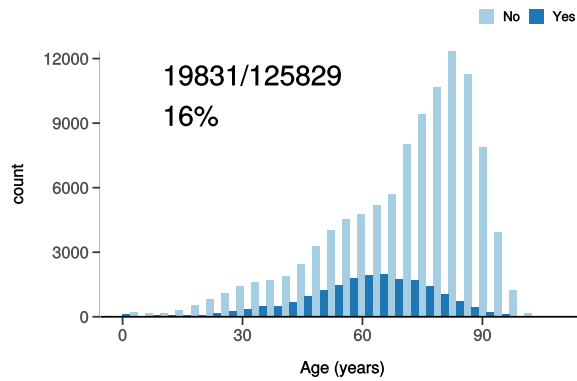


## Treatment

Figure 10

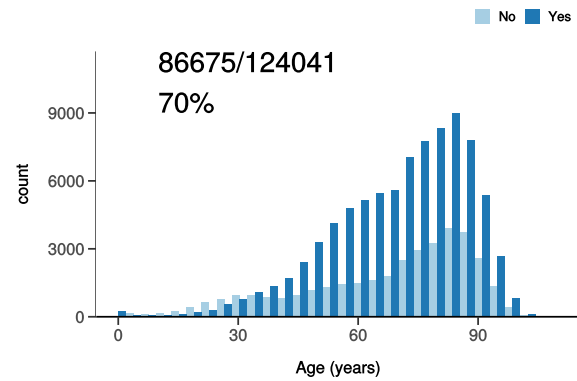
ICU/HDU admission

Figure 10A



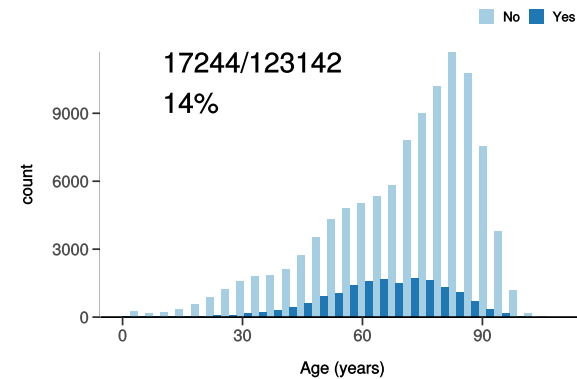
High flow oxygen

Figure 10B



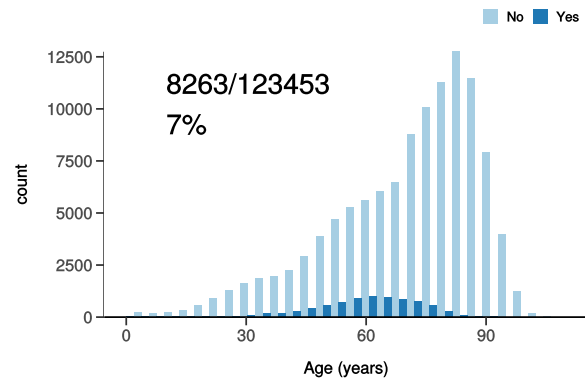
Noninvasive ventilation

Figure 10C



Invasive ventilation

Figure 10D

