

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

Dynamic content updated: 2020-11-12 03:34:26.

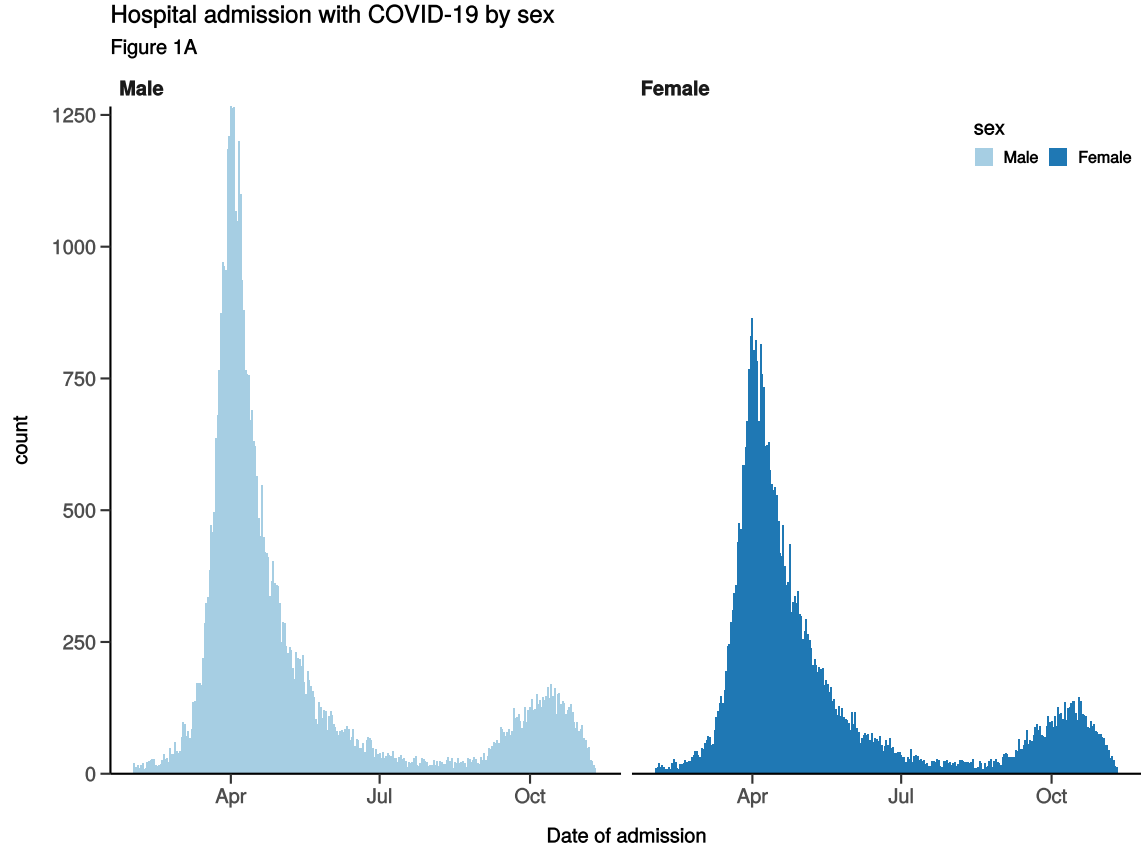
## Executive summary

### Includes all patients

There are 100137 patients included in CO-CIN. Of these, 25775 patient(s) have died and 12485 required ICU. 53441 have been discharged home.

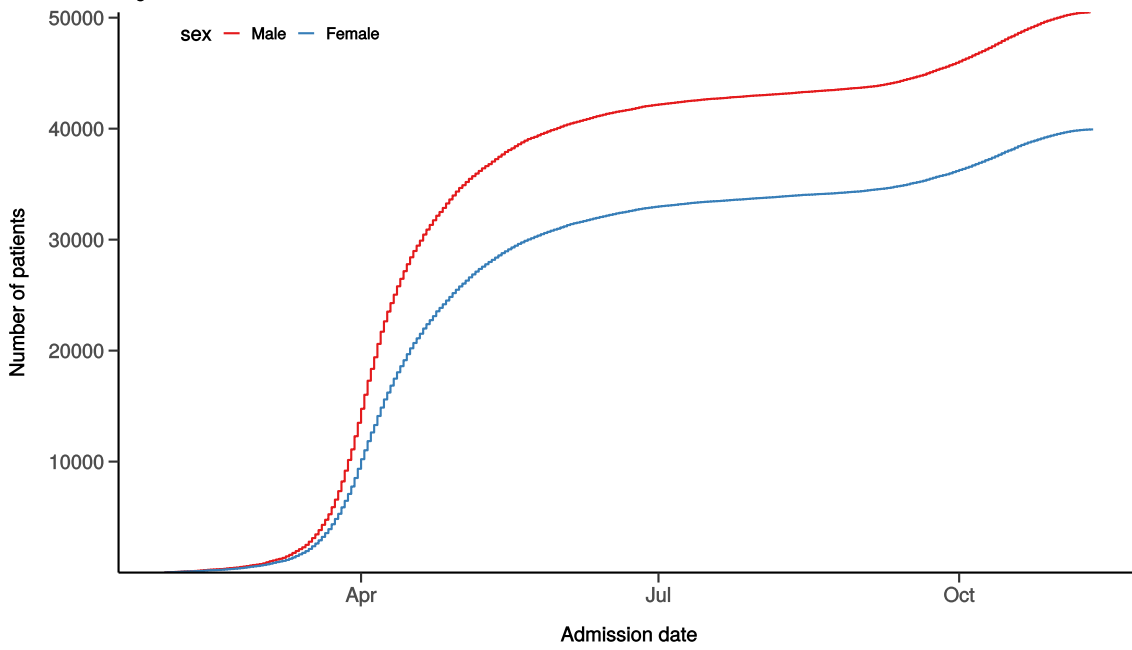
## Admission

Figure 1



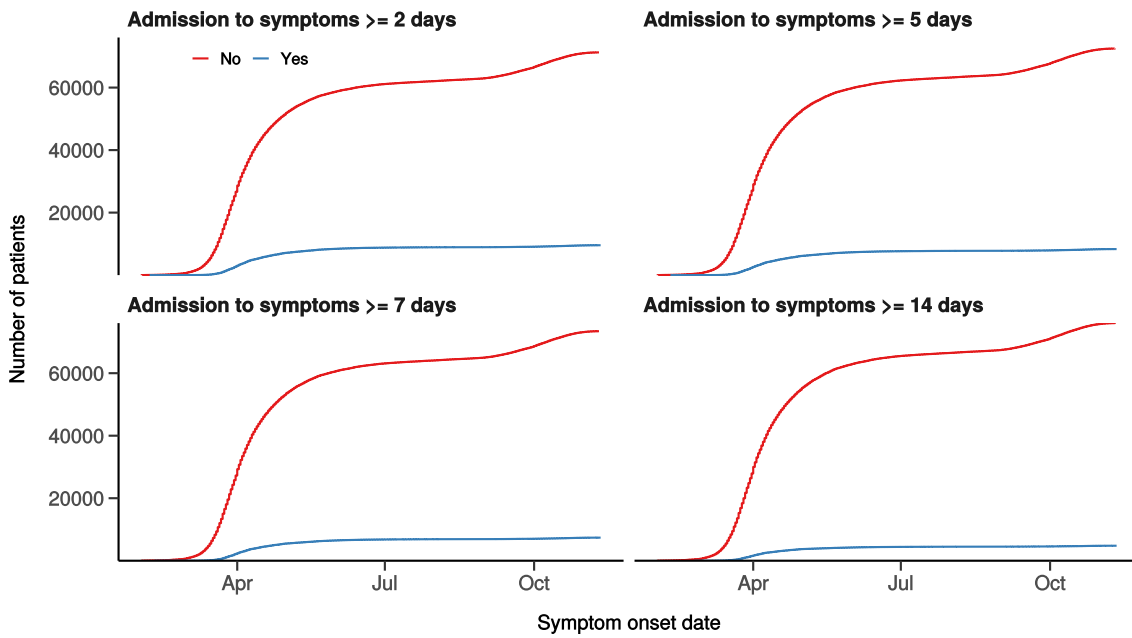
### Hospital admission with COVID-19 by sex

Figure 1B



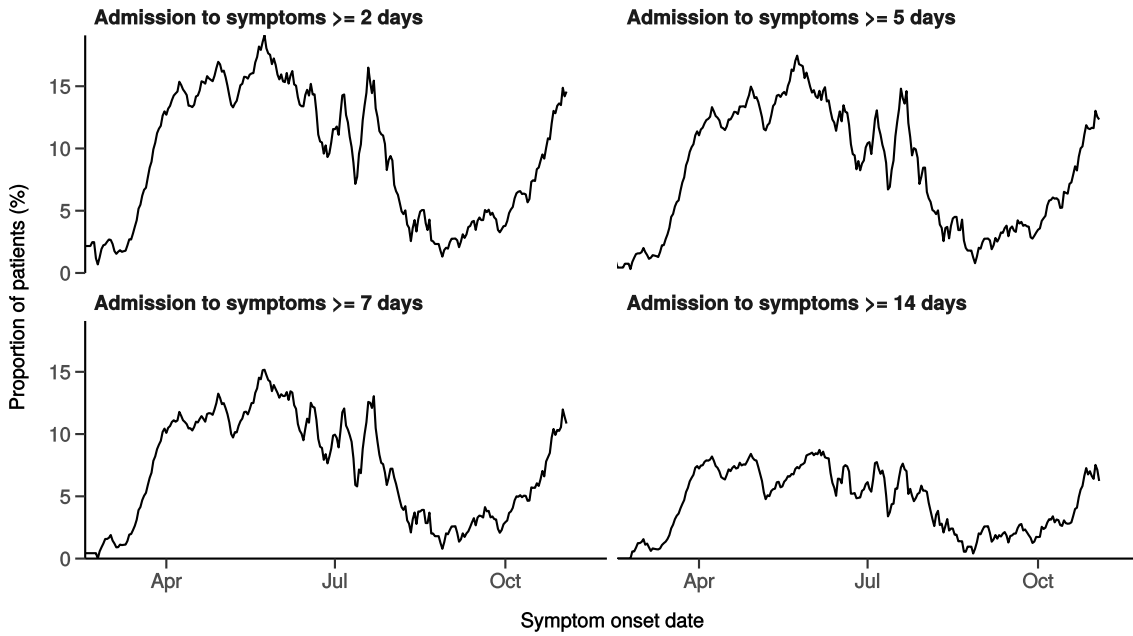
### Number with symptom onset occurring after admission to hospital

Figure 1C



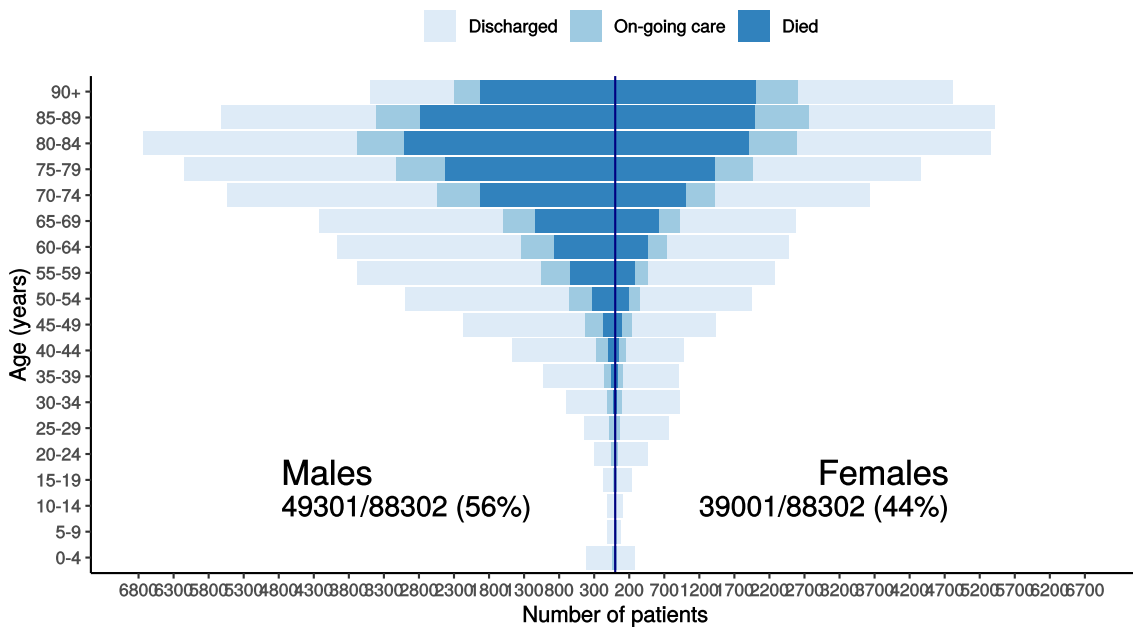
Proportion with symptom onset occurring after hospital admission

Figure 1D - 7-day rolling percentage. n = 80820

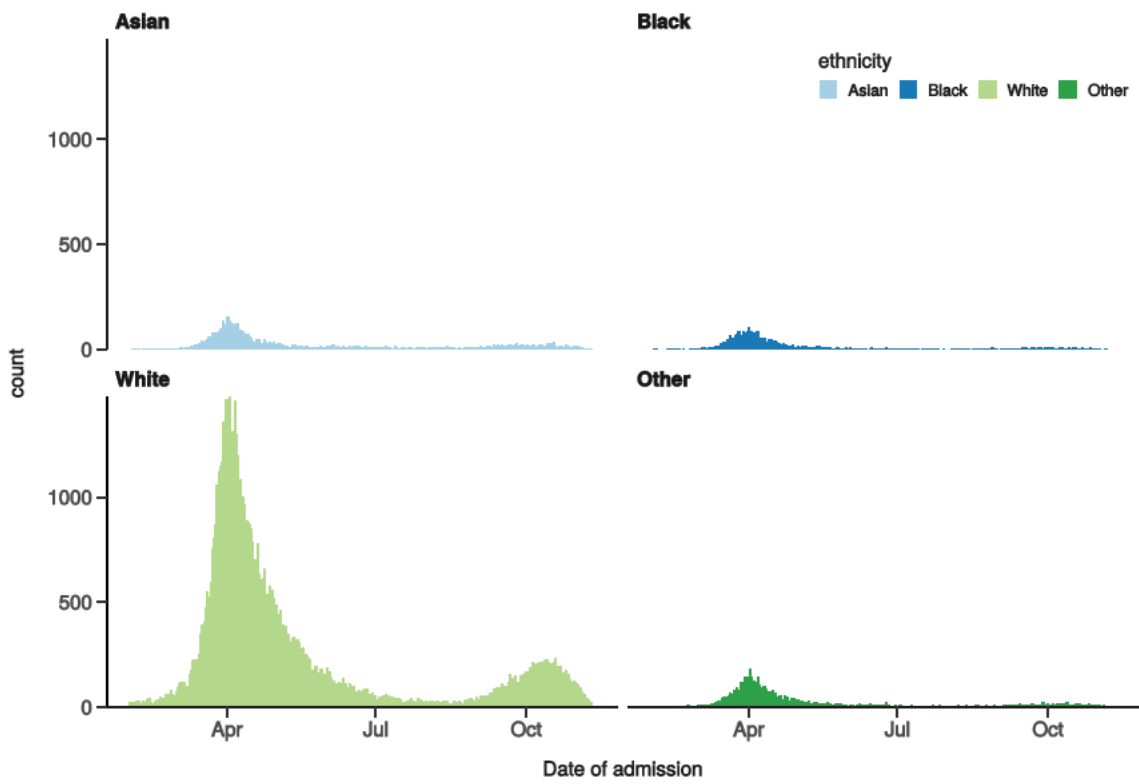


Patients with outcome stratified by age, and sex

Figure 1E



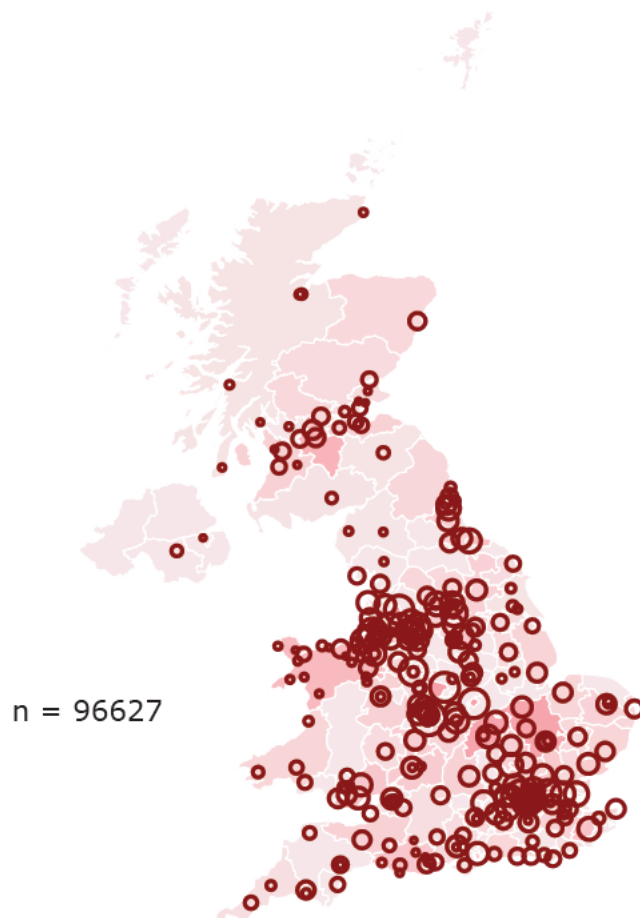
Hospital admission with COVID-19 by ethnicity  
Figure 1F