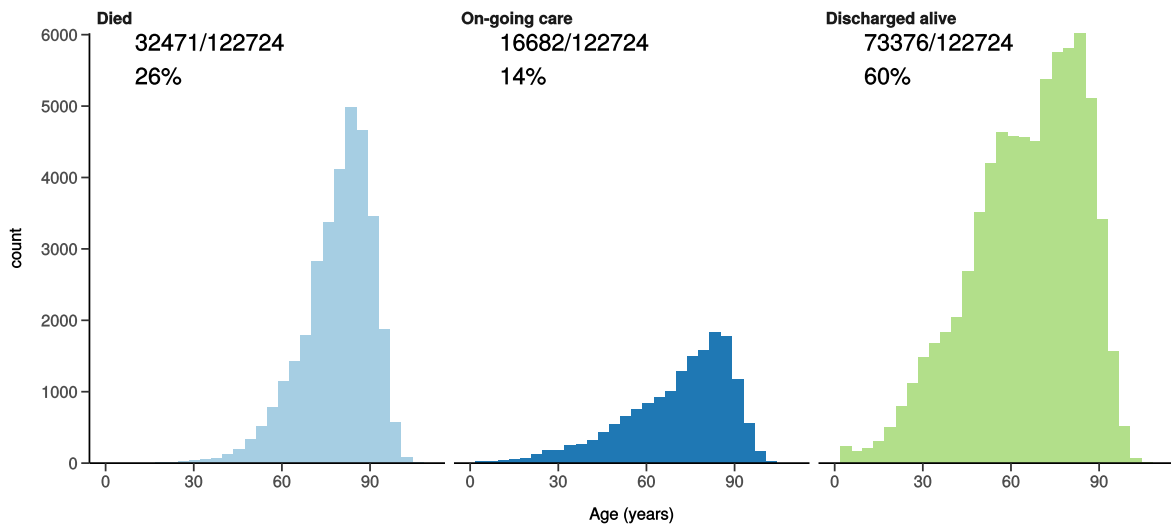


## Status in patients admitted $\geq 14$ days from today

Figure 11

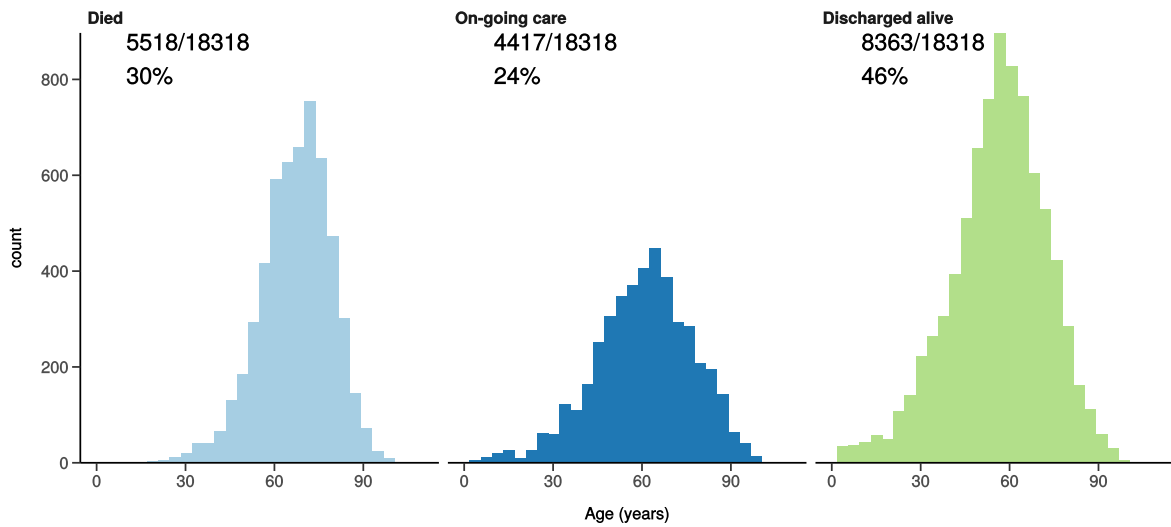
All: status in patients admitted  $\geq 14$  days ago

Figure 11A



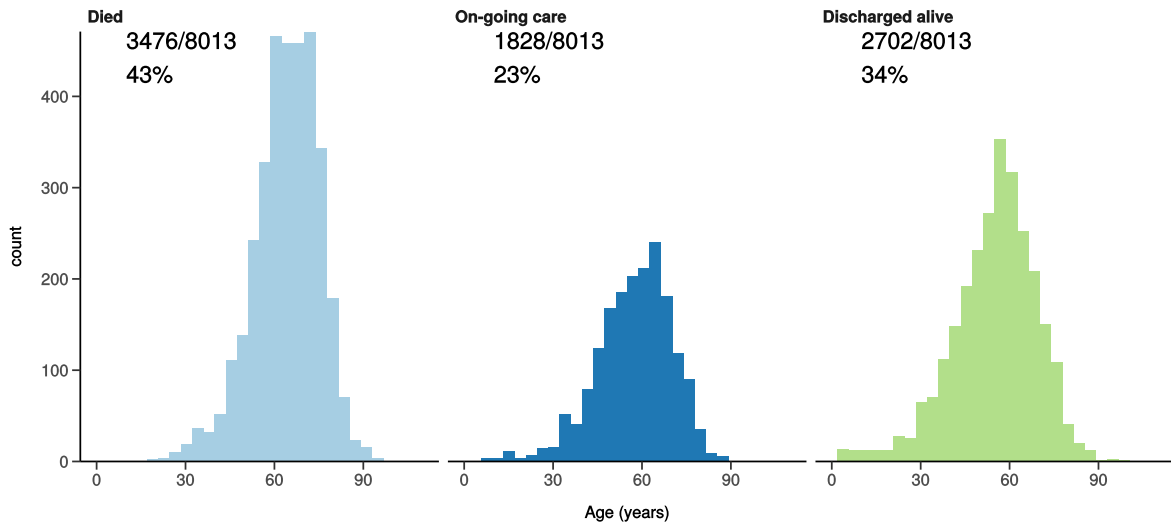
ICU/HDU admissions: status in patients admitted  $\geq 14$  days ago