## 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

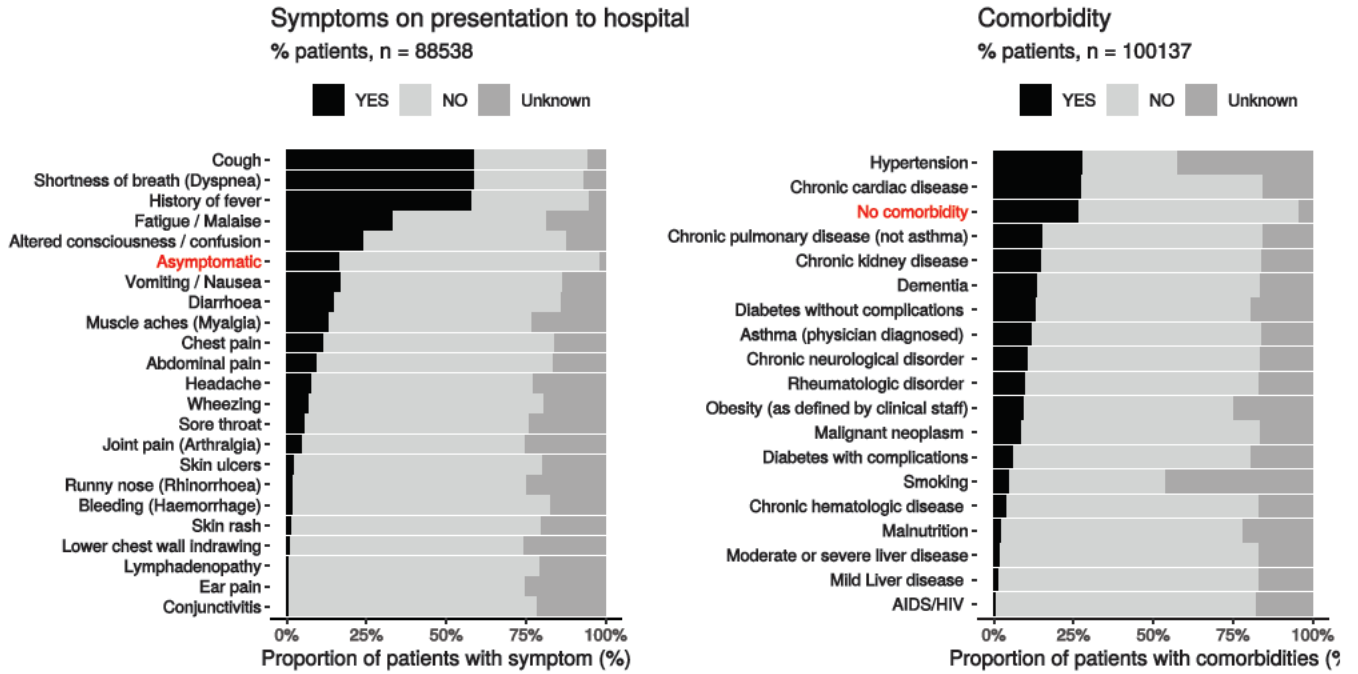


Figure 3B - Symptoms by Age

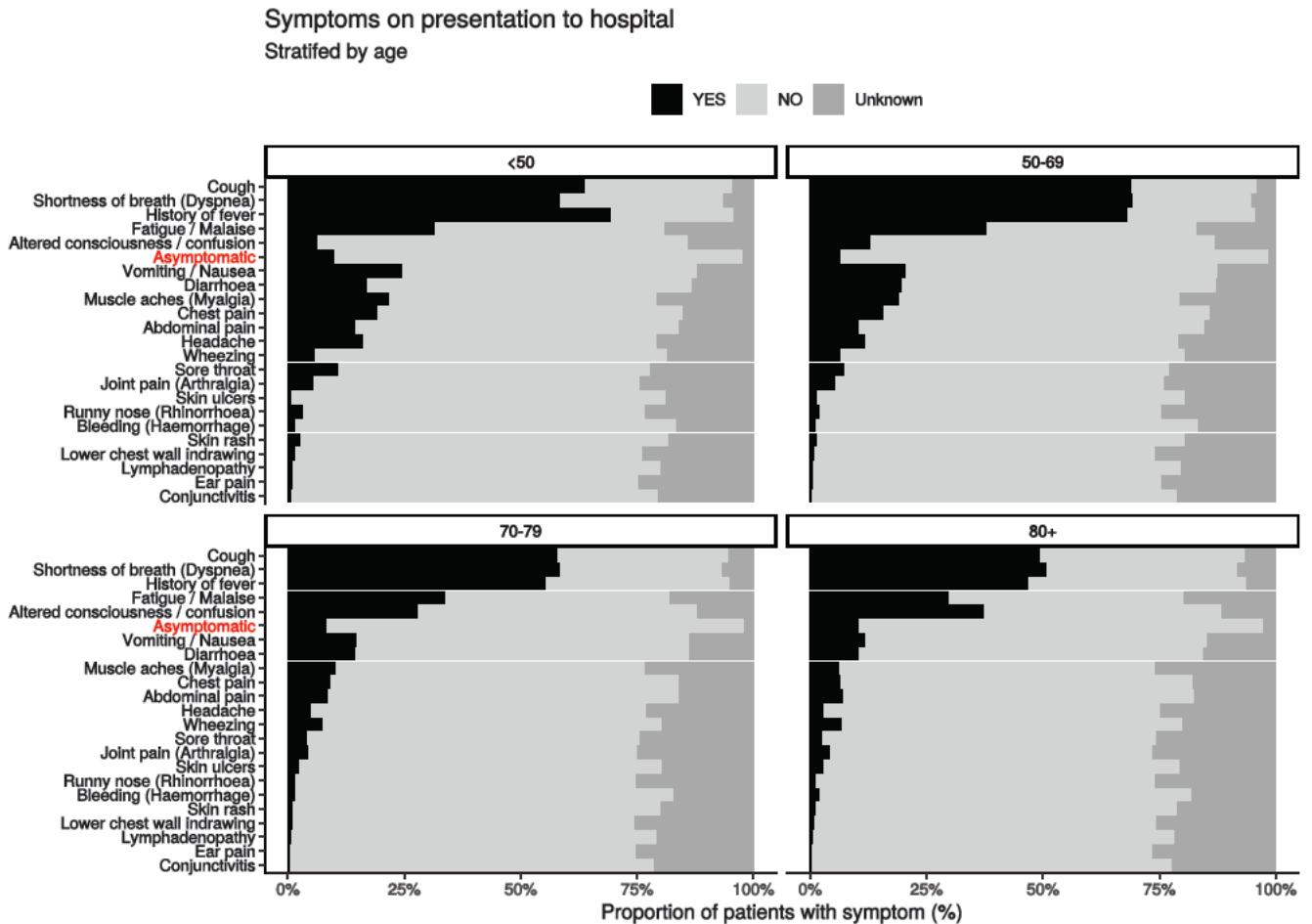
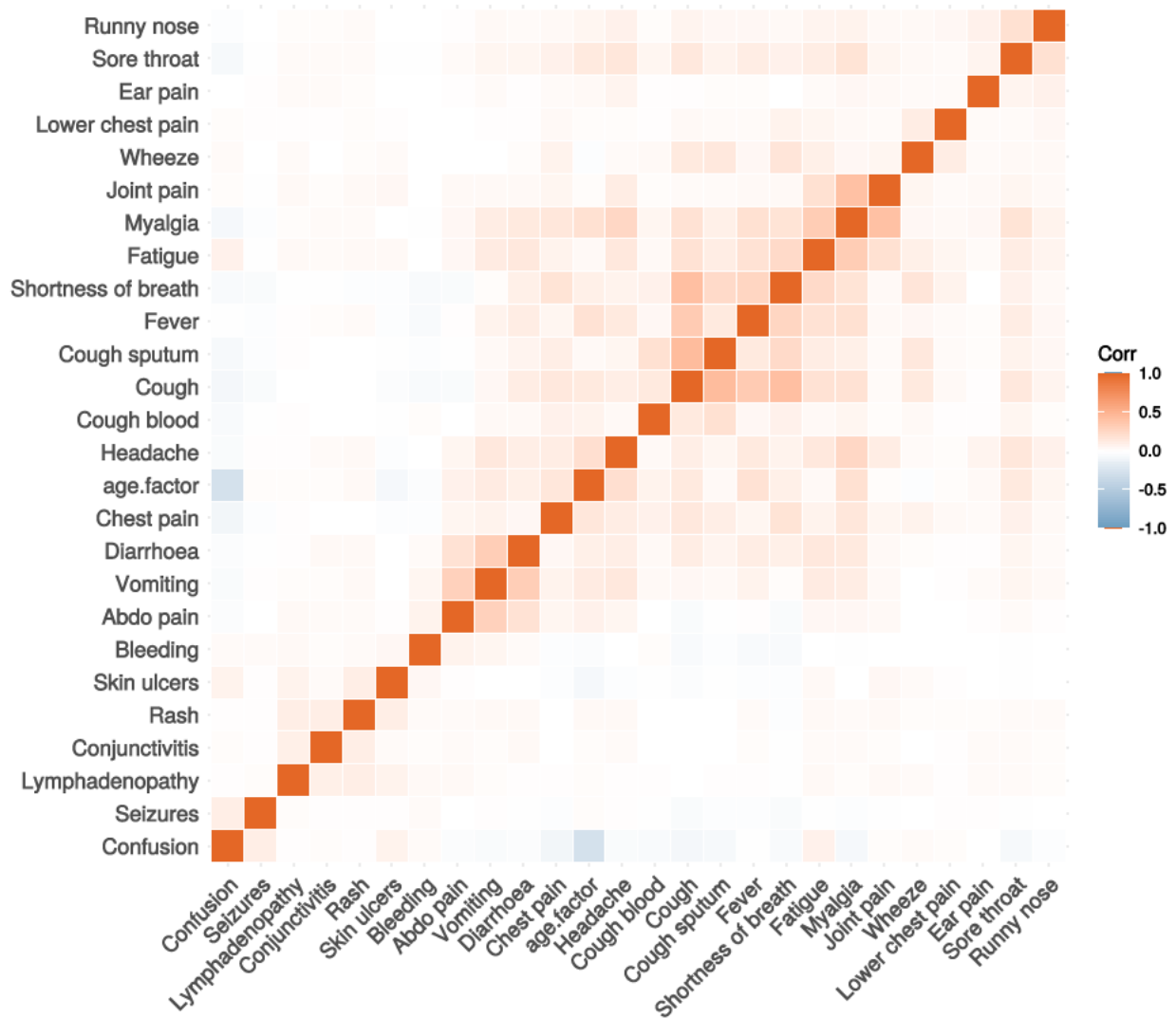


Figure 3C

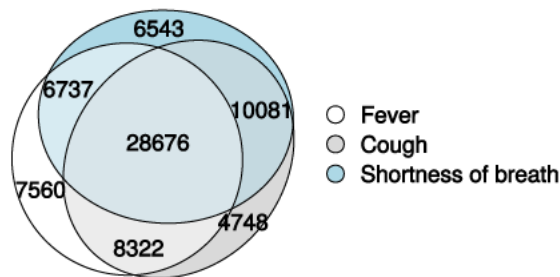
Correlation of symptoms in all pages. Note clusters, top right to bottom left, flu-like, coryzal, abdominal, respiratory, neurocutaneous.



### Symptoms (diagnostic criteria)

Figure 4A

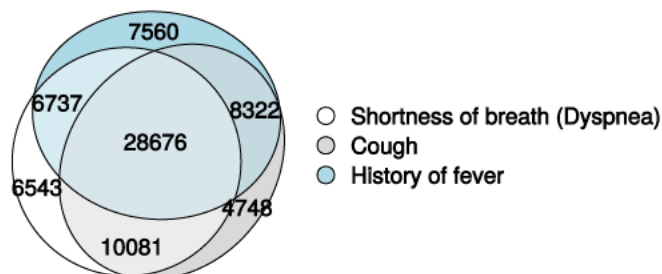
n = 88538



### Symptoms (most common)

Figure 4B

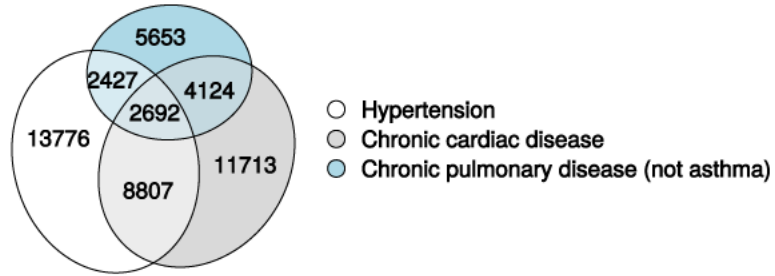
n = 88538



### Comorbidity (most common)

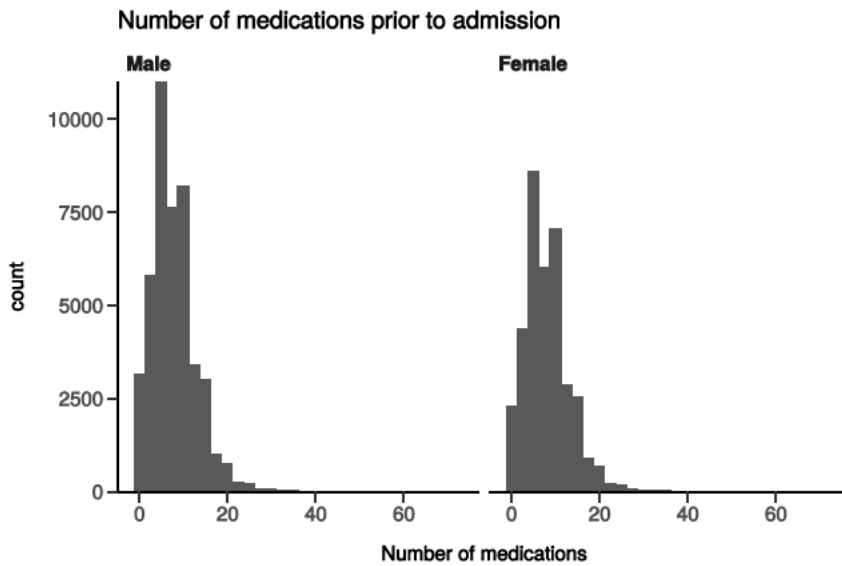
Figure 4C

n = 100137



## Medication prior to illness

Figure 5

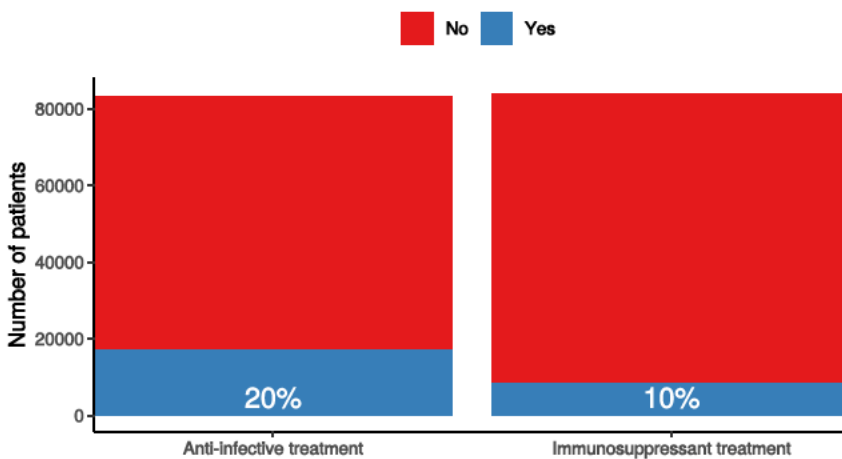


## Preadmission treatment

Figure 6

### Pre-admission treatment

Anti-infectives for illness episode (left) immunosuppressants including oral (not



## Patient flow

Figure 7A - All patients

N = 90654

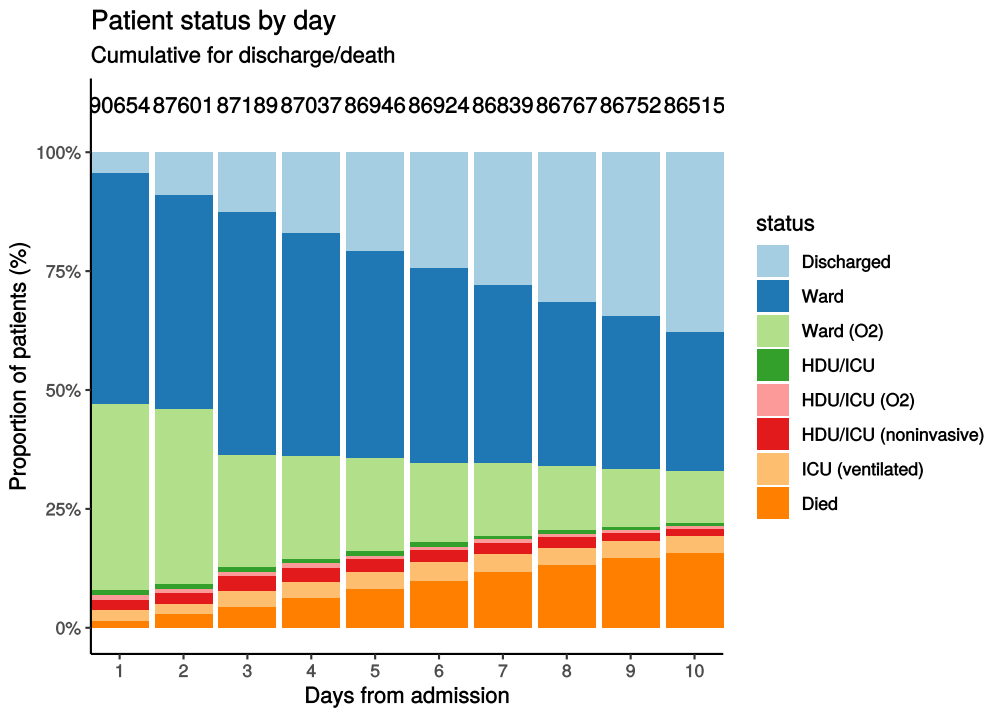
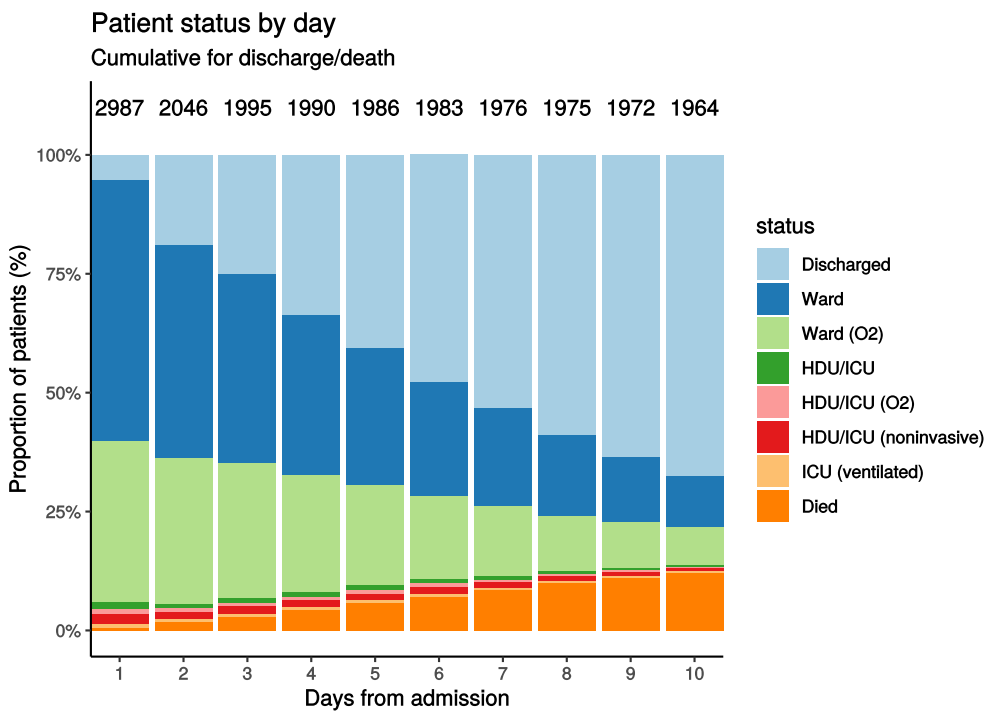


Figure 7B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

N = 2987



## Oxygen requirement

Figure 8A - All patients

N = 85851



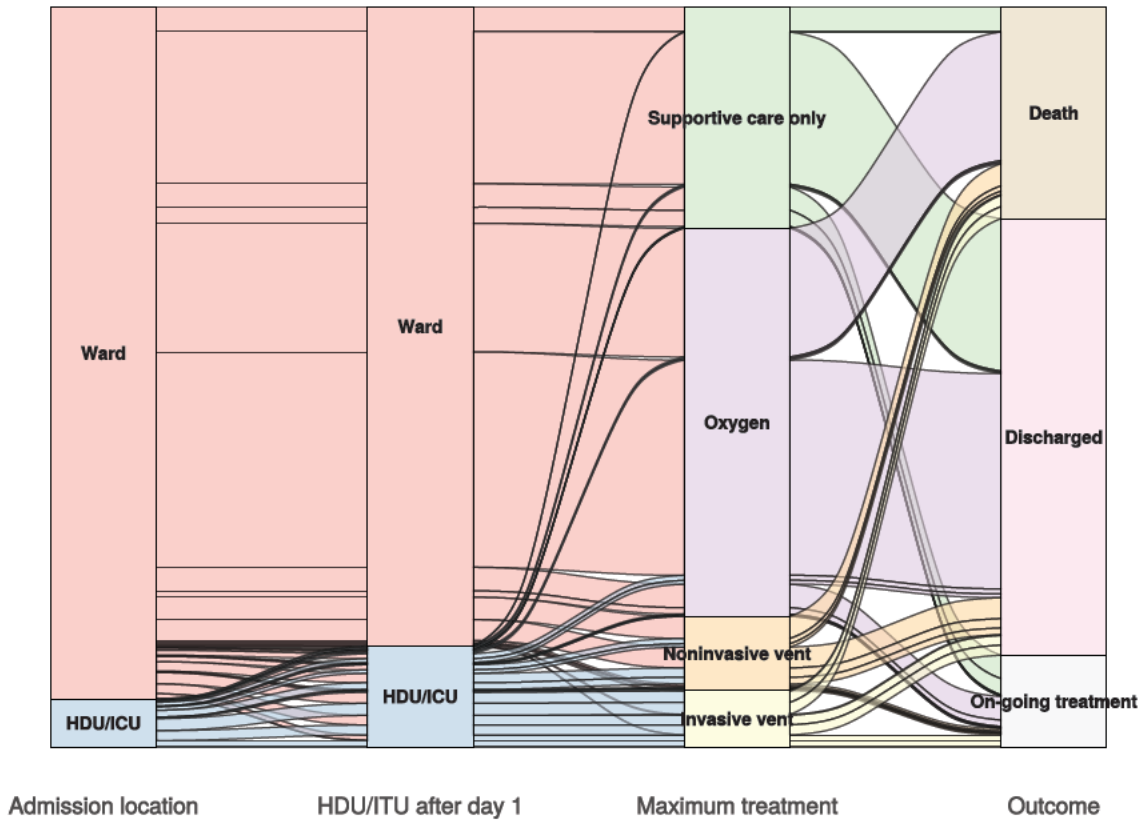


Figure 8B - Patients admitted  $\geq 14$  days and  $\leq 28$  days ago

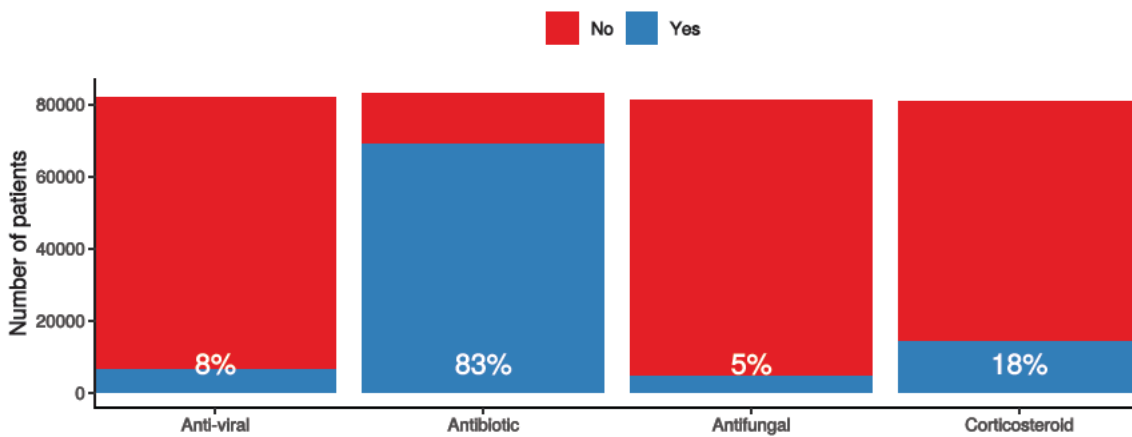
N = 2882

## In-hospital medical treatment

Figure 9

### In-hospital treatment

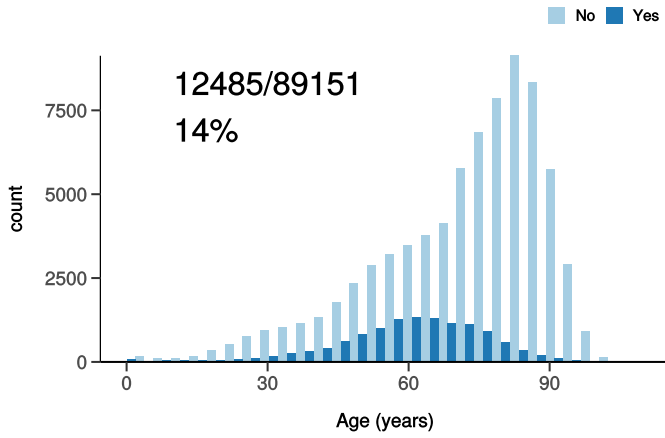
Anti-virals, antibiotics, corticosteroids, and anti-fungals for patients who have completed journey.