Figure 11B



Invasive ventilation: status in patients admitted  $\geq 14$  days ago

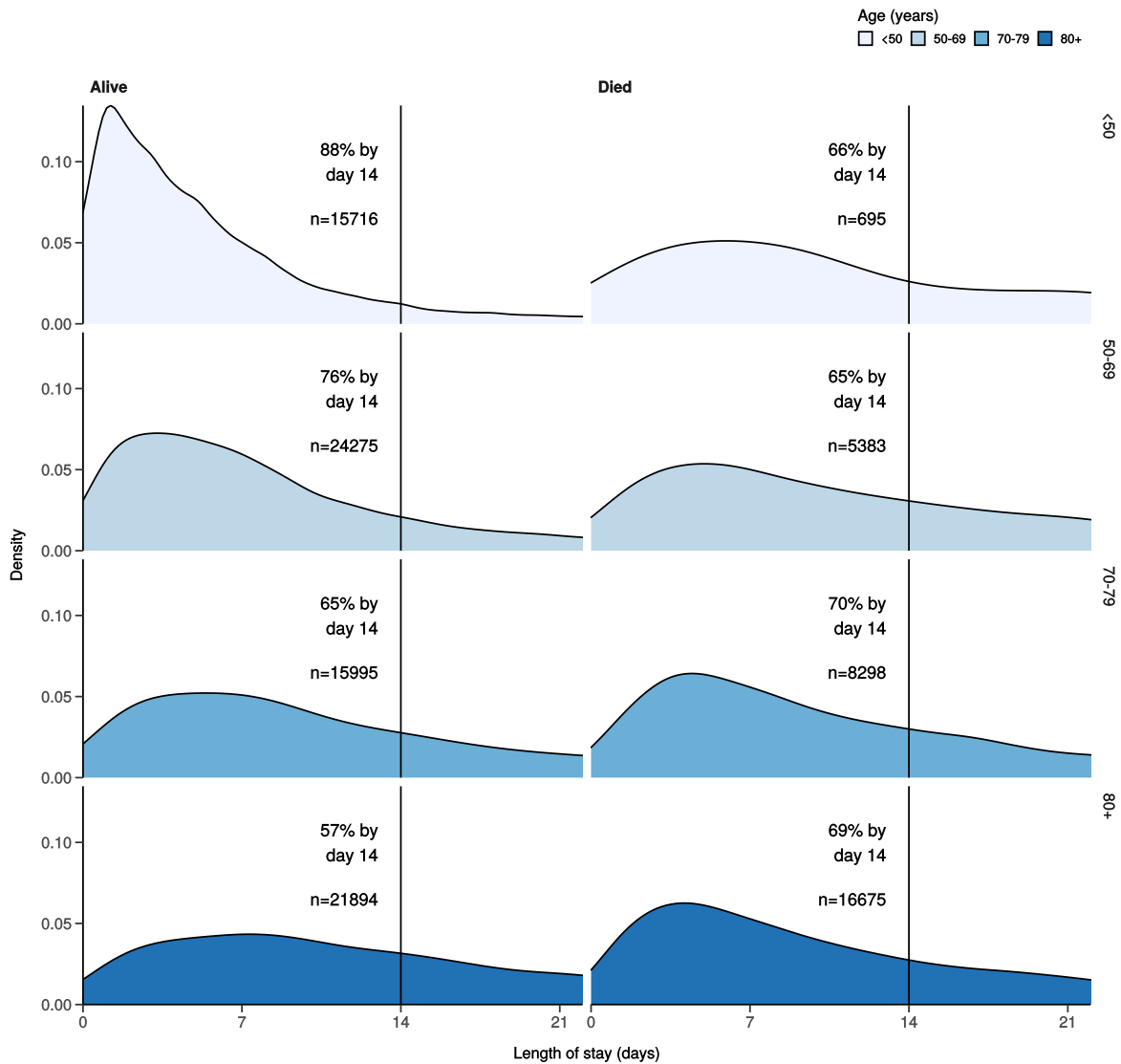
Figure 11c



## Length of stay stratified by age

Figure 12

Length of stay stratified by age and mortality  
Proportion who reach outcome by day 14 shown



## Predictors of death: logistic regression multivariable model

Logistic regression model only includes patients admitted >14 days ago from today.