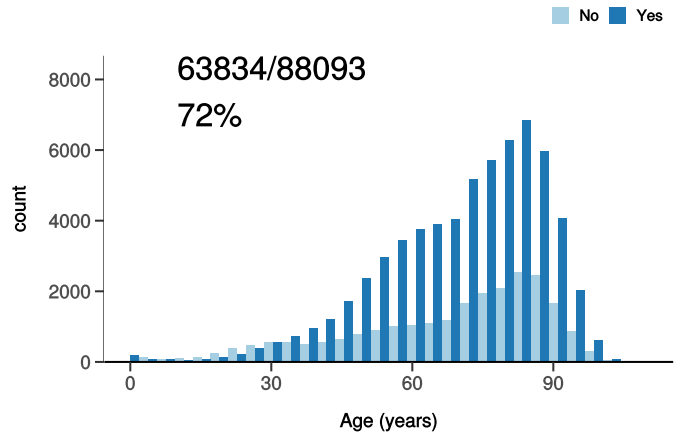
## Treatment

Figure 10

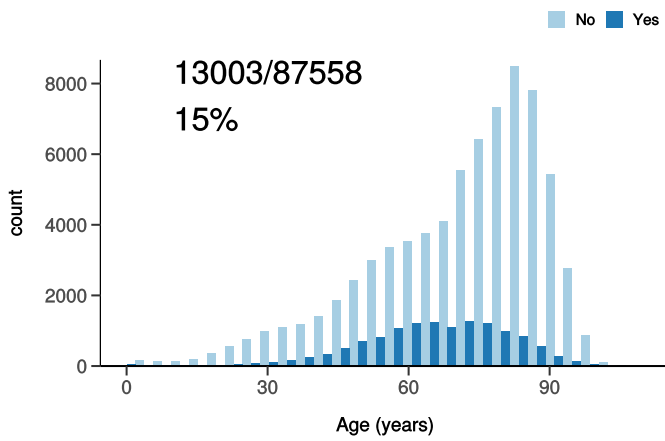
ICU/HDU admission  
Figure 10A



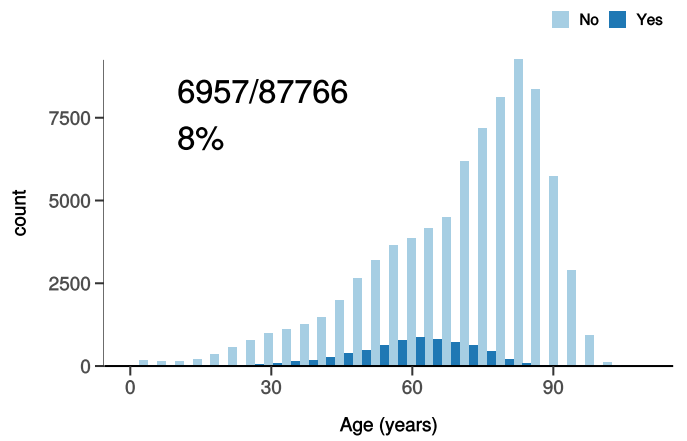
High flow oxygen  
Figure 10B



Noninvasive ventilation  
Figure 10C



Invasive ventilation  
Figure 10D

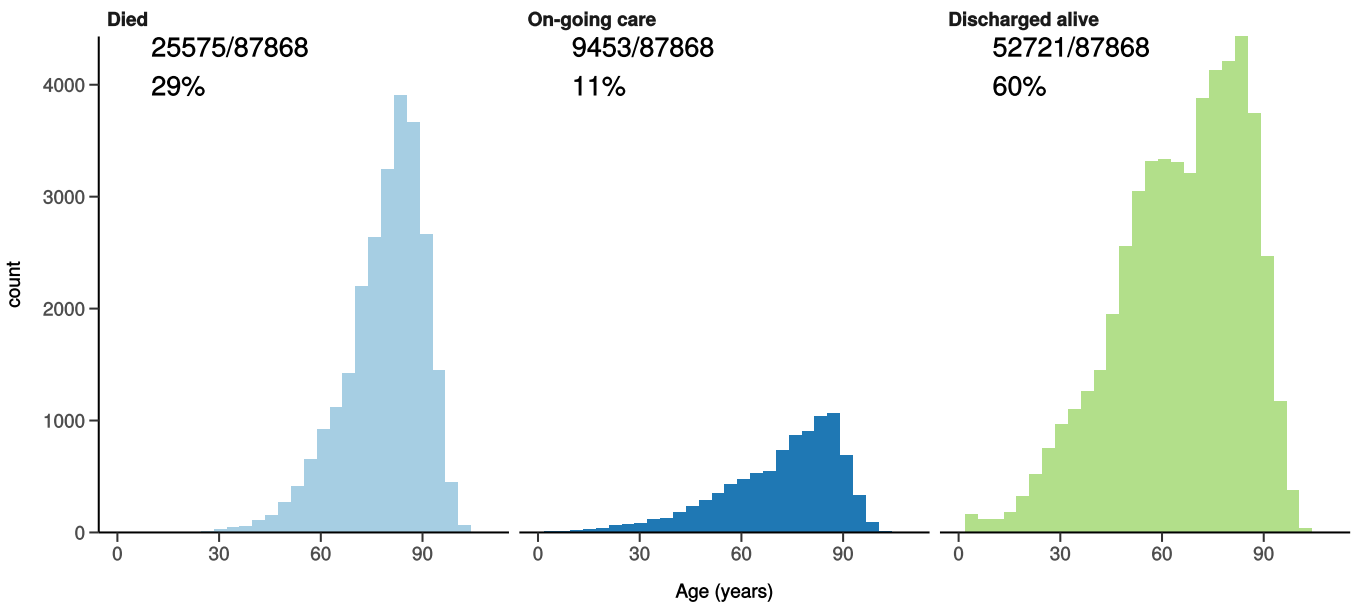


## Status in patients admitted $\geq 14$ days from today

Figure 11

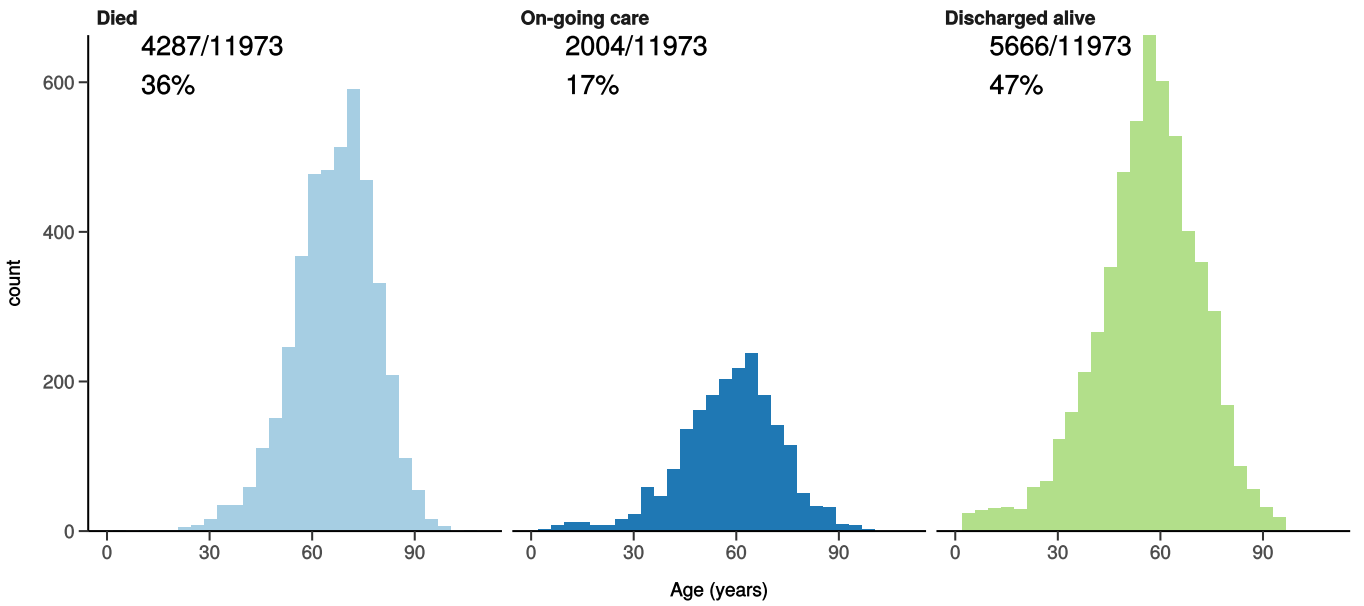
All: status in patients admitted  $\geq 14$  days ago

Figure 11A



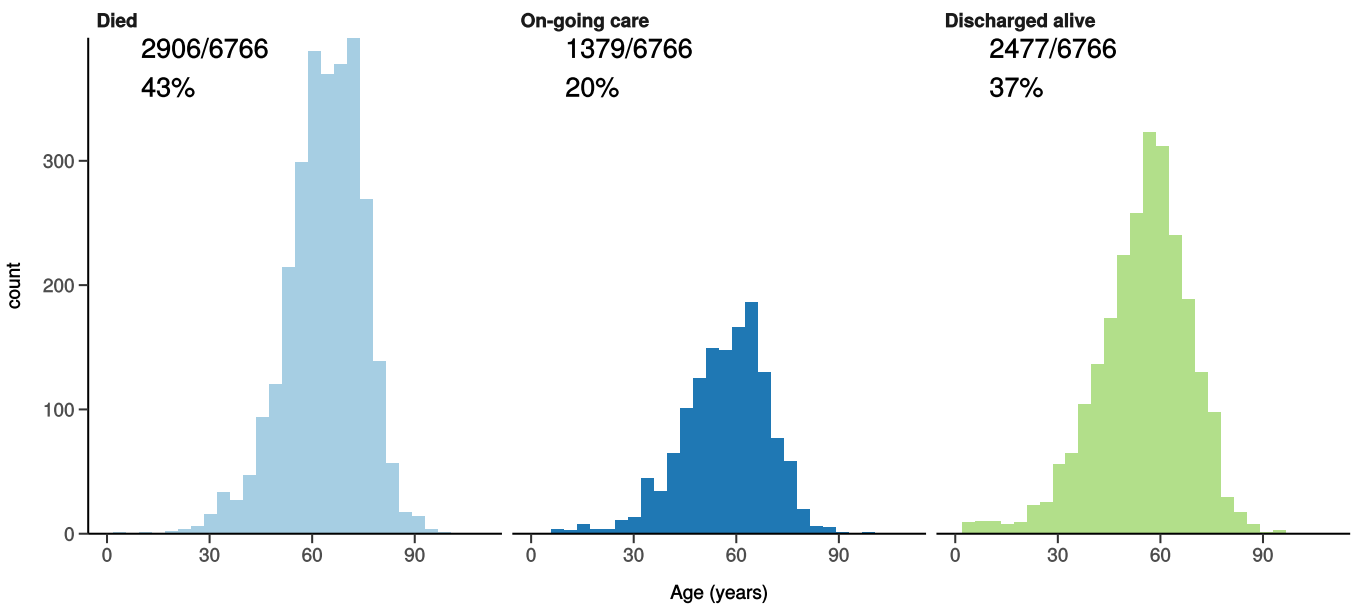
ICU/HDU admissions: status in patients admitted  $\geq 14$  days ago

Figure 11B



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

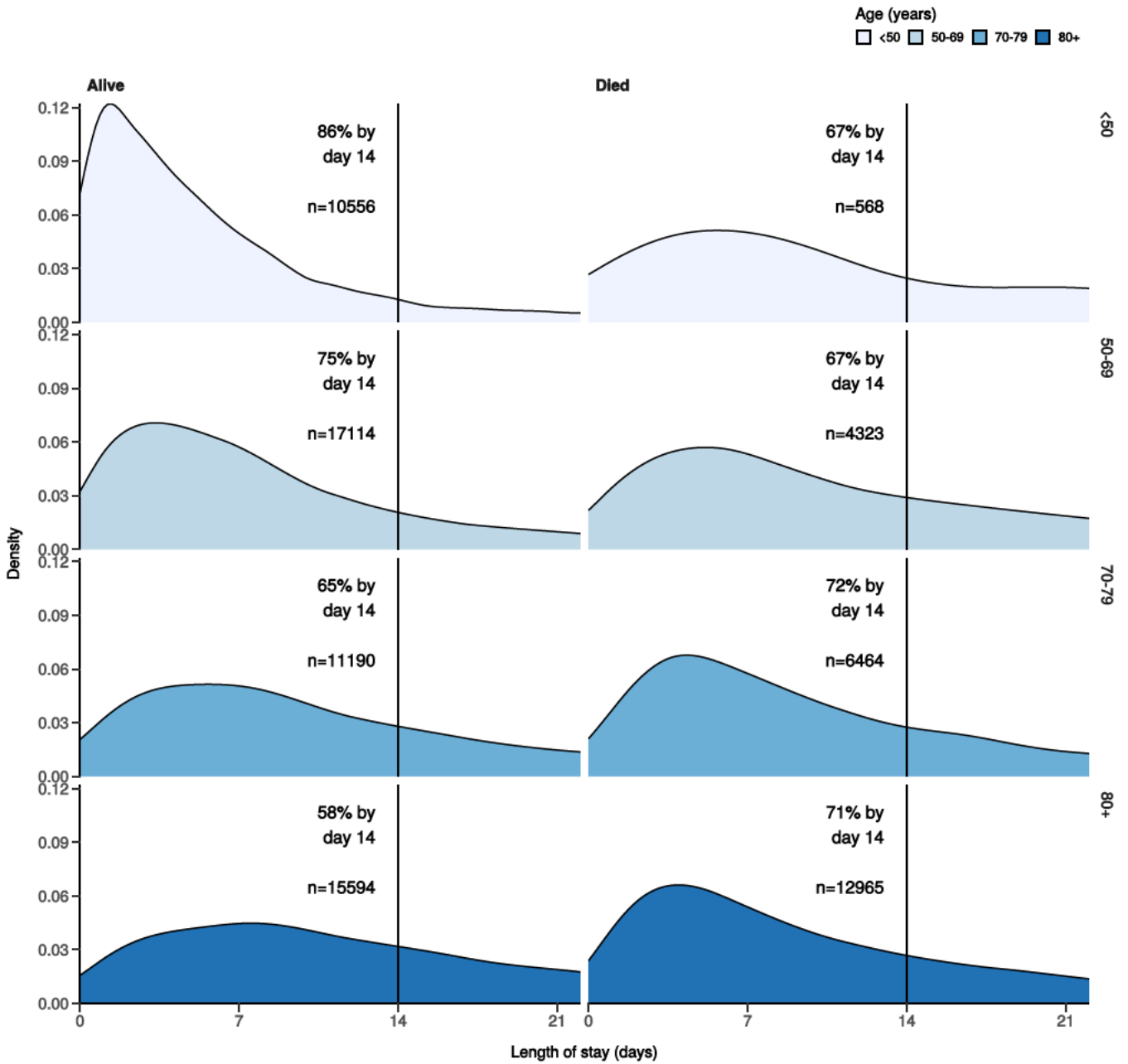
Figure 11c



# 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	12043 (95.2)	610 (4.8)	•	•
	50-69	18840 (80.6)	4536 (19.4)	4.75 (4.36-5.19, p<0.001)	4.41 (4.00-4.87, p<0.001)
	70-79	12323 (64.6)	6754 (35.4)	10.82 (9.93-11.81, p<0.001)	9.00 (8.16-9.95, p<0.001)
	80+	17062 (55.7)	13587 (44.3)	15.72 (14.46-17.12, p<0.001)	12.98 (11.77-14.34, p<0.001)

Dependent: death		No	Yes	OR (univariable)	OR (multivariable)
Sex at Birth	Male	32509 (67.8)	15419 (32.2)	•	•
	Female	27798 (73.4)	10083 (26.6)	0.76 (0.74-0.79, p<0.001)	0.70 (0.67-0.72, p<0.001)
	Not specified	0 (NaN)	0 (NaN)	•	•
Chronic cardiac disease	NO	41071 (75.2)	13521 (24.8)	•	•
	YES	15600 (59.9)	10464 (40.1)	2.04 (1.97-2.10, p<0.001)	1.16 (1.11-1.20, p<0.001)
Chronic pulmonary disease (not asthma)	NO	47997 (72.5)	18219 (27.5)	•	•
	YES	8553 (60.5)	5594 (39.5)	1.72 (1.66-1.79, p<0.001)	1.27 (1.21-1.32, p<0.001)
Chronic neurological disorder	NO	49813 (71.5)	19866 (28.5)	•	•
	YES	6368 (63.0)	3735 (37.0)	1.47 (1.41-1.54, p<0.001)	1.17 (1.11-1.23, p<0.001)
Chronic hematologic disease	NO	53889 (70.8)	22196 (29.2)	•	•
	YES	2138 (62.2)	1299 (37.8)	1.48 (1.37-1.58, p<0.001)	1.16 (1.06-1.26, p=0.001)
Chronic kidney disease	NO	48393 (73.0)	17862 (27.0)	•	•
	YES	8002 (57.6)	5883 (42.4)	1.99 (1.92-2.07, p<0.001)	1.31 (1.25-1.37, p<0.001)
Dementia	NO	49177 (73.5)	17764 (26.5)	•	•
	YES	7050 (54.4)	5912 (45.6)	2.32 (2.23-2.41, p<0.001)	1.38 (1.32-1.45, p<0.001)
Obesity (as defined by clinical staff)	NO	44435 (70.4)	18673 (29.6)	•	•
	YES	6456 (74.2)	2239 (25.8)	0.83 (0.78-0.87, p<0.001)	1.26 (1.19-1.34, p<0.001)
Malignant neoplasm	NO	51417 (72.0)	20038 (28.0)	•	•
	YES	4642 (57.0)	3497 (43.0)	1.93 (1.84-2.03, p<0.001)	1.47 (1.39-1.56, p<0.001)

Number in dataframe = 90260, Number in model = 68296, Missing = 21964, AIC = 72888.8, C-statistic = 0.72, H&L = Chi-sq(8) 126.96 (p<0.001)

**Figure 13 - Adjusted odds ratio plot**

## Death

Age on admission (years)	<50	-
	50-69	4.41 (4.00-4.87, p<0.001)
	70-79	9.00 (8.16-9.95, p<0.001)
	80+	12.98 (11.77-14.34, p<0.001)
Sex at Birth	Male	-
	Female	0.70 (0.67-0.72, p<0.001)
	Not specified	-
Chronic cardiac disease	YES	1.16 (1.11-1.20, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.27 (1.21-1.32, p<0.001)
Chronic neurological disorder	YES	1.17 (1.11-1.23, p<0.001)
Chronic hematologic disease	YES	1.16 (1.06-1.26, p=0.001)
Chronic kidney disease	YES	1.31 (1.25-1.37, p<0.001)
Dementia	YES	1.38 (1.32-1.45, p<0.001)
Obesity (as defined by clinical staff)	YES	1.26 (1.19-1.34, p<0.001)
Malignant neoplasm	YES	1.47 (1.39-1.56, p<0.001)

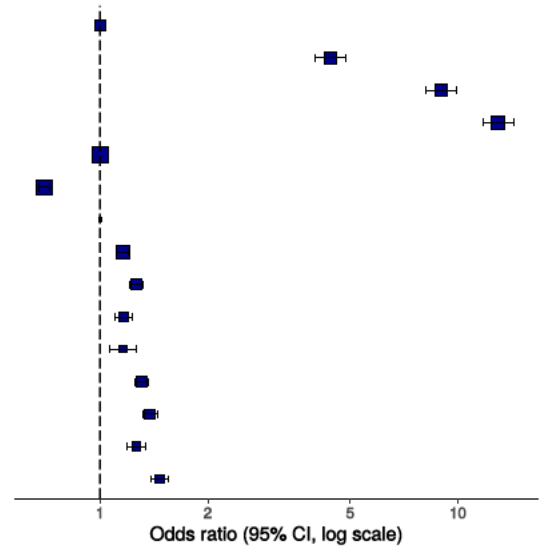
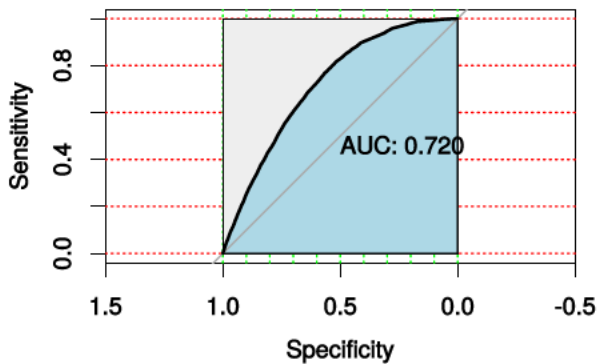


Figure 14 - ROC

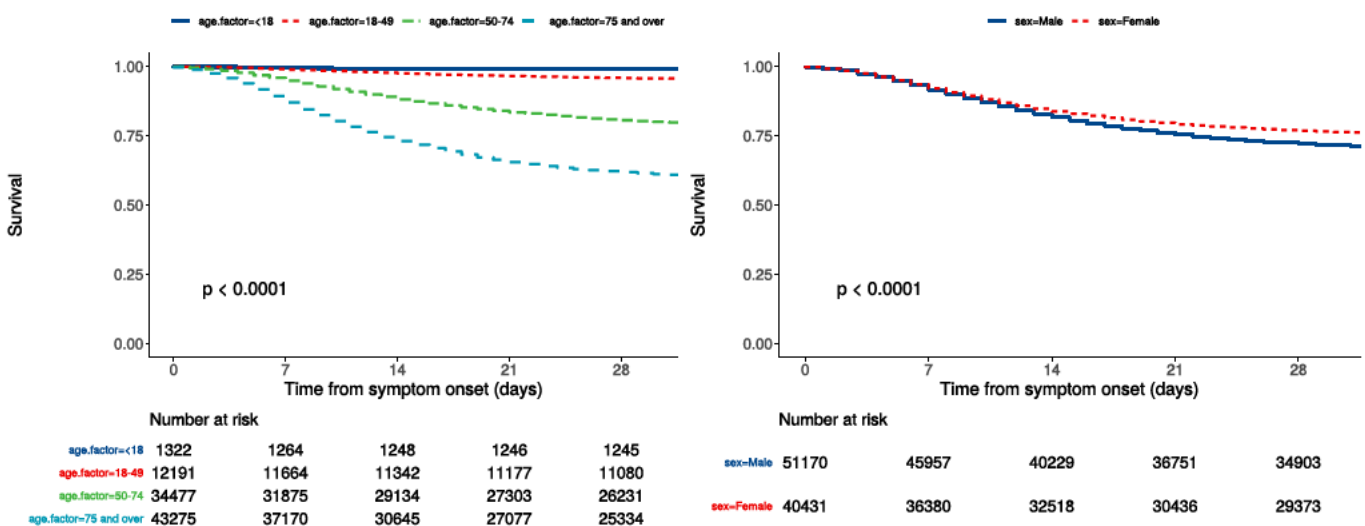


## Survival models

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.