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Age on admission (years)	<50	17753 (96.0)	741 (4.0)	•	•
	50-69	26548 (82.5)	5622 (17.5)	5.07 (4.69-5.49, p<0.001)	4.60 (4.22-5.03, p<0.001)
	70-79	17549 (67.0)	8626 (33.0)	11.78 (10.90-12.74, p<0.001)	9.55 (8.74-10.44, p<0.001)
	80+	23899 (57.9)	17387 (42.1)	17.43 (16.17-18.82, p<0.001)	13.92 (12.76-15.22, p<0.001)
Sex at Birth	Male	45670 (70.0)	19566 (30.0)	•	•
	Female	40131 (75.8)	12833 (24.2)	0.75 (0.73-0.77, p<0.001)	0.69 (0.67-0.71, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Chronic cardiac disease	NO	58549 (77.5)	16964 (22.5)	•	•
	YES	22190 (62.3)	13434 (37.7)	2.09 (2.03-2.15, p<0.001)	1.15 (1.11-1.19, p<0.001)
Chronic pulmonary disease (not asthma)	NO	68888 (74.9)	23053 (25.1)	•	•
	YES	11766 (62.1)	7190 (37.9)	1.83 (1.77-1.89, p<0.001)	1.33 (1.28-1.38, p<0.001)
Chronic neurological disorder	NO	71045 (73.8)	25245 (26.2)	•	•
	YES	9136 (65.9)	4736 (34.1)	1.46 (1.40-1.52, p<0.001)	1.11 (1.06-1.16, p<0.001)
Chronic hematologic disease	NO	76747 (73.1)	28176 (26.9)	•	•
	YES	3228 (65.7)	1688 (34.3)	1.42 (1.34-1.51, p<0.001)	1.05 (0.98-1.13, p=0.200)
Chronic kidney disease	NO	69179 (75.4)	22585 (24.6)	•	•
	YES	11268 (59.8)	7570 (40.2)	2.06 (1.99-2.13, p<0.001)	1.31 (1.26-1.36, p<0.001)
Dementia	NO	70832 (75.7)	22785 (24.3)	•	•
	YES	9338 (56.4)	7207 (43.6)	2.40 (2.32-2.48, p<0.001)	1.40 (1.35-1.46, p<0.001)
Obesity (as defined by clinical staff)	NO	62868 (72.7)	23585 (27.3)	•	•
	YES	9724 (77.1)	2896 (22.9)	0.79 (0.76-0.83, p<0.001)	1.17 (1.11-1.23, p<0.001)
Malignant neoplasm	NO	73418 (74.3)	25343 (25.7)	•	•
	YES	6624 (59.2)	4570 (40.8)	2.00 (1.92-2.08, p<0.001)	1.50 (1.43-1.57, p<0.001)

Number in dataframe = 127982, Number in model = 94455, Missing = 33527, AIC = 96331.3, C-statistic = 0.727, H&L = Chi-sq(8) 166.97 (p<0.001)

Figure 13 - Adjusted odds ratio plot

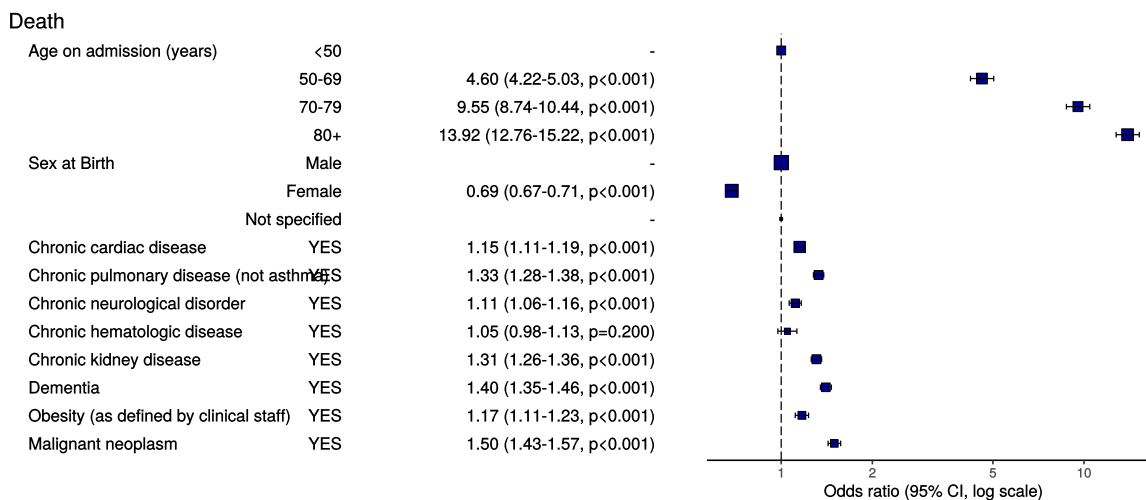
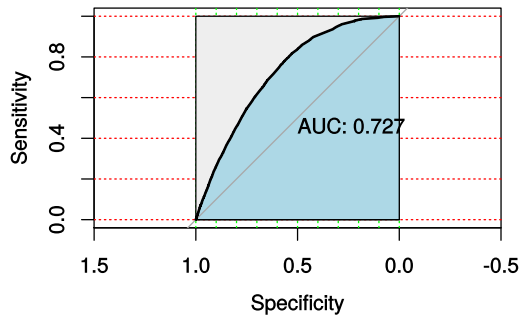


Figure 14 - ROC

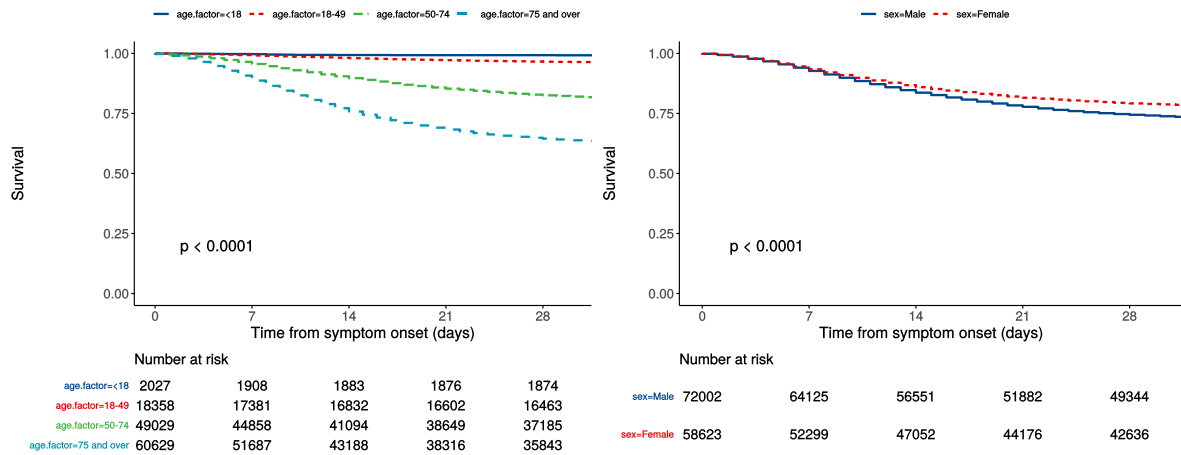


## Survival models

### Kaplan-Meier plots for survival from symptom onset stratified by age (left) and sex (right)

Figure 15

P-value is log-rank test.



## Cox proportional hazards model

The methodology for this is now up and running, but models are still being explored. **What is presented here is not a final model, but to demonstrate methodology.** The results are correct, but important variables have not yet been included.

Time from symptom onset.

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Age on admission (years)	<50	20385 (15.7)	•	•
	50-69	35504 (27.3)	4.67 (4.33-5.05, p<0.001)	4.28 (3.90-4.69, p<0.001)
	70-79	28957 (22.3)	9.84 (9.13-10.61, p<0.001)	8.76 (7.99-9.60, p<0.001)
	80+	45209 (34.8)	13.71 (12.74-14.76, p<0.001)	11.92 (10.88-13.07, p<0.001)
Sex at Birth	Male	72002 (55.1)	•	•
	Female	58623 (44.9)	0.79 (0.77-0.80, p<0.001)	0.77 (0.75-0.79, p<0.001)
qSOFA score on admission	0	50421 (46.2)	•	•
	1	47434 (43.5)	1.66 (1.62-1.70, p<0.001)	1.78 (1.73-1.84, p<0.001)
	2	10223 (9.4)	3.32 (3.21-3.44, p<0.001)	3.07 (2.95-3.20, p<0.001)
	3	1021 (0.9)	5.63 (5.20-6.10, p<0.001)	4.96 (4.53-5.42, p<0.001)
Symptomatic at presentation	No symptoms	13129 (10.5)	•	•

Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
	Symptoms	111804 (89.5)	1.95 (1.86-2.04, p<0.001)	•
Chronic cardiac disease	NO	81293 (68.1)	•	•
	YES	38123 (31.9)	1.88 (1.84-1.92, p<0.001)	1.14 (1.11-1.17, p<0.001)
Chronic kidney disease	NO	98725 (83.1)	•	•
	YES	20105 (16.9)	1.84 (1.79-1.89, p<0.001)	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	NO	115441 (98.0)	•	•
	YES	2338 (2.0)	1.34 (1.25-1.44, p<0.001)	1.45 (1.33-1.58, p<0.001)
Chronic neurological disorder	NO	103466 (87.4)	•	•
	YES	14865 (12.6)	1.39 (1.34-1.43, p<0.001)	•
Malignant neoplasm	NO	106188 (89.9)	•	•
	YES	11937 (10.1)	1.75 (1.70-1.81, p<0.001)	1.37 (1.32-1.43, p<0.001)
Chronic hematologic disease	NO	112751 (95.6)	•	•
	YES	5206 (4.4)	1.34 (1.27-1.41, p<0.001)	•
Obesity (as defined by clinical staff)	NO	92849 (87.3)	•	•
	YES	13522 (12.7)	0.81 (0.78-0.85, p<0.001)	1.10 (1.06-1.15, p<0.001)
Diabetes without complications	NO	96292 (85.0)	•	•
	YES	16945 (15.0)	1.26 (1.23-1.30, p<0.001)	•
Rheumatologic disorder	NO	103157 (87.6)	•	•
	YES	14601 (12.4)	1.15 (1.12-1.19, p<0.001)	•
Dementia	NO	100798 (85.2)	•	•
	YES	17567 (14.8)	2.13 (2.07-2.19, p<0.001)	1.19 (1.15-1.23, p<0.001)
Malnutrition	NO	107615 (97.4)	•	•
	YES	2884 (2.6)	1.54 (1.45-1.64, p<0.001)	•
smoking_mhyn_2levels	NO	64639 (52.9)	•	•
	YES	6824 (5.6)	0.85 (0.81-0.90, p<0.001)	•
	N/K	50711 (41.5)	1.14 (1.11-1.16, p<0.001)	•