<b>Dependent: Surv(time, status)</b>		<b>all</b>	<b>HR (univariable)</b>	<b>HR (multivariable)</b>
Age on admission (years)	<50	13513 (14.8)	•	•
	50-69	24982 (27.4)	4.35 (3.99-4.73, p<0.001)	4.13 (3.73-4.59, p<0.001)
	70-79	20383 (22.3)	8.92 (8.21-9.70, p<0.001)	8.20 (7.40-9.09, p<0.001)
	80+	32395 (35.5)	12.20 (11.24-13.23, p<0.001)	10.93 (9.87-12.11, p<0.001)
Sex at Birth	Male	51170 (55.9)	•	•
	Female	40431 (44.1)	0.81 (0.79-0.83, p<0.001)	0.78 (0.76-0.81, p<0.001)
qSOFA score on admission	0	33784 (43.7)	•	•
	1	34444 (44.6)	1.63 (1.58-1.68, p<0.001)	1.73 (1.67-1.79, p<0.001)
	2	8194 (10.6)	3.17 (3.05-3.30, p<0.001)	2.93 (2.80-3.06, p<0.001)
	3	885 (1.1)	5.18 (4.75-5.64, p<0.001)	4.63 (4.20-5.10, p<0.001)
Symptomatic at presentation	No symptoms	5286 (6.0)	•	•
	Symptoms	83302 (94.0)	1.62 (1.52-1.73, p<0.001)	•
Chronic cardiac disease	NO	57201 (67.8)	•	•
	YES	27218 (32.2)	1.82 (1.77-1.87, p<0.001)	1.14 (1.11-1.18, p<0.001)
Chronic kidney disease	NO	69409 (82.8)	•	•
	YES	14458 (17.2)	1.78 (1.73-1.83, p<0.001)	1.24 (1.19-1.28, p<0.001)
Moderate or severe liver disease	NO	81449 (98.0)	•	•
	YES	1642 (2.0)	1.30 (1.20-1.41, p<0.001)	1.42 (1.28-1.57, p<0.001)
Chronic neurological disorder	NO	72984 (87.4)	•	•
	YES	10498 (12.6)	1.40 (1.35-1.45, p<0.001)	•
Malignant neoplasm	NO	74835 (89.8)	•	•
	YES	8468 (10.2)	1.69 (1.63-1.75, p<0.001)	1.35 (1.30-1.41, p<0.001)
Chronic hematologic disease	NO	79669 (95.7)	•	•
	YES	3544 (4.3)	1.37 (1.29-1.45, p<0.001)	•
Obesity (as defined by clinical staff)	NO	66019 (87.8)	•	•
	YES	9135 (12.2)	0.84 (0.81-0.88, p<0.001)	1.16 (1.11-1.22, p<0.001)
Diabetes without complications	NO	67819 (84.1)	•	•
	YES	12808 (15.9)	1.27 (1.22-1.31, p<0.001)	•
Rheumatologic disorder	NO	73389 (88.4)	•	•
	YES	9636 (11.6)	1.20 (1.15-1.24, p<0.001)	•

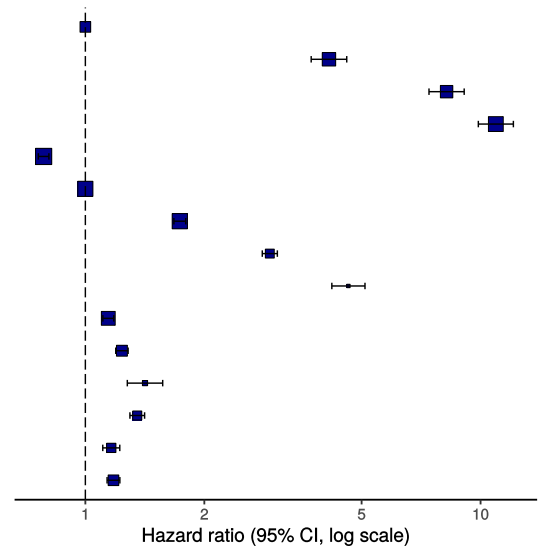
Dependent: Surv(time, status)		all	HR (univariable)	HR (multivariable)
Dementia	NO	70225 (84.0)	•	•
	YES	13413 (16.0)	2.05 (1.99-2.11, p<0.001)	1.18 (1.13-1.22, p<0.001)
Malnutrition	NO	76096 (97.3)	•	•
	YES	2116 (2.7)	1.47 (1.37-1.58, p<0.001)	•
smoking_mhyn_2levels	NO	48689 (56.7)	•	•
	YES	4766 (5.6)	0.87 (0.81-0.92, p<0.001)	•
	N/K	32365 (37.7)	1.22 (1.19-1.25, p<0.001)	•

Number in dataframe = 91975, Number in model = 63185, Missing = 28790, Number of events = 17536, Concordance = 0.723 (SE = 0.002), R-squared = 0.160 (Max possible = 0.998), Likelihood ratio test = 10994.563 (df = 13, p = 0.000)

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

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

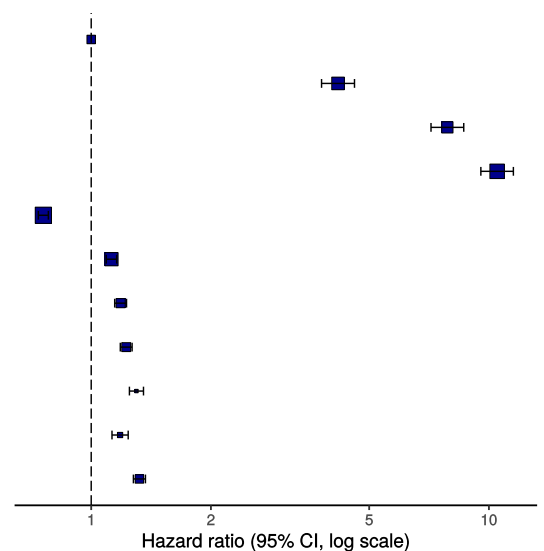
Age on admission (years)	<50	-
	50-69	4.13 (3.73-4.59, p<0.001)
	70-79	8.20 (7.40-9.09, p<0.001)
	80+	10.93 (9.87-12.11, p<0.001)
Sex at Birth	Female	0.78 (0.76-0.81, p<0.001)
qSOFA score on admission	0	-
	1	1.73 (1.67-1.79, p<0.001)
	2	2.93 (2.80-3.06, p<0.001)
	3	4.63 (4.20-5.10, p<0.001)
Chronic cardiac disease	YES	1.14 (1.11-1.18, p<0.001)
Chronic kidney disease	YES	1.24 (1.19-1.28, p<0.001)
Moderate or severe liver disease	YES	1.42 (1.28-1.57, p<0.001)
Malignant neoplasm	YES	1.35 (1.30-1.41, p<0.001)
Obesity (as defined by clinical staff)	YES	1.16 (1.11-1.22, p<0.001)
Dementia	YES	1.18 (1.13-1.22, 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	4.17 (3.79-4.59, p<0.001)
	70-79	7.86 (7.15-8.64, p<0.001)
	80+	10.49 (9.54-11.52, p<0.001)
Sex at Birth	Female	0.76 (0.74-0.78, p<0.001)
Chronic cardiac disease	YES	1.12 (1.09-1.16, p<0.001)
Chronic pulmonary disease (not asthma)	YES	1.19 (1.15-1.23, p<0.001)
Chronic kidney disease	YES	1.22 (1.18-1.27, p<0.001)
Malignant neoplasm	YES	1.30 (1.25-1.35, p<0.001)
Obesity (as defined by clinical staff)	YES	1.18 (1.13-1.24, p<0.001)
Dementia	YES	1.32 (1.28-1.37, p<0.001)



ROC = 0.7232269

**Figure 17 - Predictions calibration plot**



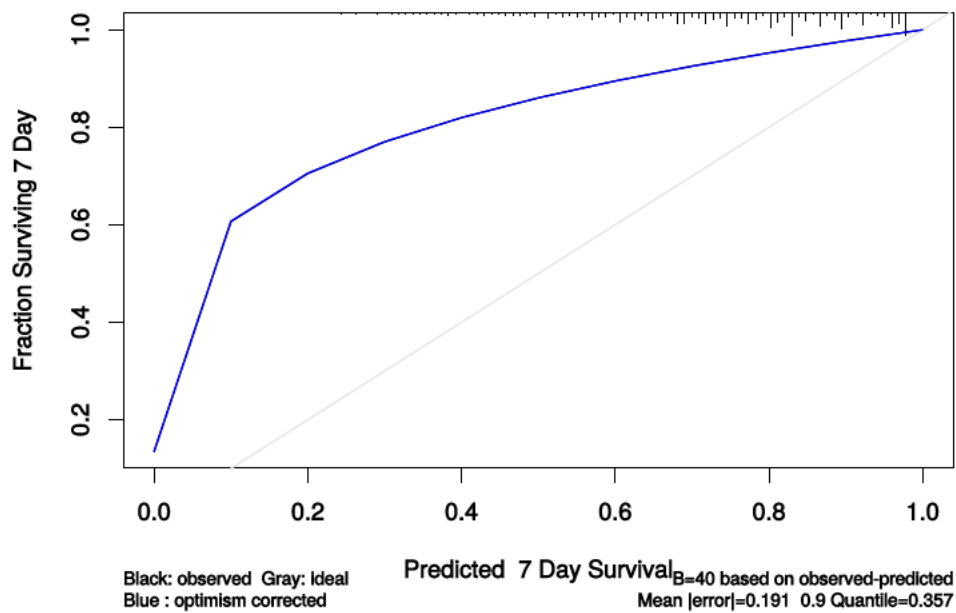


Figure 18 - Prognostic model predictions

Again, for demonstration of methods.