Number in dataframe = 131145, Number in model = 89362, Missing = 41783, Number of events = 22314, Concordance = 0.732 (SE = 0.002), R-squared = 0.156 (Max possible = 0.996), Likelihood ratio test = 15159.768 (df = 13, p = 0.000)

**Figure 16a - Multivariable Cox proportional hazards model**

Survival: HR (95% CI, p-value)

Age on admission (years)	<50	-
	50-69	4.28 (3.90-4.69, p<0.001)
	70-79	8.76 (7.99-9.60, p<0.001)
	80+	11.92 (10.88-13.07, p<0.001)
Sex at Birth	Female	0.77 (0.75-0.79, p<0.001)
qSOFA score on admission	0	-
	1	1.78 (1.73-1.84, p<0.001)
	2	3.07 (2.95-3.20, p<0.001)
	3	4.96 (4.53-5.42, p<0.001)
Chronic cardiac disease	YES	1.14 (1.11-1.17, p<0.001)
Chronic kidney disease	YES	1.24 (1.20-1.28, p<0.001)
Moderate or severe liver disease	YES	1.45 (1.33-1.58, p<0.001)
Malignant neoplasm	YES	1.37 (1.32-1.43, p<0.001)
Obesity (as defined by clinical staff)	YES	1.10 (1.06-1.15, p<0.001)
Dementia	YES	1.19 (1.15-1.23, p<0.001)

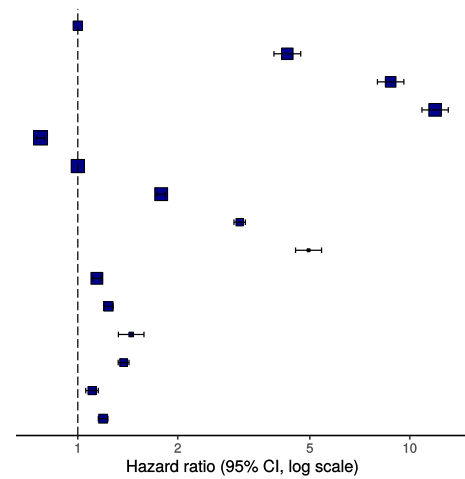
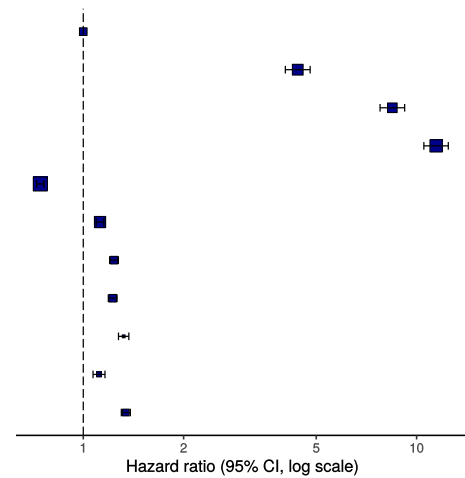


Figure 16b - Multivariable Cox proportional hazards model (age, sex, comorbidities only)

Survival: HR (95% CI, p-value)

Age on admission (years)	<50	-
	50-69	4.40 (4.04-4.79, p<0.001)
	70-79	8.46 (7.77-9.21, p<0.001)
	80+	11.44 (10.51-12.45, p<0.001)
Sex at Birth	Female	0.74 (0.72-0.76, p<0.001)
Chronic cardiac disease	YES	1.12 (1.09-1.15, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.24 (1.20-1.27, p<0.001)
Chronic kidney disease	YES	1.23 (1.19-1.26, p<0.001)
Malignant neoplasm	YES	1.32 (1.28-1.37, p<0.001)
Obesity (as defined by clinical staff)	YES	1.11 (1.07-1.16, p<0.001)
Dementia	YES	1.34 (1.30-1.38, p<0.001)



ROC = 0.7318807

Figure 17 - Predictions calibration plot

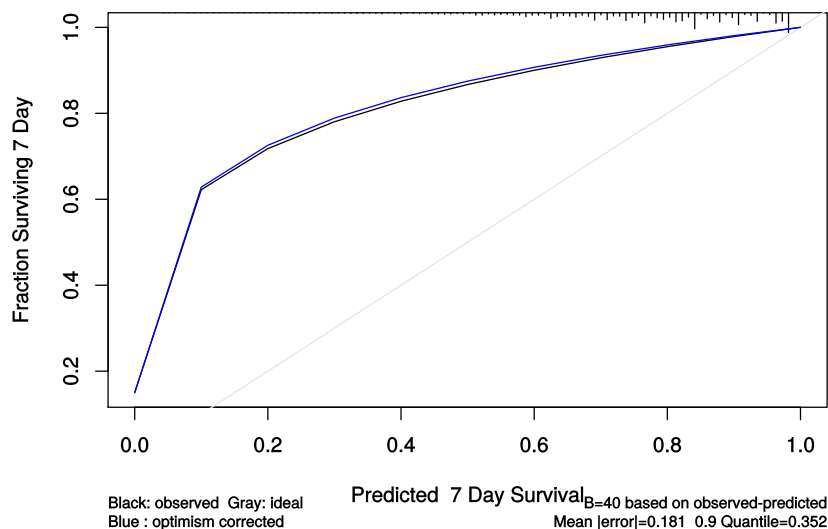


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

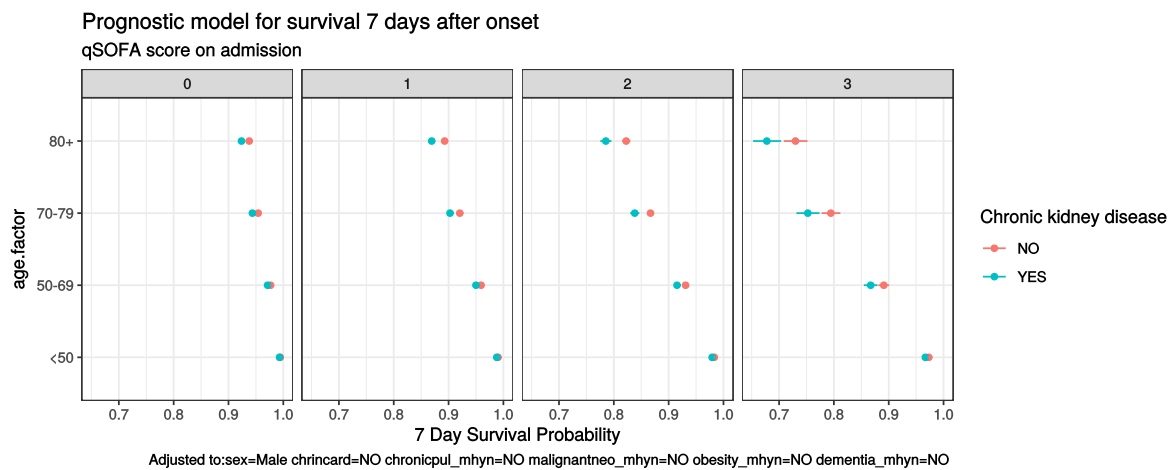


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

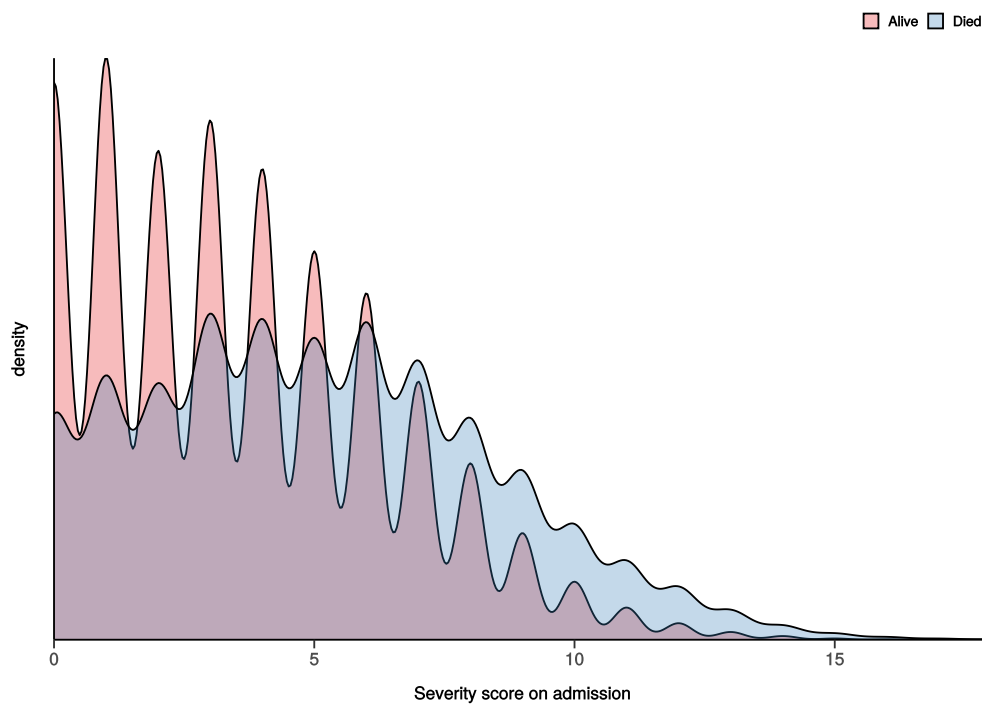


Figure 20 - Death by severity (NEWS) on admission stratified by age



Number of deaths by NEWS score at admission  