Prognostic model for survival 7 days after onset  
qSOFA score on admission

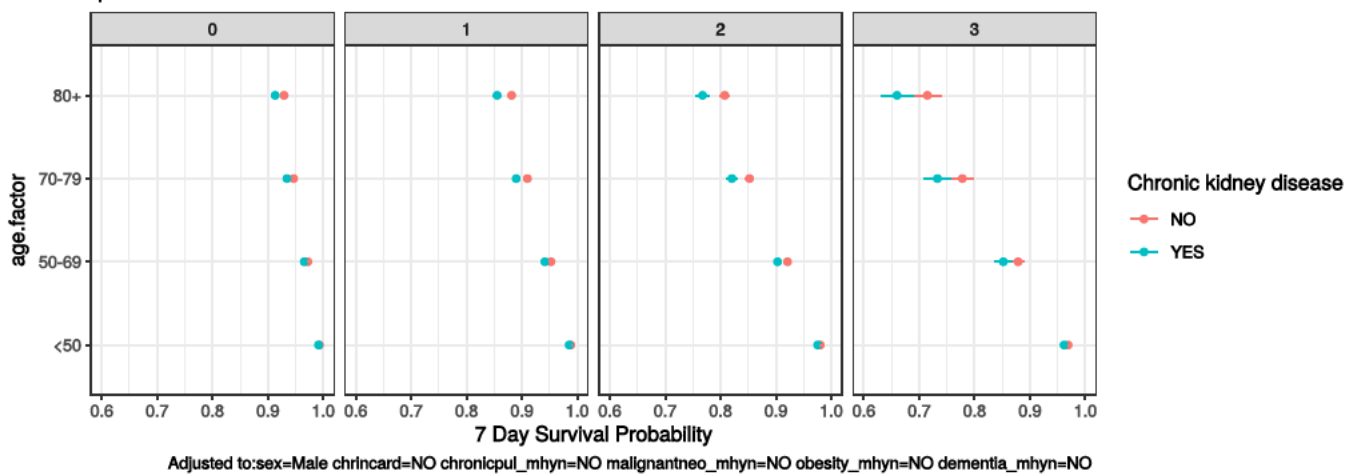


Figure 19 - Death by severity (NEWS) on admission

Number of deaths by NEWS score at admission

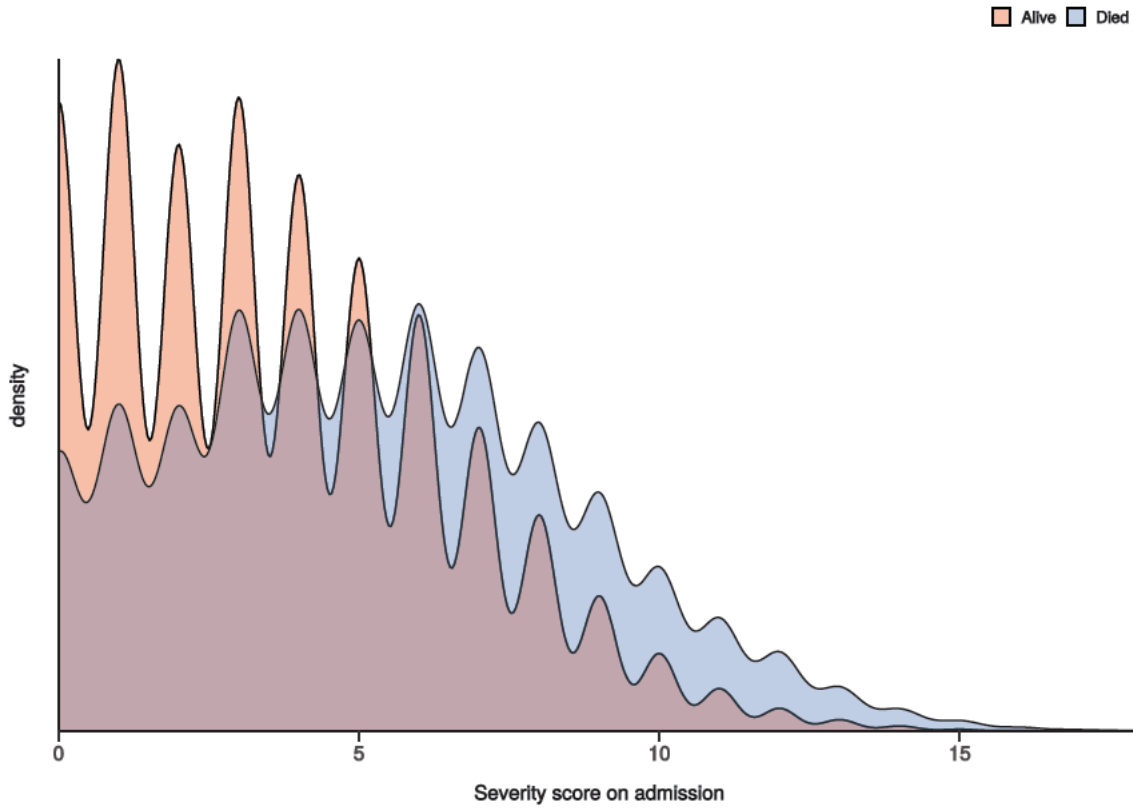


Figure 20 - Death by severity (NEWS) on admission stratified by age

Number of deaths by NEWS score at admission  
Stratified by age

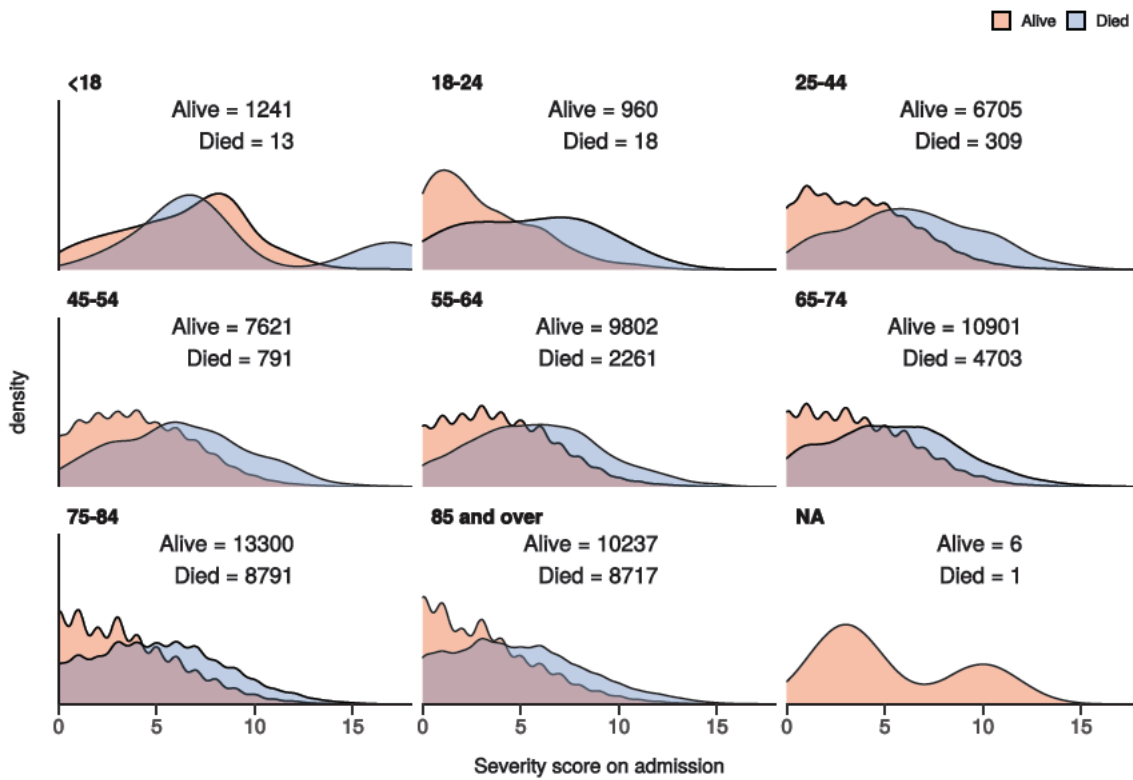
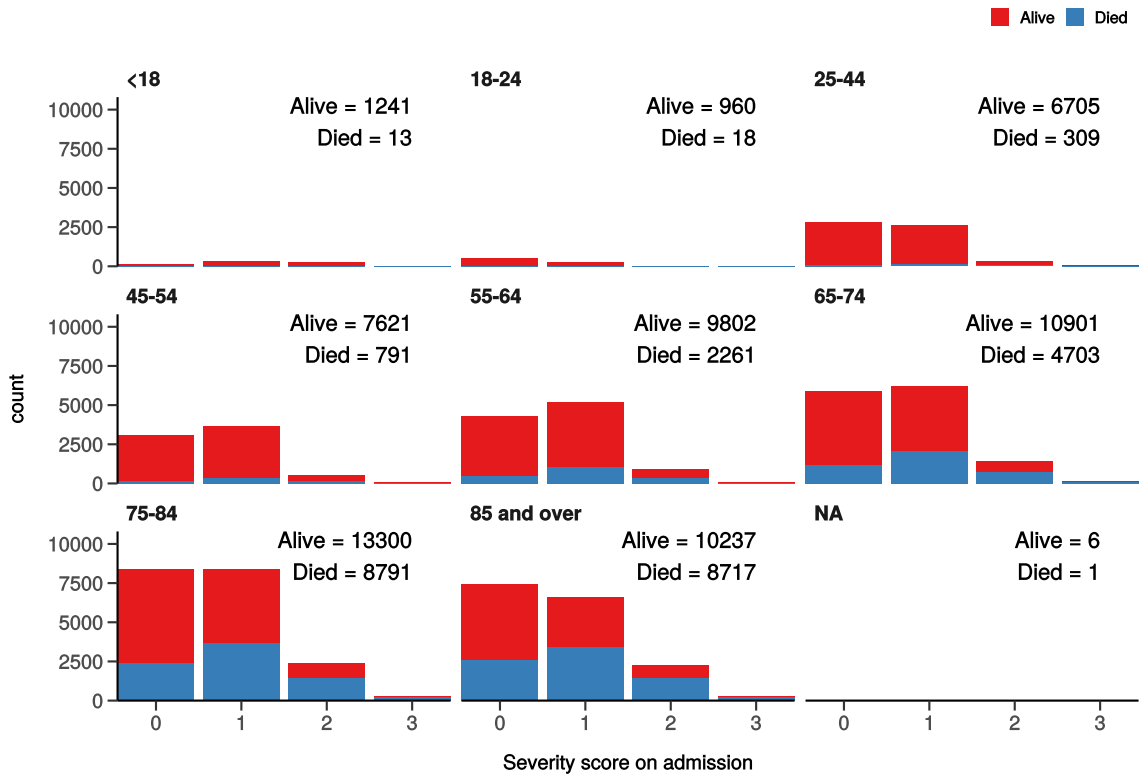


Figure 21 - Death by severity (qSOFA) on admission stratified by age

Number of deaths by qSOFA score at admission  
Stratified by age



## Healthcare workers

Employed as a healthcare worker?		NO	YES	p
Total N (%)		79970 (95.5)	3760 (4.5)	
NEWS score on admission	Median (IQR)	4.0 (4.0)	4.0 (4.0)	<0.001
Death	No	50731 (68.4)	3357 (92.8)	<0.001
	Yes	23384 (31.6)	261 (7.2)	