Stratified by age

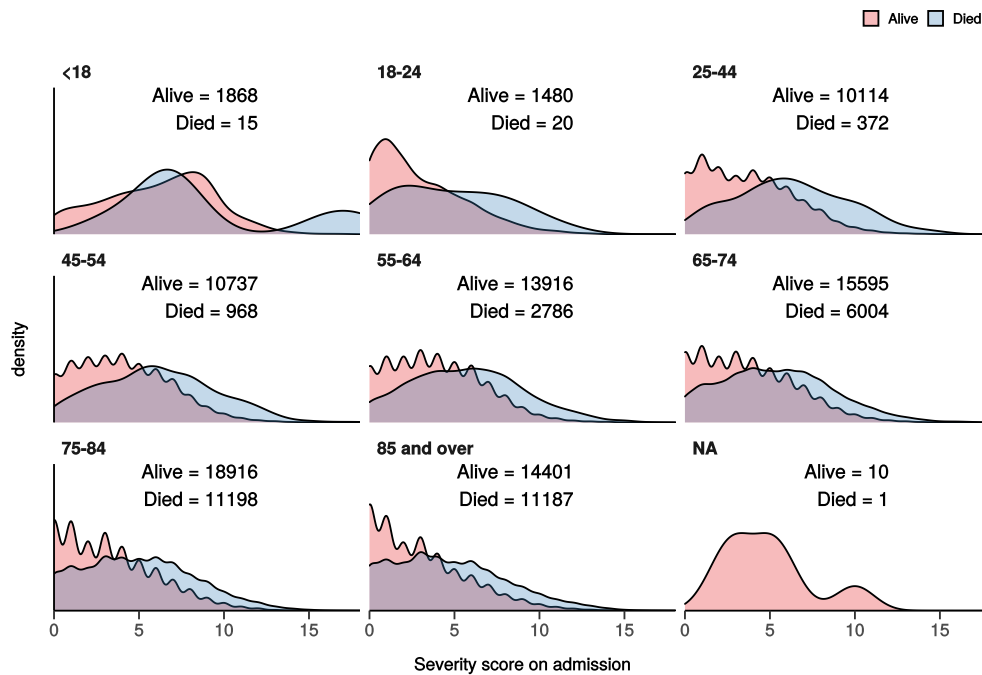
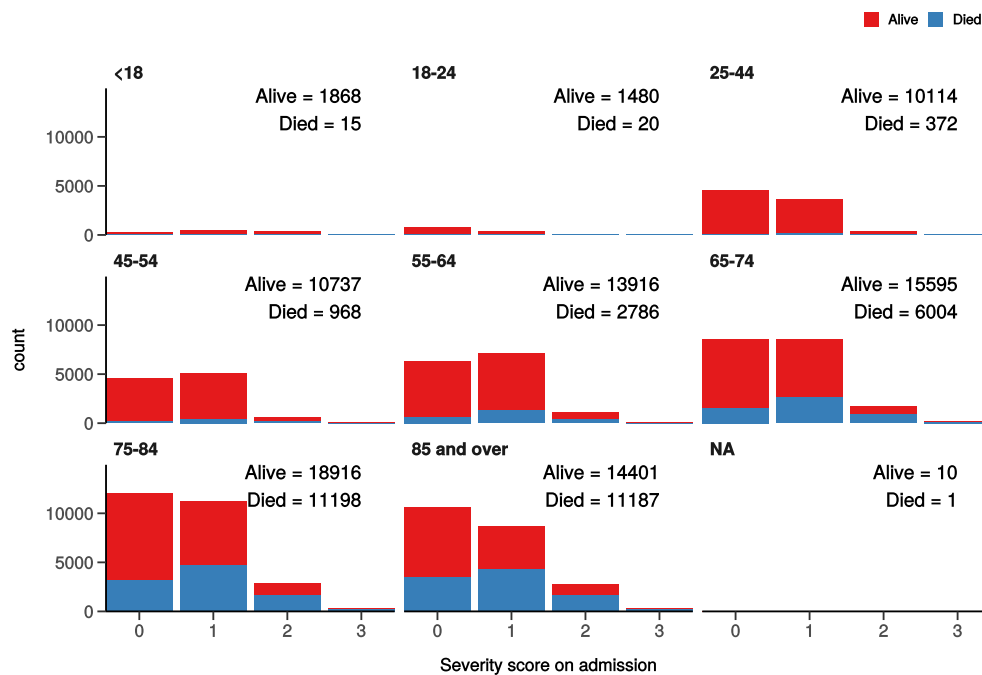


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission  
Stratified by age



## Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		110775 (96.1)	4479 (3.9)	
NEWS score on admission	Median (IQR)	3.0 (5.0)	4.0 (4.0)	<0.001
Death	No	69619 (70.2)	3950 (93.1)	<0.001
	Yes	29600 (29.8)	292 (6.9)	